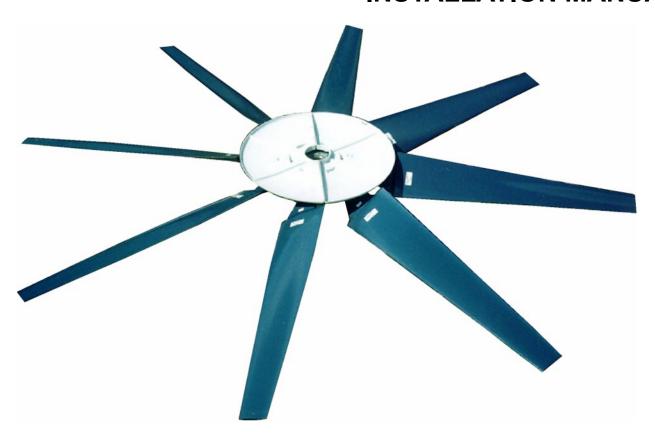


Tuf-Lite[®] and Tuf-Lite II[®] Fans 6000M Series Hub

INSTALLATION MANUAL



Adjustable Pitch Fan Assembly 32.8' or 10 Meter 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[®] (white, prev. 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.

Installation Manual 6000M Page 1 of 8 May 2012

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 (U1). Lock bushing on shaft by tightening the set screw in flange with an Allen Wrench. 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) Dry				
U1	3/16"	5/8"	15/16"	140				

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.

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.

		Torque Value							
Cap Screw	Socket	(ft-lb)							
Size	Size	Lubricated	Dry						
5/8" NC	15/16"	100	110						
3/4" NC	1-1/8"	125	130						
1" NC	1-1/2"	150	160						

NOTE: Retaining arrangement varies with gear shaft design.

THRUST RETAINER (optional equipment)

Install proper load bolt (not provided) into top of fan shaft and tighten (See Figure 1). Install thrust retainer channel on top hub plate using existing hub spool cap screws. Torque cap screws to 60-65 ft-lb. Install thrust retainer eyebolt and jam nut. Hand tighten eyebolt. Tighten jam nut securely against top of thrust retainer channel.

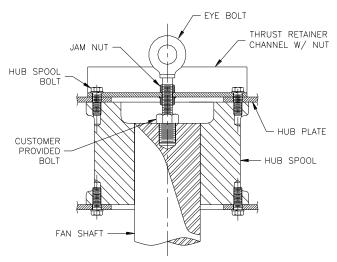


Figure 1

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 2). 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 2

Install clamp bolts through hub plates and blade clamp, putting bolt heads on top, lock washers and nuts on bottom. Tighten lightly (See Figure 3).



Figure 3

SET PITCH AND TRACK

Use Hudson EXACT-A-PITCH® digital protractor (See Figure 4) 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 360°, 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 4

Rotate blade in clamp until digital protractor shows specified pitch angle to within +/-0.2°. 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). Re-check pitch setting. Blade must be set within +/-0.2° 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 1" or more, 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 5). The difference between levels of highest and lowest outlines should not be more than 1". Correct blade track by loosening clamp bolts and adjusting blade to match track of other blades. Re-tighten bolts and re-check track and pitch angle setting. Re-tighten blade clamp bolts to recommended standard of 100 ft-lb (lubricated) or 125 ft-lb (dry) torque.



Figure 5

SEAL DISC ASSEMBLY & 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 re-tighten 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.

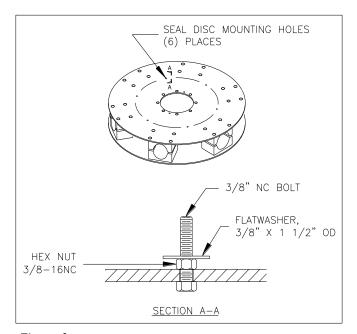


Figure 6

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 7)

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

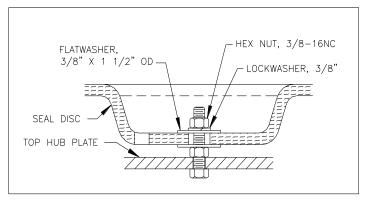


Figure 7

CHECKING TIP CLEARANCE

Rotate fan in position inside fan stack to check tip clearance (See Figure 8). The recommended tip clearance is between 1" and 1 1/2". Check for spots where fan blade clearance is not within the recommended tolerance. If necessary, adjust fan stack by shimming to obtain proper clearance.

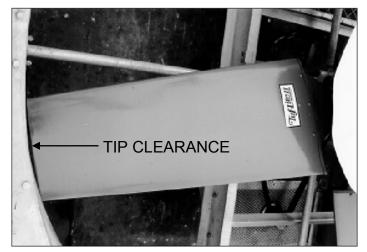


Figure 8

OPERATING INSTRUCTIONS

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

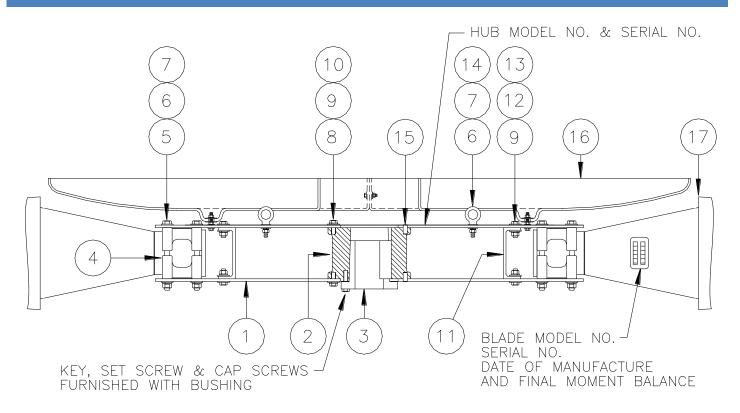
Check motor power consumption to be sure fan is pulling desired load. *CAUTION: If positive pitch is set in summer to use all available motor amps (nameplate rating), motor could be overloaded in winter.* Design pitch angles usually do not use all of the available motor horsepower. This ensures that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

HUDSON PRODUCTS CORPORATION Adjustable Pitch Fan Assembly 32.8' Diameter Series 6000M HUB

Type PART NO. 6 7 6 9 10 11 12 13 14 15 15 15 15 15 15 15			0	OM 30M	30M				0		0	166	3	16	3			16	91				0
DESCRIPTION TYPE PART NO. 6 7 8 9 10 11 12 13 14 15 16 17 18 18 18 18 18 18 18			20	6820M D6160M	D6060M		1	1	40		80	16	83	16	48	3	1	16	16	3	4		20
DESCRIPTION TYPE PART NO. 6 7 8 9 10 11 12 13 14 15 16 17 DESCRIPTION TYPE PART NO. 667/M 667/			19	6819M D6159M	D6059M		1	1	38		92	158	62	16	48	3	1	16	16	3	4	1	19
DESCRIPTION TYPE PART NO. 6 7 8 9 10 11 12 13 14 15 16 Steat, 4.25* To 5.50* Dis. U-1 Hob Asy, No. Secretal Genome			18	6818M D6078M	D6058M		1	1	36		72	150	75	16	48	3	1	16	16	3	4	1	18
DESCRIPTION TYPE PART NO. 6 7 8 9 10 11 12 13 14 15 BECRIPTION TYPE PART NO. GROWN GROWN <t< td=""><td></td><td></td><td>17</td><td>6817M D6077M</td><td>D6057M</td><td></td><td>1</td><td>1</td><td>34</td><td></td><td>89</td><td>142</td><td>71</td><td>16</td><td>48</td><td>16</td><td>1</td><td>16</td><td>16</td><td>3</td><td>4</td><td>1</td><td>17</td></t<>			17	6817M D6077M	D6057M		1	1	34		89	142	71	16	48	16	1	16	16	3	4	1	17
DESCRIPTION TYPE PART NO. 6 7 8 9 10 11 12 13 14 32.8 F. Diameter Fan U-1 Hub Assy No. 6600M 6607M 6607M<			16	6816M D6076M	D6056M		~	1	32		49	134	29	16	48	16	1	16	16	3	4	1	16
DESCRIPTION TYPE PART NO. 6 7 8 9 10 11 11 11 11 12 13 14 14 14 14 14 14 14			15	6815M D6075M	D6055M		1	1	30		09	126	63	16	48	16	1	16	16	3	4	1	15
DESCRIPTION TYPE PART NO. 6 7 8 9 10 11 11 11 11 12 13 14 14 14 14 14 14 14		ES	14	6814M D6074M	D6054M	SEMBLY	1	1	28		99	118	69	16	48	16	1	16	16	3	4	1	14
DESCRIPTION TYPE PART NO. 6 7 8 9 10 11 11 11 11 12 13 14 14 14 14 14 14 14		. OF BLAD	13	6813M D6073M	D6053M	ry Per AS	1	1	56		52	110	22	16	48	16	1	16	16	3	4	1	13
DESCRIPTION TYPE PART NO. 66 GA 7 8 9 10 22 8F 4, Diameter Fan 22 8F 4, E2 to 5, 50° Dia. U-1 Hub Assy. No. 6806M 6807M 6806M 6810M 22 Fer Hub) 175° Dia. Hub Plate U-1 Part No. D6064M D6048M D6048M D6070M DESCRIPTION U-1 Part No. D6064M D6048M D6048M D6070M Hub Spool U-1 Specify Bore 1 1 1 1 1 Hub Spool U-1 Specify Bore 1 1 1 1 1 Bushing U-1 Specify Bore 1 1 1 1 1 1 Bushing U-1 Specify Bore 1 <		ON	12	6812M D6072M	D6052M	QUANTII	1	1	24		48	102	51	16	48	16	1	16	16	3	4	1	12
DESCRIPTION TYPE PART NO. 6 7 8 9 3.2.8 Ft. Diameter Fan U-1 Hub Assy. No. 6806M 6607M 6606M 6606M Shaft. 4.25" to 5.60" bia. U-1 Part No. D6046M D6048M 6606M Q. Per Hub. U-1 Part No. D6046M D6047M D6048M D6048M Bushing U-1 Specify Bore 1 1 1 1 Bushing U-1 Specify Bore 1 1 1 1 Bushing U-1 Specify Bore 1 1 1 1 Dougle Iron** U-1 Specify Bore 1 1 1 1 Dougle Iron** Dougle Iron** 1 1 1 1 1 Dougle Iron** Fowder Epoxy Coated 65013 24 28 32 36 Blade Clamp Bolt Will Wild 34** Toxylocated 65013 27 31 35 39 At* Flat washer (31			11	6811M D6071M	D6051M		1	1	22		4	94	47	16	48	16	1	16	16	3	4	1	11
DESCRIPTION TYPE PART NO. 6 7 8 32.8 Ft. Diameter Fan Shaft. 4.25" to 5.0" Dia. Hub Plate U-1 Hub Assy. No. 6806M D6068M 6807M 6808M 81.75" Dia. Hub Plate U-1 Hub Assy. No. D6046M D6047M D6048M (2 Per Hub) U-1 Part No. D6046M D6047M D6048M Bushing U-1 Specify Bore 1 1 1 Blade Clamp Half, Powder Epoxy Coated Option 7. Coated Die Cast Alum (Standard) D6132 24 28 32 Ductile Iron** Blade Clamp Bolt W/ Nut 3/4**-10 73720 54 62 70 3/4* Flat washer (Mech. Galv.) 73731 16 16 16 5/8* Tlat washer (Mech. Galv.) 73730 16 16 16			10	6810M D6070M	D6050M		1	1	20		40	98	43	16	48	16	1	16	16	3	4	1	10
DESCRIPTION TYPE PART NO. 6806M 6807M 32.8 Ft. Diameter Fan Shaft: 4.2e* to 5.50° Dia. U-1 Hub Assy. No. 6806M 6807M 81.75° Dia. Hub Plate U-1 Part No. D6066M D6067M 2 Per Hub. U-1 Part No. D6066M D6067M Bushing U-1 Specify Bore 1 1 Ducitle Iron** U-1 Specify Bore 2 2 Blade Clamp Bolt W/ Nut 34**-10 73738 27 3 Aut 1/2* (Mech. Galv.) 73730 16 <td></td> <td></td> <td>6</td> <td>6809M D6069M</td> <td>D6049M</td> <td>_</td> <td>1</td> <td>1</td> <td>18</td> <td></td> <td>36</td> <td>78</td> <td>39</td> <td>16</td> <td>48</td> <td>16</td> <td>1</td> <td>16</td> <td>16</td> <td>3</td> <td>4</td> <td>1</td> <td>6</td>			6	6809M D6069M	D6049M		_	1	1	18		36	78	39	16	48	16	1	16	16	3	4	1
DESCRIPTION TYPE PART NO. 6 32.8 Ft. Diameter Fan U-1 Hub Assy. No 6806M 81.75" Dia. Hub Plate U-1 Part No. D6046M (2 Per Hub) DESCRIPTION PART NO. D6046M Hub Spool U-1 65058 1 Bushing U-1 65068 1 Bushing U-1 Specify Bore 1 Bushing Coated Die Cast Alum (Standard) D65013 24 Ductile Iron** 65013 24 Blade Clamp Half, Powder Epoxy Coated Ductile Iron** 65013C 24 Ductile Iron** 10 79299 24 Ald Coated Ductile Iron** 11 73738 27 Blade Clamp Bolt W/ Nut 3/4**-10 79299 24 Ald (Mech. Galv.) 73738 27 Hub Spool Cap Screw 5/8**-11 72402 16 5/8* Flat washer (Mech. Galv.) 73731 16 5/8* In washer (Mech. Galv.) 73730 16 5/8* Lock washer (Mech. Galv.) 73730			8	6808M D6068M	D6048M		1	1	16		32	20	35	16	48	16	1	16	16	3	4	1	8
DESCRIPTION TYPE PART NO. 32.8 Ft. Diameter Fan Shaff: 4.25" to 5.50" Dia. U-1 Hub Assy. No. 81.75" Dia. Hub Plate U-1 Part No. (2 Per Hub) DESCRIPTION PART NO. Hub Spool U-1 65058 Bushing U-1 65068 Bushing U-1 Specify Bore Bushing U-1 Specify Bore Bushing U-1 5pecify Bore Bushing U-1 Specify Bore Bushing U-1 5pecify Bore Bushing U-1 5pecify Bore Bushing U-1 5pecify Bore Ductile Iron** D5131 73720 Ductile Iron** 73738 Ductile Iron** 73738 At 1/2" (Mech. Galv.) 73739 3/4" Flat washer (Mech. Galv.) 73731 5/8" Lock washer (Mech. Galv.) 73730 5/8" Lock washer (Mech. Galv.) 73730 5/8" Lock washer (Mech. Galv.) 73730 Eye Bolt W/ Nut 3/4"-10 x 2" 59547<			2	MZ909Q MZ909Q	D6047M		1	1	14		28	62	31	16	48	16	1	16	16	3	4	1	2
DESCRIPTION TYPE 32.8 Ft. Diameter Fan Shaft. 4.25° to 5.50° Dia. 81.75° Dia. Hub Plate U-1 2 Per Hub U-1 Bushing U-1 Sate Clamp Bolt W/ Nut 3/4"-10 X 10" (Mech. Galv.) Hub Spool Cap Screw 5/8"-11 X 1 1/2" (316 SS) 5/8" Lock washer (316 SS) Stiffener Ring Bolt W/ Nut 3/4"-10 x 2" Wech. Galv. Eye Bolt W/ Nut 3/4"-10 x 2" (Mech. Galv.) Pin, Grooved, 1/2" X 1-1/2" Tuf-Lite If® Blade (White)*** Tuf-Lite Blade (White)***			9	6806M D6066M	D6046M		1	1	12		24	54	27	16	48	16	1	16	16	3	4	1	9
DESCRIPTION 32.8 Ft. Diameter Fan Shaft: 4.25" to 5.50" Dia. 81.75" Dia. Hub Plate (2 Per Hub) DESCRIPTION Hub Spool Bushing Blade Clamp Haff, Powder Ep Coated Die Cast Alum (Stand Option 2: Coal Tar Epoxy Coal Ductile Iron** Option 2: Coal Tar Epoxy Coal Ductile Iron** In (Mech. Galv.) 34" Flat washer (Mech. Galv.) 34" Flat washer (316 SS) 5/8" Lock washer (16 SS) 5/8" Lock washer (316 SS) 5/8" Lock washer (Mech. Galv.) Fly" (Mech. Galv.)			PART NO.	Hub Assy. No Part No.	Part No.	PART NO.	65058	Specify Bore	D5131	65013C	79299	73720	73738	72402	73719	73731	D6004	15347	73730	59547	74540	D6022	(Varies) (Varies)
			TYPE	N-1	U-1		N-1	N-1	poxy dard) sted	pated	1"-10		lv.)	11				3"-11 x	١٧.)			بر	
11			DESCRIPTION	32.8 Ft. Diameter Fan Shaft: 4.25" to 5.50" Dia.	81.75" Dia. Hub Plate (2 Per Hub)	DESCRIPTION	Hub Spool	Bushing	Blade Clamp Half, Powder E Coated Die Cast Alum (Stan Option 1: Powder Epoxy Cos	Option 2: Coal Tar Epoxy Cc Ductile Iron**	Blade Clamp Bolt W/ Nut 3/4 x 10" (Mech. Galv.)	3/4" Flat washer (316 SS)	3/4" Lock washer (Mech. Gal	Hub Spool Cap Screw 5/8"-1 x 1 1/2" (316 SS)	5/8" Flat washer (316 SS)	5/8" Lock washer (316 SS)	Stiffener Ring	Stiffener Ring Bolt w/ Nut 5/8 1 3/4" (Mech. Galv.)	5/8" Lock washer (Mech. Gal	Eye Bolt W/ Nut $3/4$ "- 10×2 " (Mech. Galv.)	Pin, Grooved, 1/2" X 1-1/2"	112" Diameter Seal Disc Kit*	Tuf-Lite II [®] Blade (White)*** Tuf-Lite [®] Blade (Black)
			ITEM		1	ITEM	2	3	4		2	9	7		6	10	11	12	13	14	15	16	

* Includes all hardware (316 SS) to assembly and mount.
** Recommended on concrete and round towers, or corrosive environments. Contact Hudson for pricing.
*** Blade color was blue prior to March 2006

HUDSON PRODUCTS CORPORATION Adjustable Pitch Fan Assembly 32.8' Diameter Series 6000M HUB



STANDARD MATERIALS & FINISHES

Blades: Fiberglass reinforced vinyl ester or epoxy **Hub Spool:** Ductile Iron, Zinc Rich Coating

Plates: Coal Tar Epoxy coated steel

Bushing: Malleable Iron

Seal Disc: Fiberglass Reinforced Polyester

Blade Clamps:

Powder Epoxy Coated Die Cast Alum (Standard) Powder Epoxy Coated Ductile Iron (Option 1) Coal Tar Epoxy Coated Ductile Iron (Option 2)

Fasteners:

Steel, Mech. Galvanized & 316 SS Opt. Complete Fan with 316 SS (Option 1) Complete Fan with K500 Monel (Option 2)

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

EXAMPLE:

APT

Fan Model
Adjustable Pitch

Fan Diameter & Blade Type
(Specify "H" for Tuf-Lite II® Blades)
(Uses 30H Blades)
(Specify "B" for Tuf-Lite® Blades)
(Uses 30B Blades)
(Uses 30B Blades)



9660 Grunwald Rd. Beasley, Texas 77417-8600

Phone: 281-396-8100 Fax: 281-396-8388

1-800-634-9160 (24 Hours)

EMAIL: hudsonproducts@hudsonproducts.com

http://www.hudsonproducts.com

Hudson, Auto-Variable, Combin-Aire, Exact-A-Pitch, Fin-Fan, Heatflo, Hy-Fin, Split-Flo, Solo Aire, Stac-Flo, Steamflo, Thermflo, Tuf-Edge, Tuf-Lite, Tuf-Lite III, and Tuf-Lite III are registered trademarks of Hudson Products Corporation.

©2012 Hudson Products Corp. All Rights Reserved.

Installation Manual 6000M Page 8 of 8 May 2012