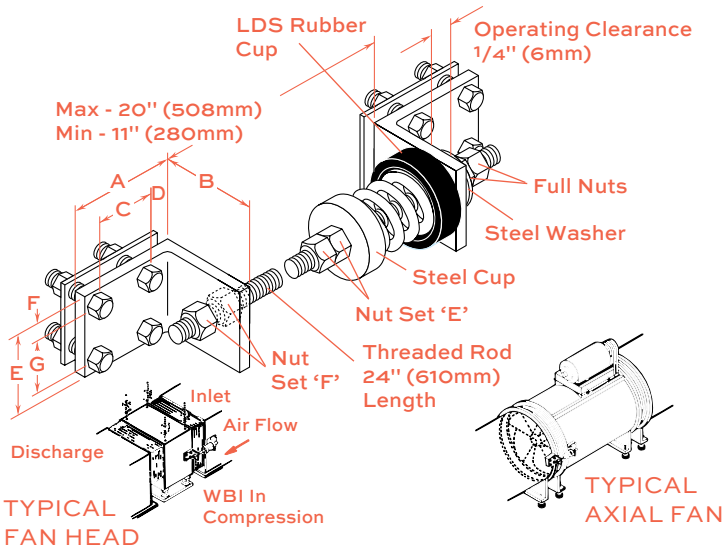


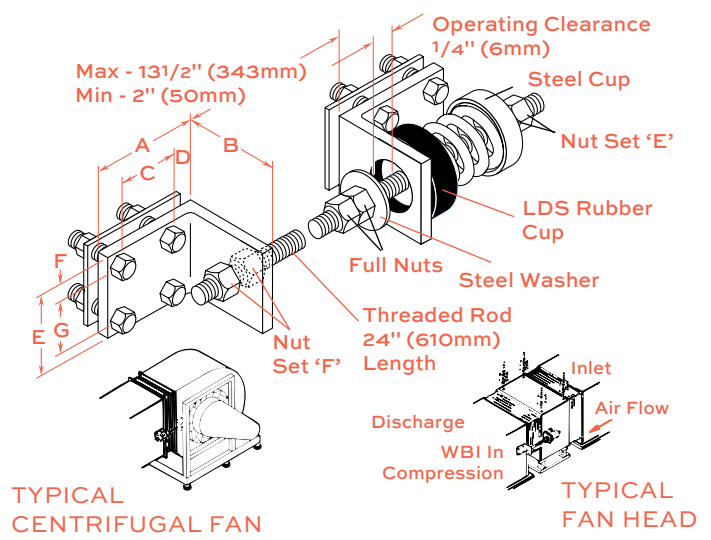
THRUST RESTRAINTS

WBI & WBD

WBI Thrust Restraint (Compression)



WBD Thrust Restraint (Tension)



Fan Heads are cabinets containing a fan and motor and no accessories such as coils or filters. They can develop extremely high thrusts that are equal to the suction area multiplied by the negative head, plus the positive pressure multiplied by the discharge area. These forces act horizontally, opposite to the airflow and about halfway up the cabinet. Since fan heads are light and narrow, they tend to shift and overturn, with damage to the flexible connections or to the units themselves.

Thrust restraints are recommended for all fan heads and for axial or centrifugal fans when the air thrust exceeds 10% of the equipment weight.

Type WBI and WBD Thrust Restraints are precompressed assemblies designed to withstand these forces and allow only minor motion. The WBI is considered standard and used in compression across the inlet flexible connection on both sides. The WBD design is used in tension across the discharge when WBI is impractical. We furnish all parts except those noted "by others".

One end of either the WBI or WBD Assembly must be attached to the unit. The other end is normally attached to the ductwork or adjacent section, but when this becomes difficult, it can be attached to a ceiling or floor stanchion fabricated for this purpose.

WBI Units can be converted to WBD by reversing the spring assembly on the angle as illustrated.

TYPE WBI & WBD DIMENSIONS

Type	Size	A (in)	A (mm)	B (in)	B (mm)	C (in)	C (mm)	D (in)	D (mm)	E (in)	E (mm)	F (in)	F (mm)	G (in)	G (mm)	Threaded Rod (in)	Threaded Rod (mm)
WBI-	A-310	31/2	89	3	76	13/4	45	11/4	32	3	76	1/2	13	2	51	1/2 - 13NC	1/2 - 13NC
	B-750	4	102	31/2	89	21/4	57	11/4	32	3	76	1/2	13	2	51	5/8 - 11NC	5/8 - 11NC
	B-1000	4	102	31/2	89	21/4	57	11/4	32	3	76	1/2	13	2	51	5/8 - 11NC	5/8 - 11NC
WBD-	B2-290	4	102	31/2	89	21/4	57	11/4	32	3	76	1/2	13	2	51	5/8 - 11NC	5/8 - 11NC
	B2-450	4	102	31/2	89	21/4	57	11/4	32	3	76	1/2	13	2	51	5/8 - 11NC	5/8 - 11NC
	B2-680	4	102	31/2	89	21/4	57	11/4	32	3	76	1/2	13	2	51	5/8 - 11NC	5/8 - 11NC
	129	6	152	6	152	37/8	98	11/2	38	5	127	5/8	16	33/4	95	5/8 - 11NC	5/8 - 11NC
	153	8	203	7	178	5	127	21/4	57	61/2	165	1	25	41/2	114	5/8 - 11NC	5/8 - 11NC

TYPE WBI & WBD DIMENSIONS

Type	Size	Max Restraint (lb/Pair)	Max Restraint (kg/Pair)	Max Fan Head Inlet* (ft sq)	Max Fan Head Inlet* (m ²)	Max Axial Fan Discharge Area** (ft sq)	Max Axial Fan Discharge Area** (m ²)
WBI-	A-310	620	280	26.00	2.4	20.00	1.8
	B-750	1500	680	64.00	6.0	47.00	4.4
	B-1000	2000	910	86.00	8.0	64.00	6.0
WBD-	B2-290	580	265	25.00	2.3	19.00	1.7
	B2-450	900	410	38.00	3.5	29.00	2.7
	B2-680	1360	620	58.00	5.3	44.00	4.1
	129	1040	470	45.00	4.2	33.00	3.1
	153	1060	480	45.00	4.2	34.00	3.2

TYPE WBI & WBD RATINGS

Type	Size	Rated Capacity (lb)	Rated Capacity (kg)	Rated Defl. (in)	Rated Defl. (mm)	Spring Constant (lb/in)	Spring Constant (kg/cm)	Spring Color/Stripe
WBI-	A-310	310	140	1.00	25	310	5.6	Yellow
	B-750	750	340	1.12	28	670	12.1	White
	B-1000	1000	455	1.00	25	1000	18.2	Blue
WBD-	B2-290	290	130	2.00	51	144	2.6	Blue
	B2-450	450	205	2.00	51	224	4.1	Tan
	B2-680	680	310	2.00	51	340	6.2	Gray
	129	520	235	3.25	83	162	2.8	Green
	153	530	240	4.38	110	120	2.2	Green

*Based on 6" (152mm) pressure differential across unit with 4.5" (115mm) negative pressure
 **Based on 6" (152mm) pressure differential

EXAMPLES OF CALCULATIONS USED TO DETERMINE NEED FOR THRUST RESTRAINTS

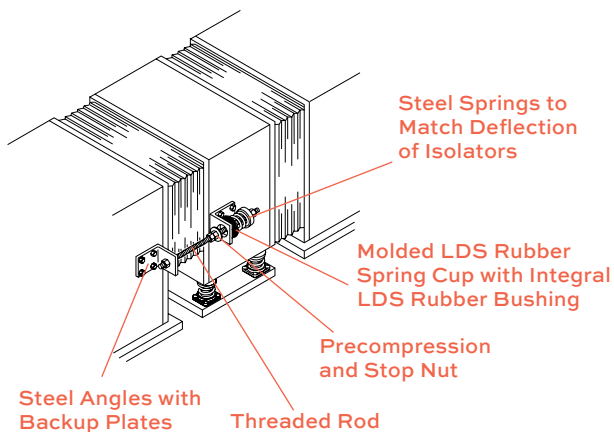
Equipment Type	Size Area (in) (m)	Inlet Area (ft²) (m²)		Outlet Area (ft²) (m²)		Weight (lb) (kg)		Presser Differential of Water (in) (N/m²)		Assumption	Force (lb) or (N) Equals Water Pressure x 5.2 ¹ (lb/ft²) x 6.8 ¹ (N/m²) Area (ft²) (m²)			Thrust Restraints are required when Thrust Force Exceeds 10% of Equipment Weight (Force/Weight) (lb) (kg)		Restrains (Num) (Size)	
Fan Head	Typical	73	6.8	20	1.85	2600	1179	4	996	40% Inlet 60% Outlet	(.4x4) x 5.2 x 73 = 607 (.6x4) x 5.2 x 20 = 249 Total Force 856 996 x 6.8 x 0.4 = 2709 N 996 x 1.85 x 0.6 = 1106 N Total Force = 3815 N	856 = 33% 2600 389 = 33% 1179 000000	2	B-750			
Axial Blower	60	1.5	19.6	1.82	19.6	1.82	1553	704	3	747	All Discharge	3 x 5.2 x 19.6 = 306 747 x 1.82 = 1360 N (138 kg)	306 = 20% 1553 138 = 20% 704 000000	2	A-310		
Double Inlet Class 1 Fan	49	1.25	Not Considered	24.8	2.3	4000	1814 with Motor & Steel Base	3	747	All Discharge	3 x 5.2 x 24.8 = 387 747 x 2.3 = 1718 N (175 kg)	387 = 9.7% 4000 175 = 9.7% 1814 000000	None Required				

¹1" (25mm) Water Pressure = 5.2 lb/ft² (249 N/m²)

HORIZONTAL THRUST RESTRAINTS

It is not unusual to encounter problems where the horizontal combined air thrust exceeds 10% of the equipment weight. If the spring columns alone resist a 10% force, they will lean over about 12% of the rated deflection. This is the recommended maximum.

When the thrust is higher, the best solution is adding mass to bring the ratio back down to 10%. If adding mass is impractical, horizontal restraints are another possibility. This is particularly true of fan heads, but high pressure axial and centrifugal fans may present the same problem. The equipment may be hung or floor mounted. Our horizontal restraint is a modified spring hanger with a precompression adjustment to limit movement when the system starts and stops, and the air pressure builds up or dies off, as explained in the specification.



SPECIFICATION

When total air thrust exceeds 10% of the isolated weight, floor mounted or suspended air handling equipment shall be protected against excessive displacement by the use of horizontal thrust restraints. The restraint shall consist of a modified Specification B spring mounting. Restraint springs shall have the same deflection as the isolator springs. The assembly shall be preset at the factory and fine-tuned in the

INSTALLATION INSTRUCTIONS

1. Check with air handling unit manufacturer to establish the structural integrity of the unit and to determine their recommendation as to the bolting position.
2. Install unit on mounting or suspend from hangers.
3. Bolt thrust assembly angle brackets with backup plates to fan cabinet on the centerline of the inlet (approximately halfway up the unit). Bolt second angle bracket with backup plates to the plenum or coil section as shown. If overall length is more than needed, loosen nut set "F", slide angle on threaded rod and retighten.
4. Turn unit on.
 - a. If the operating clearance between angle and washer exceeds 1/4" (6mm), turn nut "E" clockwise (to load spring) two turns at a time on assembly until clearance is reduced 1/4" (6mm).
 - b. If the operating clearance between angle and washer is less than 1/4" (6mm), turn nut "E" counterclockwise (to unload spring) two turns at a time on each assembly, until clearance is 1/4" (6mm).
5. When unit is shut down, the 1/4" (6mm) operating clearance will disappear and reappear when operation is renewed.

field to allow for a maximum of 1/4" (6mm) movement from stop to maximum thrust. The assemblies shall be furnished with rod and angle brackets for attachment to both the equipment and duct work or the equipment and the structure. Restraints shall be attached at the center line of thrust and symmetrically on both sides of the unit. Horizontal thrust restraints shall be Type **WB** as manufactured by Mason Industries, Inc.

