GREENHECK

DAMPERS AND LOUVERS

Combination FIRE SMOKE DAMPERS

Model FSD-33

Steel Airfoil Blades
UL 555S Leakage Class I
UL 555 1½ Hour Fire Resistance Rating*

Application and Design

Model FSD-33 is a high performance combination fire smoke damper with extremely low leakage. High strength airfoil blades insure the lowest resistance to airflow in HVAC systems with velocities to 4000 fpm and pressures to 8 in. w.g. Model FSD-33 may be installed vertically (with blades running horizontal) or horizontally and is rated for airflow and leakage in either direction.

Ratings

Fire Resistance: 1½ hours in walls and floors to UL Standard 555

Leakage: UL 555S leakage class I (to 8 in. w.g.) Leakage rated in both directions

Pressure: 8 in. w.g. - differential pressure

Velocity: Dynamic and operational rated to 4000 fpm. Rating is for airflow in either direction through damper.

Temperature: 350°F with all actuators. Fire tested to 1800°F.

Standard Construction

Frame: 5 in. x 1 in. galvanized steel hat channel with reinforced corners. A low profile head and sill are used on sizes less than 17 in. high to maximize free area and performance.

Blades: Double skin airfoil shape of galvanized steel with full length structural reinforcement. 14 ga. equivalent thickness.

Seals: Extruded silicone rubber blade seals. Flexible stainless steel jamb seals.

Linkage: Concealed in jamb.

Fusible Link: UL listed 165°F.

Axles: ½ in. dia. plated steel.

Bearings: Bronze sleeve type.

Size Limitations

Minimum Size: 8 in. W x 6 in. H

Maximum Size:

Single Section:	32 in. W x 50 in. H
Multiple Section:	96 in. W x 50 in. H
Vertical Only:	128 in. W x 100 in. H

Optional Features

- Galvanized steel sleeves.
- Stainless steel bearings
- OCI (Open closed indication switches)
- 212°F fuse links (other temperatures available, consult Greenheck)
- TOR (remote override of 165°F or 212°F closure allows damper to perform smoke management functions during a fire emergency.)
- Electric or pneumatic actuators to accomplish smoke management and system functions.

Installation and Maintenance

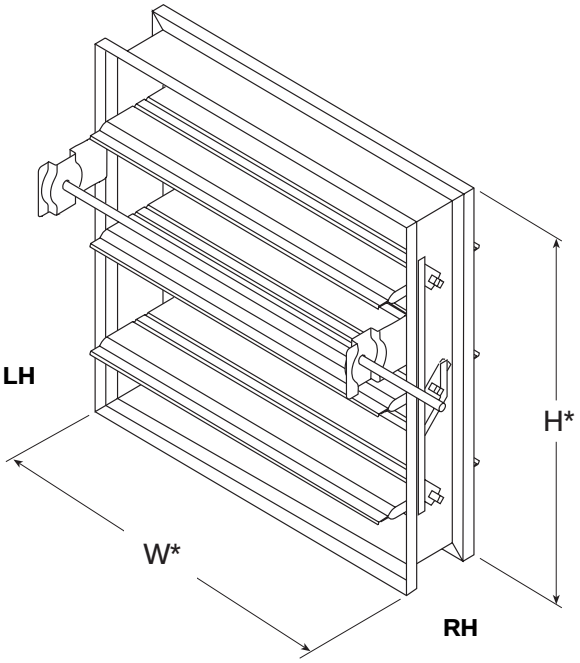
Refer to Greenheck Installation Instructions: Part #453402
Dampers and their electric/pneumatic actuator(s) must be maintained, cycled, and tested at intervals not less than every six months but in accordance with:

- The latest editions of NFPA 90A, 92A, and UL 864 unless local codes require more frequent inspections.
- Actuator manufacturer recommendations.

Model FSD-33 meets the requirements for fire dampers, smoke dampers and combination fire smoke dampers established by:

National Fire Protection Association
NFPA Standards 90A, 92A, 92B & 101
BOCA National Building Codes
ICBO Uniform Building Codes
SBCCI Standard Building Codes
CSFM California State Fire Marshal
Fire Damper Listing (#3225-0981:103)
Leakage (Smoke) Damper Listing (#3230-0981:104)
New York City (MEA listing #260-91-M)

"UL CLASSIFIED (see complete marking on product)"
"UL CLASSIFIED to Canadian safety standards (see complete marking on product)"
Standard 555 (Classification #R13317)
Standard 555S (Classification #R13447)



*W&H dimensions furnished approximately ¼ in. undersize.
(Add sleeve thickness for overall sleeved damper dimension)
Right hand drive is shown. Left hand drive is available upon request.

FSD-33 Pressure Drop Data

This pressure drop testing was conducted in accordance with AMCA Standard 500 using the three configurations shown. All data has been corrected to represent standard air at a density of .075 lb/ft^3.

Actual pressure drop found in any HVAC system is a combination of many factors. This pressure drop information along with an analysis of other system influences should be used to estimate actual pressure losses for a damper installed in a given HVAC system.

AMCA Test Figures

Figure 5.3 Illustrates a fully ducted damper. This configuration has the lowest pressure drop of the three test configurations because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

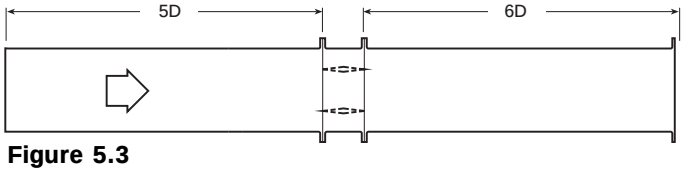


Figure 5.3

Figure 5.2 Illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5 because entrance losses are minimized by a straight duct run upstream of the damper.

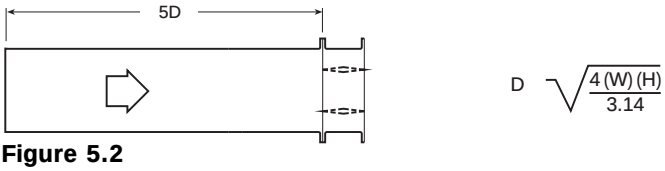


Figure 5.2

Figure 5.5 Illustrates a plenum mounted damper. This configuration has the highest pressure drop because of extremely high entrance and exit losses due to the sudden changes of area in the system.

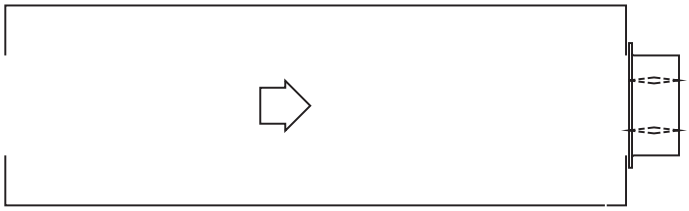
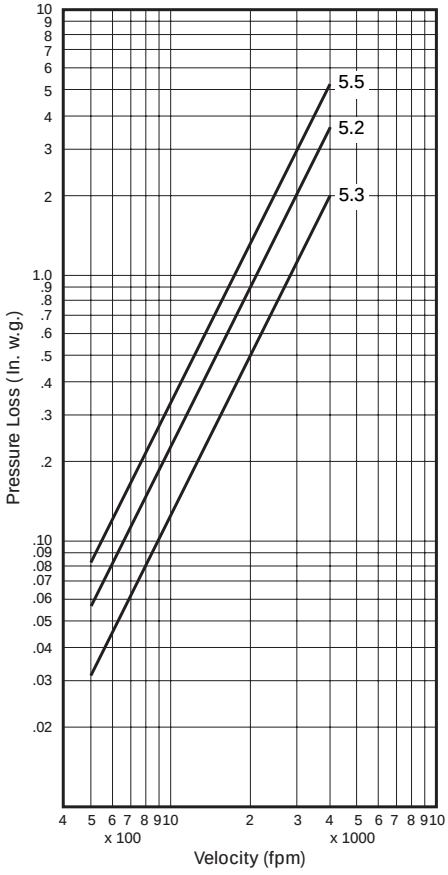
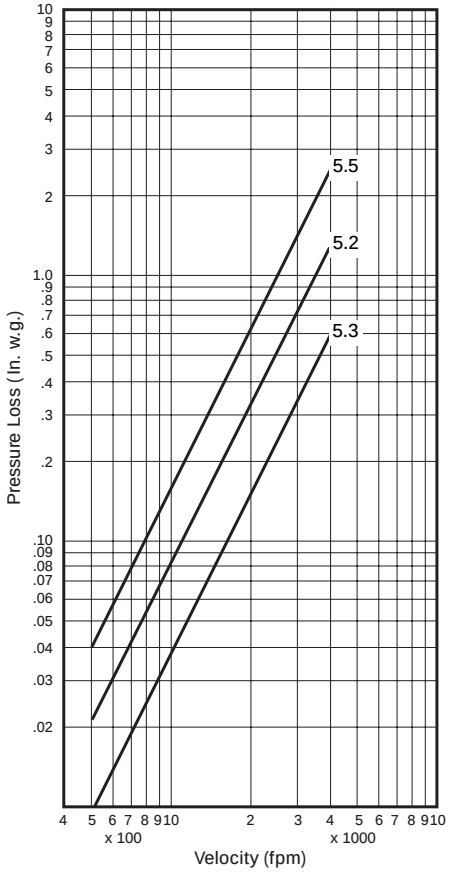


Figure 5.5

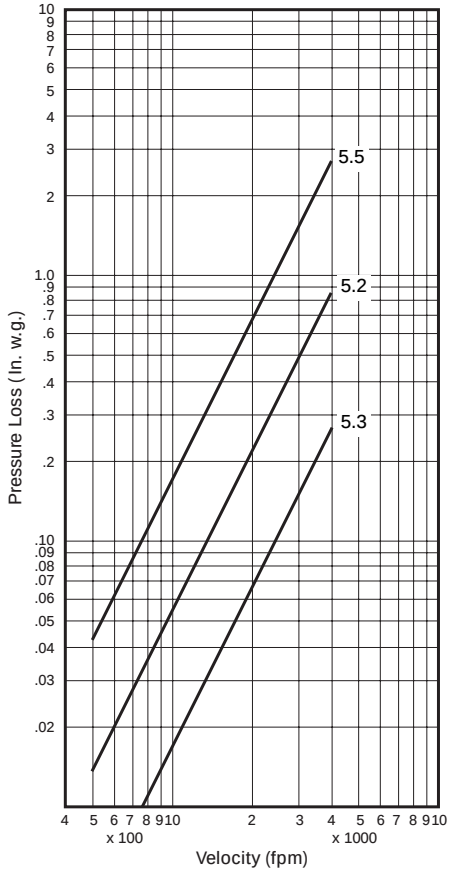
Damper Size
12 in. x 12 in.



Damper Size
24 in. x 24 in.



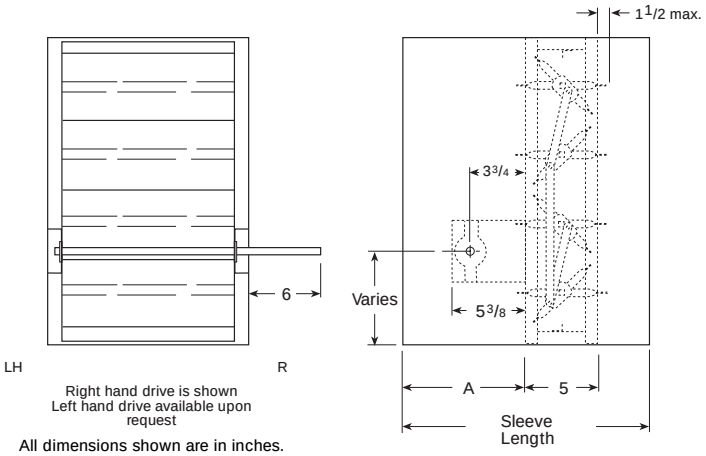
Damper Size
32 in. x 50 in.



Application Data

Damper Sleeve Dimensional Data

The drawings below and corresponding table show the position of the FSD-33 damper when mounted in a factory sleeve. The standard mounting locations provide enough space for the mounting of actuators, controls and allow space for installation of retaining angles and duct connections.



Right hand drive is shown
Left hand drive available upon request

All dimensions shown are in inches.

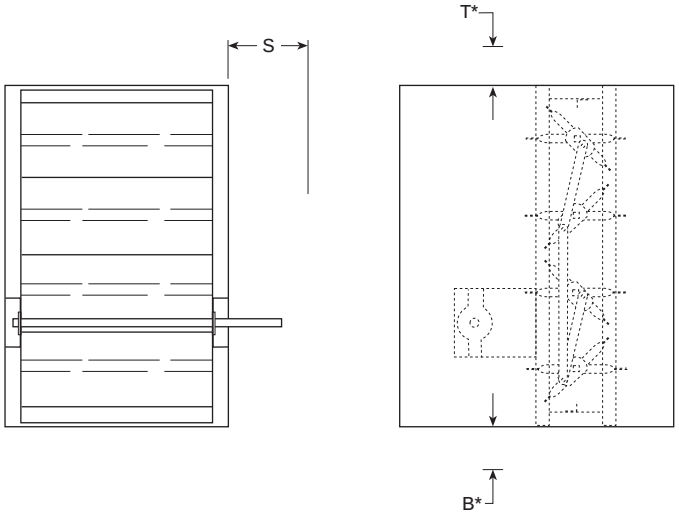
The standard location of a damper mounted in a factory sleeve ("A" dimension) is shown below. The damper can be positioned at other locations within a range of 5 3/8 in. to 12 in. for the "A" dimension.

	"A" Dimension	
	Standard	Maximum
All Dampers*	7 3/16	12
When H is < 11 in. w/OCI, RRL, or TOR	12	12

All dimensions shown are in inches.

*With the exception of dampers < 11 in. with either OCI, RRL or TOR option.

NOTE: Entire damper frame is not required to be installed within the wall. The damper blades, when closed should be contained within the wall.



Actuators and Accessories Space Envelopes

Externally mounted actuators always require space outside of the damper sleeve. The “S” dimension illustrates the clearance required for various available actuators.

On dampers less than 18 in. high, actuators may also require clearances above and/or below the sleeve. “B” and “T” dimensions are ***worst*** case clearance requirements for some dampers less than 18 in. high. All damper sizes under 18 in. high do not require these worst case clearances. If space availability above or below the damper sleeve is limited, each damper size should be individually evaluated.

Actuator Type/Model	B*		T*		S
	Without Accessories	With OCI, RRL, or TOR	Without Accessories	With OCI, RRL, or TOR	
120 Volt AC					
MP-2985 Multi Products	2 1/8	2 1/8	2 1/8	2 1/8	6
ML-4115 Honeywell	1 1/8	4 5/8	5/8	5/8	6
ML-4105 Honeywell	1 1/8	4 5/8	5/8	5/8	6
MA-418 Barber-Colman	2 1/2	2 1/4	1	6 1/4	10 1/2
M4182A-1004 Honeywell	2 1/2	2 1/4	1	6 1/4	13 1/4
24 Volt AC					
MP-2986 Multi Products	2 1/8	2 1/8	2 1/8	2 1/8	6
ML-8115 Honeywell	1 1/8	4 5/8	5/8	5/8	6
ML-8105 Honeywell	1 1/8	4 5/8	5/8	5/8	6
MA-318 Barber-Colman	2 1/2	2 1/4	1	6 1/4	10 1/2
M8182A-1005 Honeywell	1 1/8	4 5/8	5/8	5/8	6
Pneumatic (20 psi min.)					
331-4551 Powers	1 3/4	1	3/4	6 1/4	6 1/2
331-2976 Powers	2 3/4	1 3/4	1 1/4	12 1/4	9 1/4
MK2-7121 Barber-Colman	3 3/4	3 3/4	2 1/4	16 1/2	10

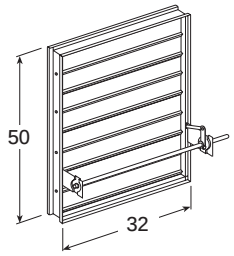
* For dampers 18 in. or more in height these dimensions are 0 in.

All dimensions shown are in inches.

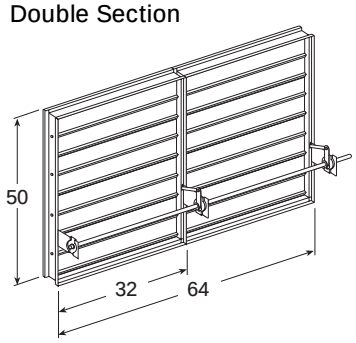
Damper Sizing Information

Dampers larger than maximum single section size are supplied as a factory assembly of two or more sections of equal size. The following figures show maximum damper section size and assembly configurations for multi-section dampers.

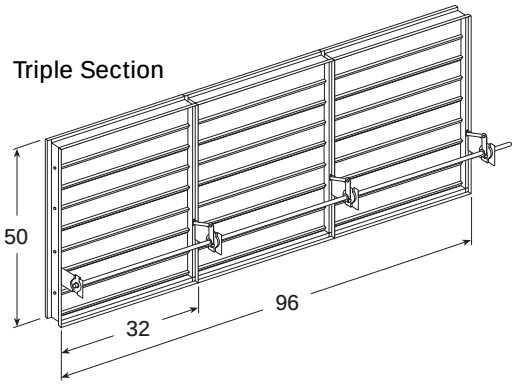
Single Section



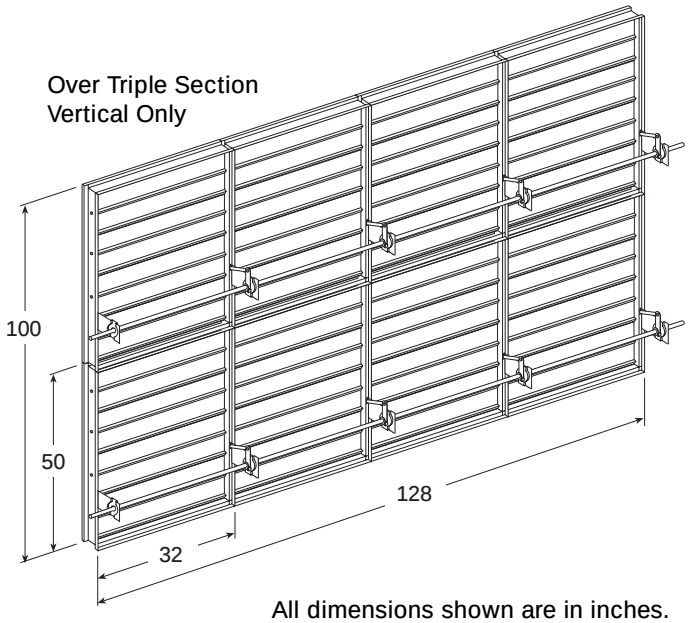
Double Section



Triple Section



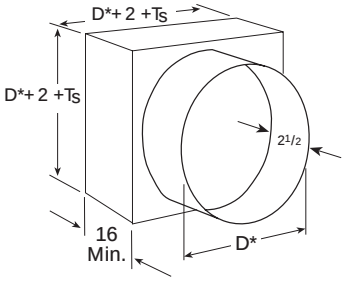
Over Triple Section
Vertical Only



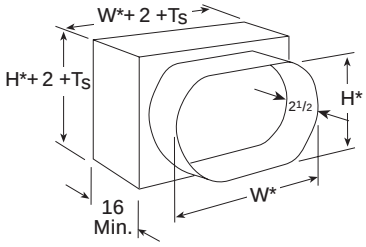
All dimensions shown are in inches.

Transitioned Damper Dimensions

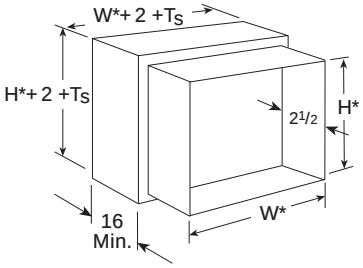
When a fire/smoke damper is being used in conjunction with round or oval ductwork, the FSD-33 can be supplied in a factory sleeve with round or oval transitions on both ends of the sleeve. Dampers should be ordered to the duct dimensions. Drawings below show overall damper size.



TYPE R



TYPE O



TYPE C

* These dimensions are furnished approximately 1/4 in. undersize, except round and oval dimensions which are approximately 1/8 in. undersize.

Ts = (2)(Sleeve Thickness)

All dimensions shown are in inches.

Specifications

Combination Fire Smoke Dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules. Dampers shall meet the requirements of NFPA 90A, 92A, and 92B and further shall be tested, rated and labeled in accordance with the latest edition of UL Standards 555 and 555S. Dampers shall have a UL555 fire rating of 1 1/2 hours and be of low leakage design qualified to UL 555S Leakage Class I.

Each damper/actuator combination shall have a UL555S elevated temperature rating of 350° F minimum and shall be operational and dynamic rated to operate at maximum design air flow at its installed location. Each damper shall be supplied with an appropriate actuator installed by the damper manufacturer at the time of damper fabrication. Damper actuator shall be (specifier select one of the following) electric type for 120 (or 24) Volt operation *or* pneumatic type for 20 psi minimum operation.

Damper blades shall be of the double skin airfoil type and shall have an equivalent thickness of 14 ga. Damper frame shall be galvanized steel formed into a structural hat channel shape with reinforced corners. Bearings shall be sintered bronze sleeve type rotating in extruded holes in the damper frame. Blade edge seals shall be silicone rubber designed to inflate and provide a tighter seal against leakage as pressure on either side of the damper increases. Jamb seals shall be stainless steel compression type with silicone rubber backing. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow in either direction or pressure on either side of the damper. Damper must be rated for mounting vertically (with blades running horizontal) or horizontally and be UL 555S rated for leakage and airflow in either direction through the damper. Each damper shall be supplied with a 165°F fusible link. The basis of design is Greenheck Model FSD-33.

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