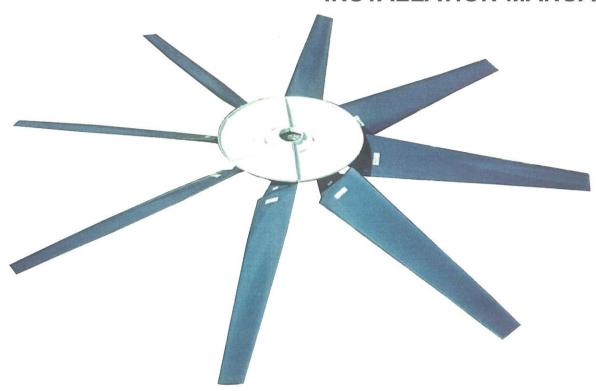


4000 Series Hub

INSTALLATION MANUAL



Adjustable Pitch Fan Assembly 15' through 20' Diameter

Hudson Tuf-Lite® and Tuf-Lite II® fan blades

Hudson Tuf-Lite® (black) fan blades are made from fiberglass reinforced epoxy resin having a very high strength-to-weight ratio and corrosion resistance (not shown).

Hudson Tuf-Lite II[®] (blue) fan blades are made from fiberglass reinforced vinyl-ester resin having a very high strength-to-weight ratio and superior ultra-violet and corrosion resistance. An elastomeric blade/holder joint cover (not shown) prevents moisture from entering the blade (shown above).

The individually balanced blades can be replaced independently – matched sets are not required.

RECOMMENDED TOOLS

- Long T-Handle Allen Wrench Set (3/16" to 3/8")
- Medium Size Flat Head Screw Driver
- Brass Ball Peen Hammer
- Flat Bastard File
- 240 Grit Sand Paper
- Anti-Seize Lubricant
- WD-40
- 12" Crescent Wrench

- Shop Towels
- Exact-A-Pitch® Digital Protractor (P/N 62375)
- 25 ft. Measuring Tape
- Pencil or Marker
- Open/Box End Wrench Set (1/2" 1-1/2")
- Socket Set for 1/2" Drive (1/2" 1-1/2")
- Torque Wrench(s) Rated for 0-200 ft-lb.

INSTALLATION PROCEDURES

ASSEMBLY WITH BUSHING

Clean all mating surfaces between hub, bushing and shaft. All grease and lubricant should be removed, leaving the mating surfaces dry.

If there is no shoulder on shaft to prevent bushing from sliding down shaft, slide spacer/sleeve (not provided) on shaft before bushing or use a thrust retainer (optional equipment) on top of hub. Slide bushing and key onto shaft until flush with end of shaft. The shaft size determines the bushing type (Q2, R2, or S2). Lock bushing on shaft by tightening the set screw in flange with an Allen Wrench. (Note: Q2 bushings have no set screws.) Line up key and set hub on bushing. Engage the three (3) cap screws in flange of bushing into hub spool, using a torque wrench with a socket, and tighten evenly. Use the following table to determine the proper tools and torque values.

Bushing Size	Allen Wrench Size	Cap Screw Size	Socket Size	Torque (ft-lb)
Q2	-	3/8"	9/16"	29
R2	3/16"	3/8"	9/16"	29
S2	3/16"	1/2"	3/4"	70

ASSEMBLY WITH STRAIGHT SHAFT (NO BUSHING)

Clean all mating surfaces between the hub and the shaft. If there is no shoulder on shaft to prevent hub from sliding down shaft, slide spacer/sleeve (not provided) on shaft before hub or use a thrust retainer (optional equipment) on top of hub. Install key in shaft. Line up key and keyway and set hub on shaft. Tighten set screw(s) in hub.

ASSEMBLY WITH TAPERED SHAFT (NO BUSHING REQUIRED)

Clean all mating surfaces between the hub and shaft. Coat all mating surfaces with an anti-seize or lubricating compound.

Align keyways and install hub. Install retainer plate and cap screw(s) with lock washer(s). Shaft size determines what size cap screw is necessary. Using a torque wrench with a socket, evenly tighten cap screw to recommended standard per table below.

Cap Screw	Socket	Torque Value (ft-lb)			
Size	Size	Lubricated	Dry		
5/8" NC	15/16"	70	90		
3/4" NC	1-1/8"	125	130		
1" NC	1-1/2"	150	160		

NOTE: Retaining arrangement varies with gear shaft design.

BLADE INSTALLATION

Remove blade clamp bolts, nuts, lock washers, and blade clamp halves from hub. Assemble blade clamp halves over groove in blade neck, and install into hub (See Figure 1). The thick leading edge will be to your left and thin trailing edge will be to your right as you stand at end of blade.

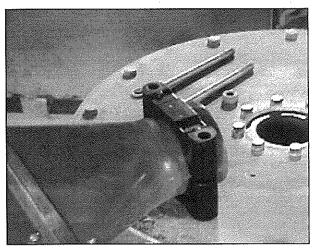


Figure 1

Install clamp bolts through hub plates and blade clamp, putting bolt heads on top, lock washers and nuts on bottom. Tighten lightly (See Figure 2).

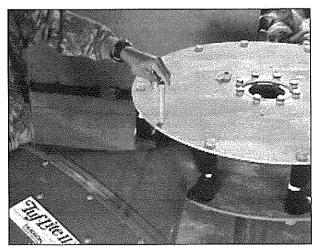


Figure 2

SET PITCH AND TRACK

Use Hudson's EXACT-A-PITCH* digital protractor (See Figure 3) or a bubble protractor to set blade pitch. Mount protractor on a flat bar as a base and place it approximately 1" from tip of blade. Note pitch on protractor. Rotate fan 360½, noting high and low pitch readings. Locate place where pitch reading is at mid-point between high and low readings, and set pitch at that point.

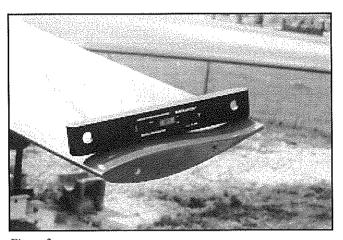


Figure 3

Rotate blade in clamp until digital protractor shows specified pitch angle to within $\pm 0.2 \frac{1}{2}$. Fan pitch angle is shown on fan specification sheet for design duty. After desired pitch angle is set, raise and lower end of fan blade and find midpoint of blade travel. Hold blade at the midpoint. Pull blade outward so that the blade neck flange rests against the back of the blade clamps. Push blade to the right to remove all slack.

Use torque wrench to tighten clamp bolts to 100 ft-lb (lubricated) or 125 ft-lb (dry). Recheck pitch setting. Blade must be set within $\pm 0.2 \frac{1}{2}$ of desired pitch angle. Tighten clamp bolts evenly. **DO NOT OVER-TORQUE CLAMP BOLTS.**

When bolts are tightened, hold a pencil against top end of blade and mark the level onto a fixed object, such as a pole or the fan ring.

Install remaining blades at same place as first blade, following the instructions above. After tightening bolts, mark top end of each blade in same place first blade was marked. If marks differ by more than 3/4", adjust blade.

CHECK TRACK

After fan is installed in fan stack cylinder ring, outline top side of each blade onto fan stack cylinder ring with a marker (See Figure 4). The difference between levels of highest and lowest outlines should not be more than 3/4". Correct blade track by loosening clamp bolts and adjusting blade to match track of other blades. Retighten bolts and recheck track and pitch angle setting. Retighten blade clamp bolts to recommended standard of 100 ft-lb (lubricated) or 125 ft-lb (dry) torque.

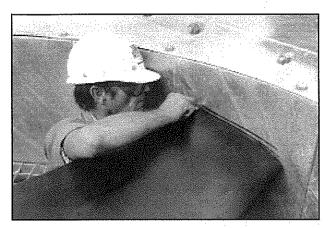


Figure 4

SEAL DISC ASSEMBLY AND INSTALLATION

Install self adhesive rubber gaskets on both flanges of one seal disc half. Bolt two halves of seal disc together, using 3/8" NC bolts, flat washer, lock washer, and nut. Torque to 15 ft-lb (lubricated) and 20 ft-lb (dry).

Install 3/8" NC bolts at six (6) places on top hub plate (See Figure 6). Threaded portion of bolts must be pointing up to mount seal disc. Install lock washer, nut, and flat washer on each bolt. Tighten 3/8" NC nuts to 15 ft-lb (lubricated) and 20 ft-lb (dry).

Locate the six (6) mounting holes in seal disc and install over the six (6) bolts pointing up on upper hub plate. If difficulty is encountered, loosen bolts on seal flanges until seal disc can be mounted, then retighten to 15 ft-lb (lubricated) or 20 ft-lb (dry).

NOTE: The purpose of the seal disc is to prevent hot air from recirculating back down through the hub, increasing efficiency.

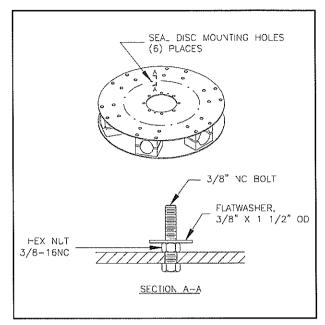


Figure 5

After mounting, install flat washer, lock washer, and 3/8" NC nuts. Tighten to 15 ft-lb (lubricated) or 20 ft-lb (dry). (See Figure 6)

Note: Refer to instructions included with seal disc for further details.

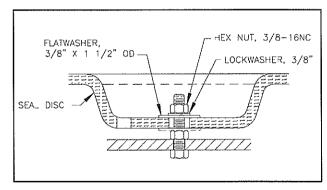


Figure 6

CHECKING TIP CLEARANCE

Rotate fan in position inside fan stack to check tip clearance (See Figure 7). The recommended tip clearance is between 1" and 1 1/2". Check for spots where fan blade clearance is not within the recommended tolerance.

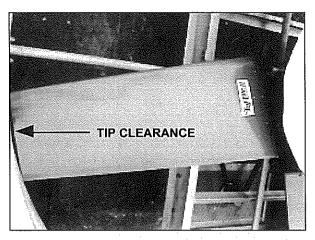


Figure 7

If necessary adjust fan ring or fan stack by shimming to obtain proper clearance. For heat exchangers, spacers may be added at the fan ring joints to increase clearance (See Figure 8). Use a chisel to maintain the correct gap until the bolts on the ring are retightened.

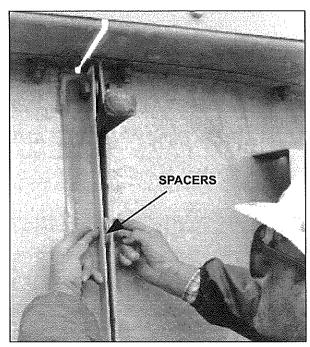


Figure 8

If a small adjustment is needed, tighten or loosen nut on fan strut in section requiring adjustment (See Figure 9).



Figure 9

OPERATING INSTRUCTIONS

Start fan and check rotation. Viewed from top (discharge), fan blades should rotate clockwise.

Check motor power consumption to be sure fan is pulling desired load. CAUTION: If positive pitch is set in summer to use all available motor amps (nameplate rating), motor could be overloaded in winter. Design pitch angles usually do not use all of the available motor horsepower. This ensures that the motors will not be overloaded at low winter temperatures.

HUDSON PRODUCTS CORPORATION Adjustable Pitch Fan Assembly 15' Thru 20' Diameter Series 4000 HUB

			PARTS LIST					1		
		NO. OF BLADES								
ITEM	DESCRIPTION	TYPE	PART NO.	4	5	6	7	8	9	10
	1" Diameter Thru 3.62" Diameter Shaft	R-2	Hub Assy. No. Part No.	4204 H4200	4205 H4210	4206 H4220	4207 H4230	4208 H4240	4209 H4250	4210 H4260
	3.68" Diameter Thru 4.19" Diameter Shaft	S-2	Hub Assy. No. Part No.	4304 H4300	4305 H4310	4306 H4320	4307 H4330	4308 H4340	4309 H4350	4310 H4360
1	Hub Plate (2 Per Hub)	R-2	Part No.	61501	61510	61503	61504	61501	61505	61510
		S-2								
ITEM	DESCRIPTION	TYPE	PART NO			QUANIT	Y PER AS	SEMBLY		
2	Hub Spool	R-2	65050	1	1	1	1	1	1	1
		S-2	65055	1	1	1	1 .	1	1	1
3	Bushing	R-2	Specify	1	1	1	1	1	1	1
		S-2	Bore	1	1	1	1	1	1	1
4	Blade Clamp Half (Epoxy Coated Aluminum) Optional (Ductile Iron)		C4742A 65010	8	10	12	14	16	18	20
15	Blade Clamp Bolt With Nut 3/4"-10 x 9 1/2" (Mech. Galv.)		70600	8	10	12	14	16	18	20
6	3/4" Lock washer (Mech. Galv.)		73738	8	10	12	14	16	18	20
7	Hub Spool Bolt 5/8"-11 x 1 1/2" (316 SS)		72402	16	16	16	16	16	16	16
8	5/8"-Lock washer (316 SS)		73731	16	16	16	16	16	16	16
9	Seal Disc Bolt 3/8"-16 X 1 1/2" (316 SS)		60274	6	6	6	6	6	6	6
10	3/8" Flat Washer (316 SS)		73623	6	6	6	6	6	6	6
11	3/8" Lock washer (316 SS) 🛰		73722	6	6	6	6	6	6	6
12	3/8" Hex Nut (316 SS)		72050	6	6	6	6	6	6	6
13	64" Dia. Seal Disc Kit *		81115	1	1	1	1	1	1	1
14	Tuf-Lite II® Blade (Blue)		(Varies)	4	5	6	7	8	9	10
	Tuf-Lite® Blade (Black)		(Varies)	4	5	6	7	8	9	10

^{*} Includes all 316 SS hardware (items 9 thru 12) to assemble and mount.

STANDARD MATERIALS & FINISHES

Blades: Fiberglass reinforced vinyl ester or epoxy Blade Clamps

Hub Spool: Ductile Iron, Zinc Rich Coating

Plates: Steel, Galvanized Bushing: Malleable Iron

Seal Disc: Fiberglass Reinforced Polyester

Blade Clamps: Epoxy Coated Aluminum (Std)

Ductile Iron (Optional)

Fasteners: Steel, Mech. Galvanized & 316 SS Opt.

Complete Fan W/316 SS (Optional) Complete Fan W/K500 Monel (Optional)

WHEN ORDERING, SPECIFY FAN DIAMETER, TYPE & NUMBER OF BLADES & SHAFT DIAMETER

EXAMPLE:

Fan Model
Adjustable Pitch

Fan Diameter & Blade Type
(Specify "H" for Tuf-Lite II® Blades)
(Specify "B" for Tuf-Lite® Blades)

- 6 Number of Blades

2 7/8" BORE
Shaft Diameter

