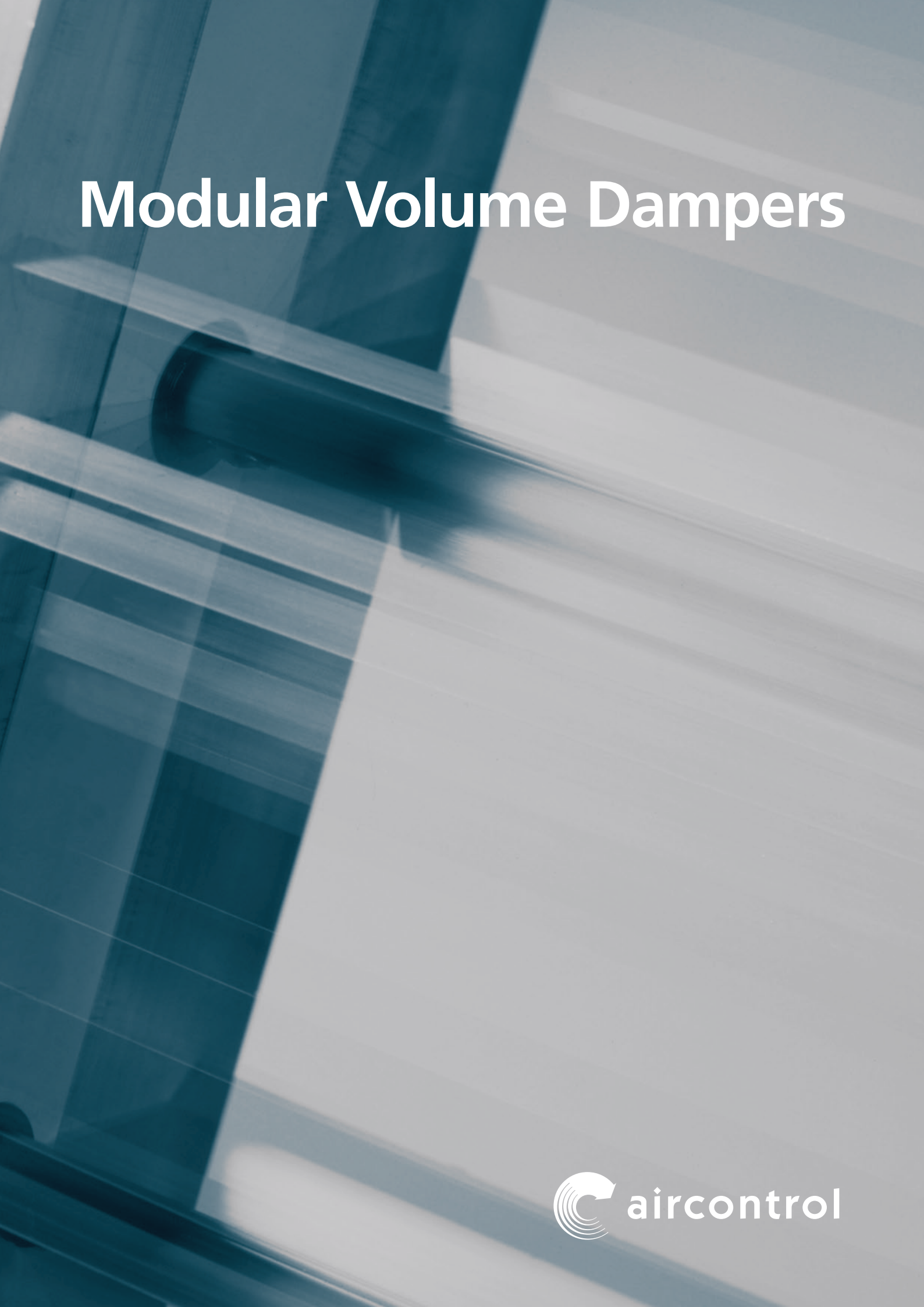
Modular Volume Dampers



aircontrol

Modular Volume Dampers

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Celmec International

Leading the way in Air Control, Heating & Cooling

At Celmec International, it is our belief that working closely with our clients aids the mutual success of both organisations and for this reason we have adopted the following mission:

"To excel in the commercial and industrial building industry by setting new standards with innovative products through leadership, first class customer service and engineering excellence."

It is with confidence that we at Celmec International offer our Dampers as part of our unique AirControl product range. Our Dampers are tried and proven for well over three decades.

We trust that this information will assist all users in the area of damper selection, application design and installation techniques.

Product Range

Celmec Volume Dampers

KEY FEATURES

- Modular design
- Lightweight
- Versatile
- Easy to install & handle
- Precise air control
- The economical solution to airflow control in ducting systems
- Manufactured from marine grade extruded aluminium with inherent advantages in performance and resistance to corrosion.

Select the dampers that suit your needs from the following summary:

Volume Damper - Blade Seal Design - 30 series

Max SP **1500Pa**
Max Vel **8m/s**

Model **30 MTA - Motorized Damper**
Includes: Blade seals / side frame seals / top & bottom frame seals
30 MTO - Motorized Damper for Outside air (no side frame seals)
Includes: Blade seals / top & bottom frame seals
30 SDA - Smoke Damper (High Temperature)
Includes: Blade seals / side frame seals / top & bottom frame seals

Volume Damper - No Blade Seal Design - 40 series

Max SP **40 MTA - 1000Pa**
40 MTO - 1000Pa
40 MLA - 500Pa
Max Vel **8m/s**

Model **40 MTA - Motorized Damper** (no blade seals)
Includes: Side frame seals / top & bottom frame seals
40 MTO - Motorised Damper for Outside air (no blade seals, no side frame seals)
Includes: Top & bottom frame seals
40 MLA - Manual Damper (no seals)

Non Return Damper - 60 series

Max SP **500Pa**
Vel **2-8m/s**

Model **60 RAA - Relief Air Damper**
60 NRA - Non Return Damper
60 WNRA - Weighted Non Return Damper

Special Purpose Dampers

Max SP **30 CRA - 1500Pa | 40 CRA - 500Pa**
Max Vel **8m/s**
Model **30 CRA - Clean Room Motorised Damper**
Standard face leakage performance
Includes: Fully sealed casings
Blade seals
Side frame seals
Top & bottom seals

40 CRA - Clean Room Manual Damper
Includes: Fully sealed casing
No internal seals.

- The versatile Celmec Damper frame has its corners punched to match the latest industry requirement for flanging such as Ductmate, Mez, Metuangle, TDC and TDF etc.
- Should overall damper size be difficult to manage, the damper can be installed on site in preassembled modular sections.

Volume Damper - Medium Velocity

30 MTA Motorised - Clean Air Damper

30 MTO Motorised - Outside Air Damper

30 SDA Motorised - Smoke Damper

Blade Seal Design 1500Pa.

The 30 MTA, 30 MTO & 30 SDA Dampers are designed to work in medium velocity systems with a maximum static pressure of 1500Pa. Operating temperature range for the 30 MTA & 30 MTO Dampers 0-80°C, 30 SDA Dampers 0-300°C.

30 SDA Smoke Dampers | Smoke Exhaust Dampers:

Tested to 200°C for 2h (sprinklered building) in accordance with AS1530.7-2007 to comply with AS1682.1-2015.
Tested to 300°C for 30min (unsprinklered building) in accordance with AS1530.4-2014 to comply with AS1682.1-2015.

The above test results surpass all the requirements of AS1682.1-2015 for air leakage performance, damper opening & closing functionality and the duration of exposure to elevated temperatures at 200°C, 300°C and beyond.

- The 30 MTA Damper is designed to regulate clean indoor air where low air leakage is required.
- The 30 MTO Damper is designed for outside or unfiltered air where controlled leakage is a consideration.
- The 30 SDA Motorised Damper is designed to regulate clean indoor air where low air leakage is required at elevated air temperatures such as smoke spill applications.
- The linkage system and the opposed blade configuration provide flexibility and accurate setting.
- The Frame and Blades are extruded from high quality marine grade aluminium for corrosion protection.
- The blade tips overlap providing positive locking to produce minimal air leakage utilizing a unique blade seal.
- Special venetian side strips (30 MTA, 30 SDA) and top and bottom frame seals (30 MTA, 30 MTO, 30 SDA) further reduce the leakage rate.
- The bearings on which the blades and drive shafts pivot are synthetic high temperature bush type.
- The series 30 Dampers are provided with an 11 mm hex shaft for adaptation to the client's powering unit.

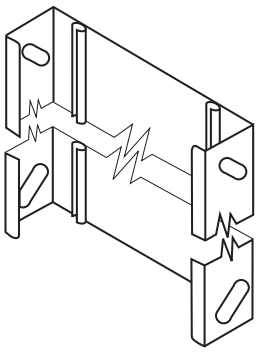
Technical Data – 30 MTA, 30 MTO, 30 SDA

SPECIFICATIONS	30 MTA	30 MTO	30 SDA
Application	Clean air	Outside air	Smoke Damper (clean air)
Frame	Extruded marine grade aluminium	Extruded marine grade aluminium	Extruded marine grade aluminium
Blades	Extruded marine grade aluminium	Extruded marine grade aluminium	Extruded marine grade aluminium
Blade Configuration	Opposed	Opposed	Opposed
Blade centres	140mm	140mm	140mm
Bearings	Synthetic bush	Synthetic bush	High temperature synthetic bush
Side Seals	Contained venetian strip	Not Applicable	Contained venetian strip
Blade & stop seals	Air activated EPDM rubber	Air activated EPDM rubber	Air activated high temperature silicon rubber
Max Face Velocity	8m/s	8m/s	8m/s
Max Static Pressure	1500Pa. (when closed)	1500Pa. (when closed)	1500Pa. (when closed)
Motor Torque	5Nm per m^2 of damper face area	5Nm per m^2 of damper face area	5Nm per m^2 of damper face area
Drive Shaft	11mm Hex	11mm Hex	11mm Hex
Max Module Width	1000mm (1200 @500Pa Max. SP)	1000mm (1200 @500Pa Max. SP)	1000mm (1200 @500Pa Max. SP)
Max Modul Height	2000mm	2000mm	2000mm
Operating Temperature	0-80°C	0-80°C	0-300°C

Note: Do not fit damper near fan discharge or in other turbulent areas.

Duct Flange Connection

10mm x 25mm long slot suitable for connection to: Angle Iron Frames, Ductmate, Mez, Metu, TDC, TDF etc



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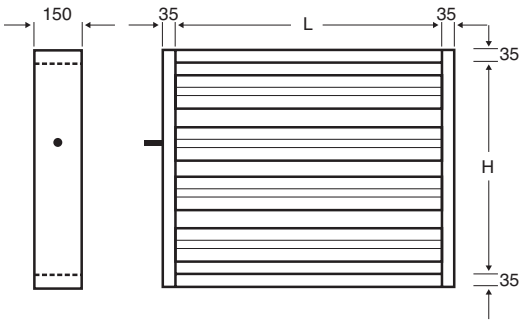
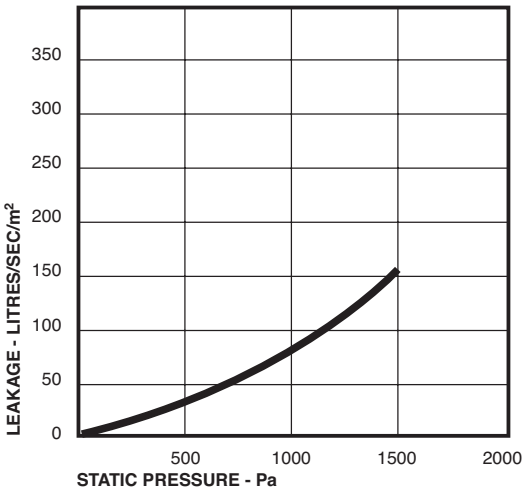


Height:
150 - 2000mm in 25mm increments

Blade Length:
Maximum 1000mm

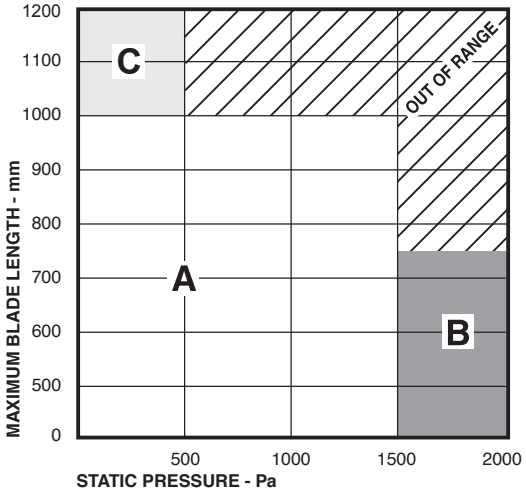
Leakage vs SP - 30 MTA, 30 SDA

Maximum module 1000 x 2000mm
Maximum SP 1500 Pa



Blade Length vs SP - 30MTA, 30 MTO, 30 SDA

Maximum module 1000 x 2000mm
Maximum SP 1500 Pa



A - Standard Selection
B - Reduced Blade Length (special request only)
C - Extended Blade Length - Max SP 500 Pa

Volume Damper - Low Velocity

40 MTA Motorised - Clean Air Damper

40 MTO Motorised - Outside Air Damper

40 MLA Manual - Balancing Damper

No Blade Seal Design 500Pa - 1000Pa.

The 40 series Dampers are designed to work at a maximum static pressure of 1000Pa. (40 MTA, 40 MTO), 500Pa. (40 MLA). Operating temperature range for 40 series dampers is 0-80°C.

- The 40 MTA Motorised Damper is designed to regulate clean indoor air where controlled air leakage is a consideration.
- The 40 MTO Motorised Damper is designed for outside or unfiltered air control, where slightly higher leakage is acceptable.
- The 40 MLA Manual Damper is designed to regulate air flow to suit most balancing applications in low to medium velocity systems.
- The linkage system and the opposed blade configuration provide flexibility and accurate setting.
- The Frame and Blades are extruded from high quality marine grade aluminium for corrosion protection.
- The blades are designed to interlock in the closed position to produce minimal air leakage rates suitable for most A/C system applications.
- Motorized dampers are fitted with venetian side strips (40 MTA) and top and bottom frame seals (40 MTA, 40 MTO) to further reduce the leakage rate.
- The bearings on which the blades and drive shafts pivot are synthetic bush type.
- The series 40 Dampers are provided with an 11mm hex shafts for adaptation to the client's powering unit.

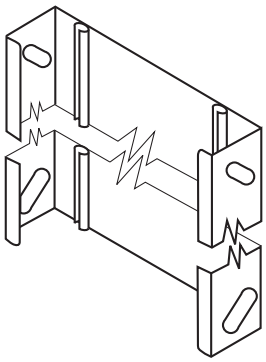
Technical Data – 40 MTA, 40 MTO, 40 MLA

SPECIFICATIONS	40 MTA	40 MTO	40 MLA
Application	Clean air	Outside air	Balancing Damper (clean or outside air)
Frame	Extruded marine grade aluminium	Extruded marine grade aluminium	Extruded marine grade aluminium
Blades	Extruded marine grade aluminium	Extruded marine grade aluminium	Extruded marine grade aluminium
Blade Configuration	Opposed	Opposed	Opposed
Blade centres	140mm	140mm	140mm
Bearings	Synthetic bush	Synthetic bush	Synthetic bush
Side Seals	Contained venetian strip	Not Applicable	Not Applicable
Frame stop seals	Air activated EPDM rubber	Air activated EPDM rubber	Not Applicable
Max Face Velocity	8m/s	8m/s	8m/s
Max Static Pressure	1000Pa. (when closed)	1000Pa. (when closed)	500Pa. (when closed)
Motor Torque	5Nm per m^2 of damper face area	5Nm per m^2 of damper face area	Not Applicable
Drive Shaft	11mm Hex	11mm Hex	Manual quadrant
Max Module Width	1000mm (1200 @500Pa Max. SP)	1000mm (1200 @500Pa Max. SP)	1200mm
Max Modul Height	2000mm	2000mm	2000mm
Operating Temperature	0-80°C	0-80°C	0-80°C

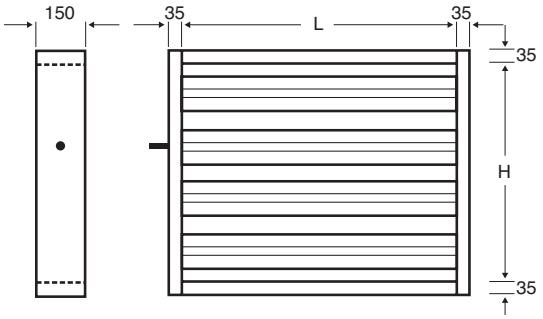
Note: Do not fit damper near fan discharge or in other turbulent areas.

Duct Flange Connection

10mm x 25mm long slot suitable for connection to: Angle Iron Frames, Ductmate, Mez, Metu, TDC, TDF etc



Dimensional Data

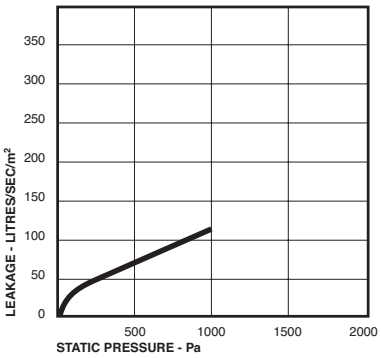


Height:
150 - 2000mm in 25mm increments

Blade Length:
Max - 40 MTA
1000mm (motorized)
Max - 40 MTO
1000mm (motorized)
Max - 40 MLA
1200mm (manual)

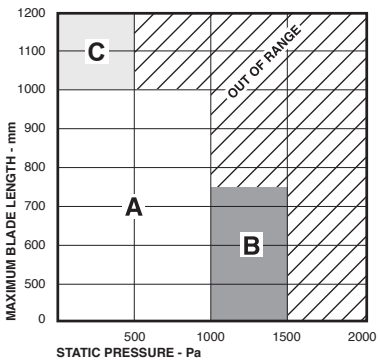
Leakage vs SP Motorized Volume Dampers

Maximum module 1000 x 2000mm
Max SP 1000 Pa



Blade Length vs SP Motorized Volume Dampers

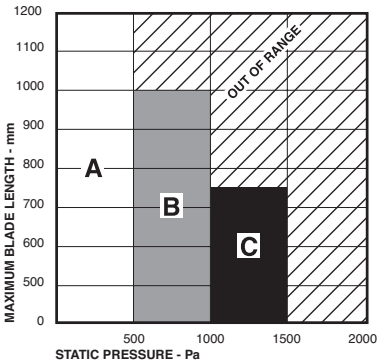
Max module 1000 x 2000mm
Max SP 1000 Pa



A - Standard Selection
B - Reduced Blade Length
C - Extended Blade Length Max SP 500 Pa

Blade Length vs SP Manual Volume Dampers

Max module 1200 x 2000mm
Max SP 500 Pa



A - Standard Selection
B & C - Reduced Blade Length
(special request only)

Non Return Damper - Low Velocity

60 RAA Relief Air

60 NRA Non Return

60 WNRA Weighted Non Return

Series 60 Non Return Dampers are designed to work in a laminar air flow environment between 2m/s - 8m/s and maximum static pressure of 500Pa.

The operating temperature range for series 60 dampers is 0-80°C.

- The 60 RAA Relief Air Damper is designed to relieve pressure from unduly pressurized compartments (blades not ganged).
- The 60 NRA Non Return Damper is designed to be used in ductwork where direction of air flow is to be controlled (blades ganged together)
- The 60 WNRA Weighted Non Return Damper enables site adjustment of the Pressure Drop requirement across the Non Return Damper (all blades are ganged and weighted by an adjustable weight on a counter lever arm).
- All Series 60 Non Return Dampers are manufactured from high quality marine grade aluminium for corrosion protection.
- Aluminium blades are supported on 6mm shafts and synthetic bush bearings.
- Model 60 WNRA is supplied with an adjustable weight on a counter lever arm mounted outside the damper frame.

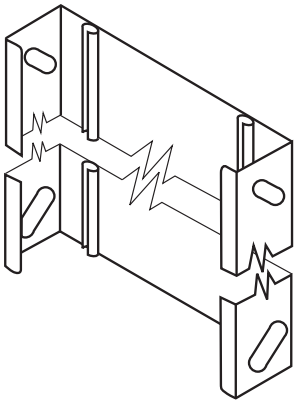
Technical Data – 60 RAA, 60 NRA, 60 WNRA

SPECIFICATIONS	60 RAA	60 NRA	60 WNRA
Application	Relief Air Damper	Non Return Damper	Weighted Non Return Damper
Frame	Extruded marine grade aluminium	Extruded marine grade aluminium	Extruded marine grade aluminium
Blades	Light duty marine grade aluminium	Light duty marine grade aluminium	Light duty marine grade aluminium
Blade Configuration	Parallel (unganged)	Parallel (ganged)	Parallel (ganged & weighted)
Blade centres	75mm	75mm	75mm
Bearings	Synthetic bush	Synthetic bush	Synthetic bush
Max Face Velocity	8m/s	8m/s	8m/s
Min Face Velocity	4m/s	2m/s	2m/s
Max Static Pressure	500Pa. (when closed)	500Pa. (when closed)	500Pa. (when closed)
Max Module Width	750mm (900 @250Pa Max. SP)	750mm (900 @250Pa Max. SP)	750mm (900 @250Pa Max. SP)
Max Modul Height	1500mm	1500mm	1500mm
Operating Temperature	0-80°C	0-80°C	0-80°C

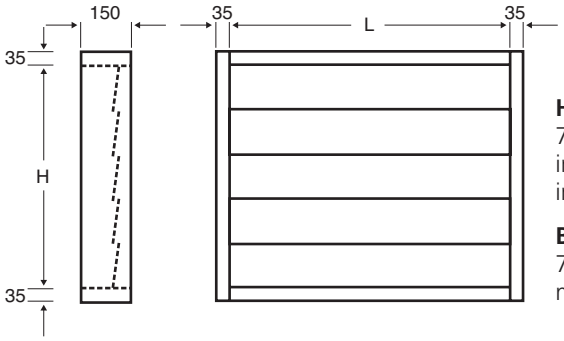
Note: Do not fit damper near fan discharge or in other turbulent areas.

Duct Flange Connection

10mm x 25mm long slot suitable for connection to: Angle Iron Frames, Ductmate, Mez, Metu, TDC, TDF etc.



Dimensional Data



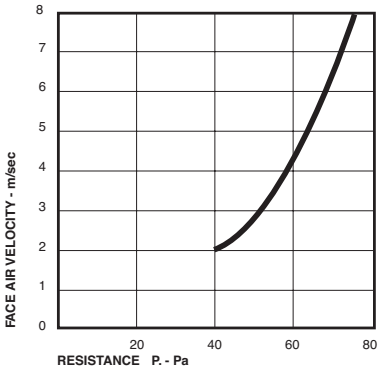
Height:
75 - 1500mm in 25mm increments

Blade Length:
750mm maximum

NOTE: DO NOT FIT DAMPER NEAR FAN DISCHARGE OR IN OTHER TURBULENT AREAS.

Air Velocity vs SP Non Return Dampers

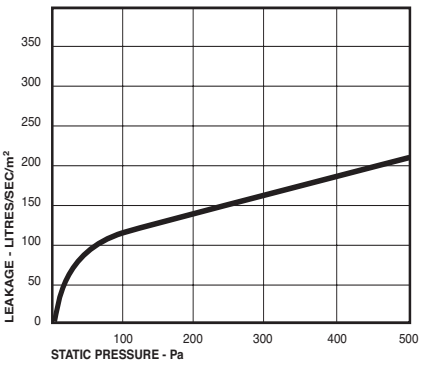
Max module 750 x 1500mm
Max velocity 8m/s



Note: Tested with NRD blades in vertical plane, discharge duct fitted.

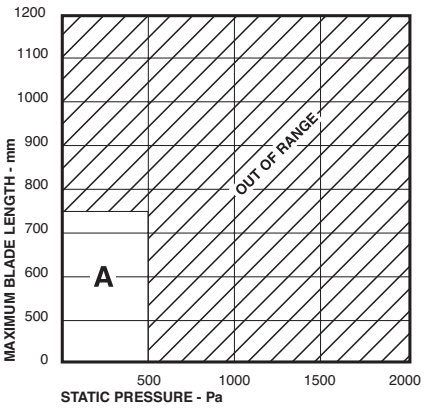
Leakage vs SP Non Return Dampers

Max module 750 x 1500mm
Max SP 500 Pa



Blade Length vs SP Non Return Dampers

Max module 750 x 1500mm
Max SP 500 Pa



A - Standard Selection

Clean Room Damper - Medium Velocity

30 CRA Motorised - Clean Air Damper

Blade Seal Design 1500Pa.

30 CRA dampers are designed to work in medium velocity systems
with a maximum static pressure of 1500 Pa.
Operating temperature range 0-80° C.

40 CRA Manual - Balancing Damper

No Blade Seal Design 500Pa.

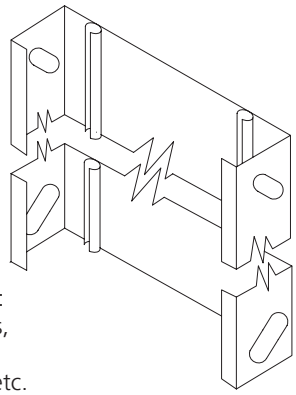
Max. Static Pressure 500Pa.
Operating termperature range 0-80° C.

- The 30 CRA Damper is designed to regulate air flow where low leakage is a consideration. The 40 CRA is intended for manual air balancing applications.
- The casings are fully sealed to prevent external leakage and to conceal the linkage system for protection and ease of cleaning.
- Linkage components are out of the air stream.
- The Linkage system and the opposed blade configuration provide operational flexibility and accurate setting.
- The frame and blades are extruded from high quality marine grade aluminium for corrosion protection.
- The blade tips overlap, providing positive locking to produce minimal air leakage utilizing blade tip seals together with side strip seals and top and bottom frame seals (30 CRA only).
- The bearings on which the blades and drive shafts pivot are non-corrosive, synthetic high temperature bush type.
- 30 CRA Dampers are provided with an 11mm hex shaft for adaption to an actuator, or in the case of 40 CRA, a manual quadrant is provided.

TECHNICAL DATA - 30 CRA

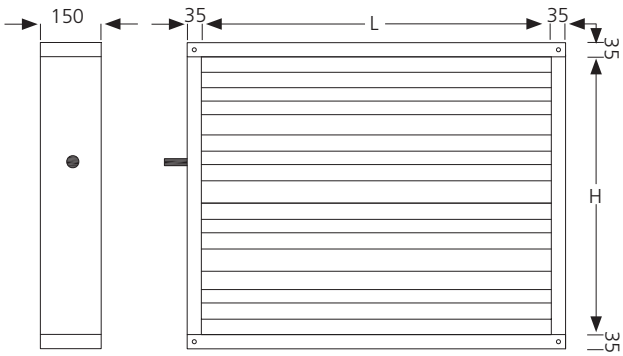
SPECIFICATIONS	30 CRA	40 CRA
Frame	Extruded marine grade aluminium	Extruded marine grade aluminium
Casing	Fully sealed (tested to 1500 Pa)	Fully sealed (tested to 1500 Pa)
Blades	Extruded marine grade aluminium	Extruded marine grade aluminium
Blades Configuration	Opposed	Opposed
Blade Centres	140mm	140mm
Bearings	High temperature synthetic bush	High temperature synthetic bush
Side Seals	Venetian strip	Not Applicable
Blade & Stop Seals	High temperature rubber	Not Applicable
Max Face Velocity	8m/s	8m/s
Max Static Pressure	1500Pa. (when closed)	500 Pa.
Motor Torque	5Nm per m² of damper face area	Not Applicable
Drive Shaft	11mm Hex	Manual quadrant
Max Module Width	1000mm (1200 @500Pa Max. SP)	1200
Max Module Height	2000mm	2000mm
Operating Temperature	0-80° C	0-80° C

Duct Flange Connection



10mm x 25mm long slot suitable for connection to: Angle iron frames, Ductmate, Mez, Metu, TDC, TDF etc.

Dimensional Data

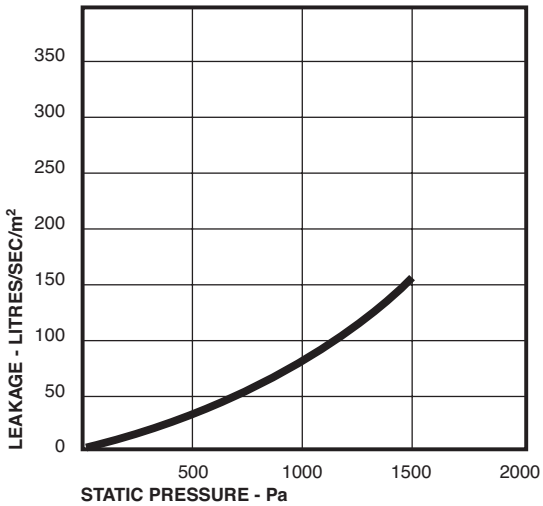


Height: 'H'
150 -2000mm in 25mm increments

Blade Length: 'L'
Maximum 1000mm

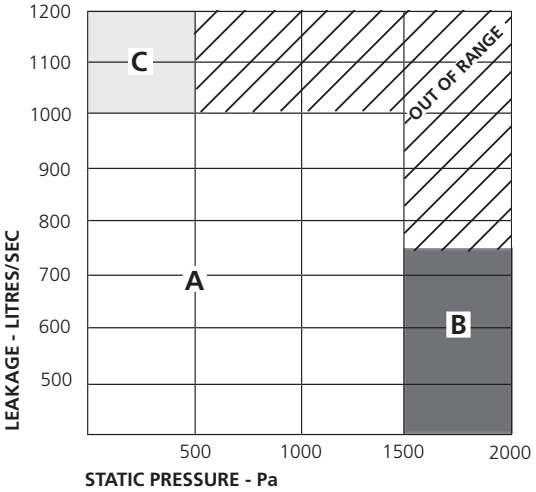
Face Leakage vs SP - 30 CRA

Maximum module 1000 x 2000mm
Maximum SP 1500 Pa.



Blade Length vs SP - 30 CRA

Maximum module 1000 x 2000mm
Maximum SP 1500 Pa.



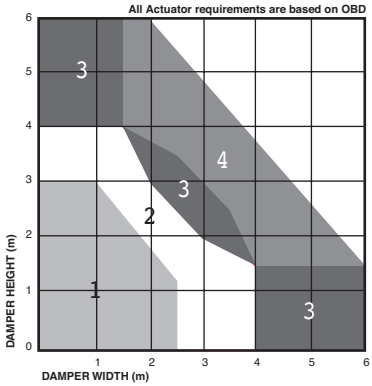
A - Standard Selection
B - Reduced Blade Length (special request only)
C - Extended Blade Length Max SP 500 Pa

Motor Application Guide

The Modular Damper System is based on motor selection of up to 15Nm torque output.

The following graph may be used to determine the minimum number of damper actuators required for each damper.

Suggested torque requirement for low to medium velocity systems is 5Nm per 1.0m^2 of damper face area.



Damper Drive Examples

Over 2.5m wide - Fig. 1

Over 3.0m high - Fig. 2

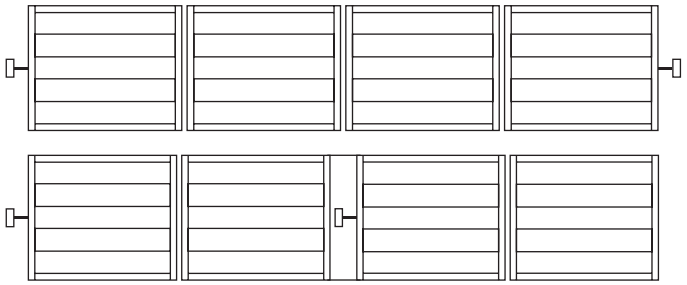


Fig. 1

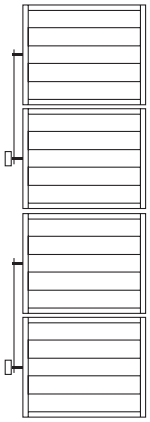
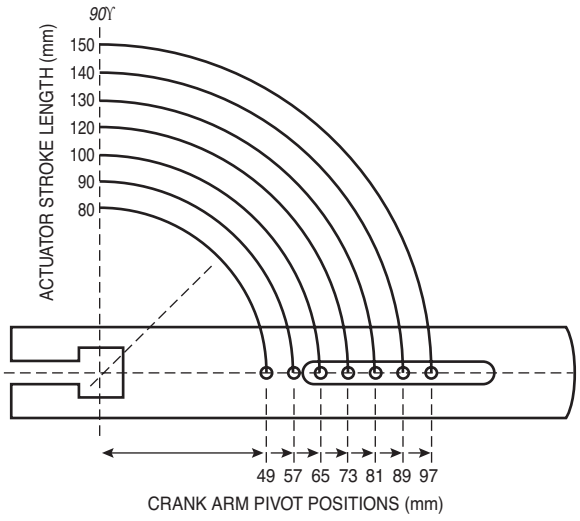


Fig. 2

Motor Stroke

WARNING: STROKE ALL DAMPERS FROM CLOSED POSITION TO AVOID OVERDRIVING

1. Lineal Action Actuator Stroke vs Pivot Point



Note: For pivot positions not accommodated in the crank arm slot, drill 7mmØ hole to suit.

2. Lineal Actuator Stroke Length

For Pneumatic Actuators allow 10mm for spring tension at the appropriate end of stroke/ i.e. 100mm stroke actuator- use 90mm dim.

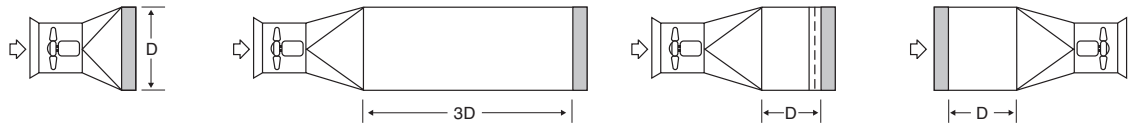
For Electric Actuators allow full stroke/ i.e. 100mm stroke actuator- use 100mm dim.

3. Rotating Actuator Pivot Ratio

Actuator Rotation	Pivot Dimension Ratio	
	Driver	Driven
45°	2	1
90°	1	1
160°	1	1.7
180°	1	2

DAMPERS MUST NOT BE OVERDRIVEN IN EITHER DIRECTION

System Design



Where:
D - Maximum cross-sectional dimension

Axial or Centrifugal fan

NRD or VD

Pressure plate upstream of NRD or VD (45-50% free area)

Volume Damper Applications

Fig. 1

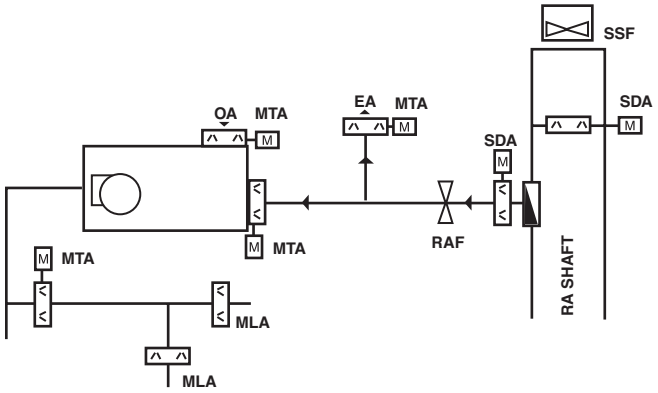
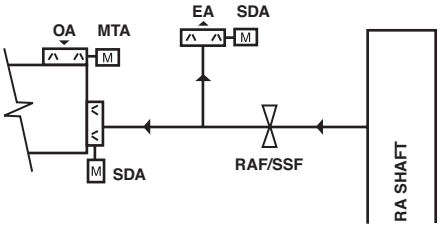


Fig. 2



Non Return Damper Applications

Fig. 3

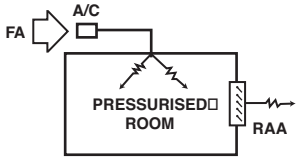


Fig. 4

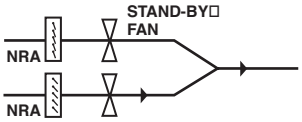
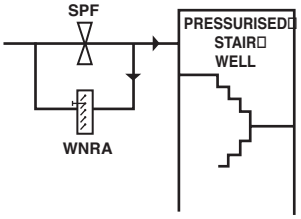


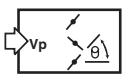
Fig. 5



OA - Outside Air EA - Exhaust Air RAF - Return Air Fan SSF - Smoke Spill Fan SPF - Stair Pressurization

Pressure Drop

For Manual Balancing and Motorized Opposed Blade Dampers, the pressure drop will not exceed the values calculated from the 1981 SMACNA duct design tables, section 6-14F as follows.

PD Test Method		Loss Coefficient C								
Rectangular Duct	L/R	θ								
		80°	70°	60°	50°	40°	30°	20°	10°	0°
	0.3	807	284	73	21	9.0	4.1	2.1	0.8	0.52
	0.4	915	332	100	28	11	5.0	2.2	5.0	0.52
	0.5	1945	377	122	33	13	5.4	2.3	0.9	0.52
	0.6	1121	411	148	38	14	6.0	2.3	2.0	0.52
	0.8	1299	495	188	54	18	6.6	2.4	1.0	0.52
	1.0	1521	547	245	65	21	7.3	2.7	1.0	0.52
	1.5	1654	677	361	107	28	9.0	3.2	1.1	0.52

PD = Vp x C

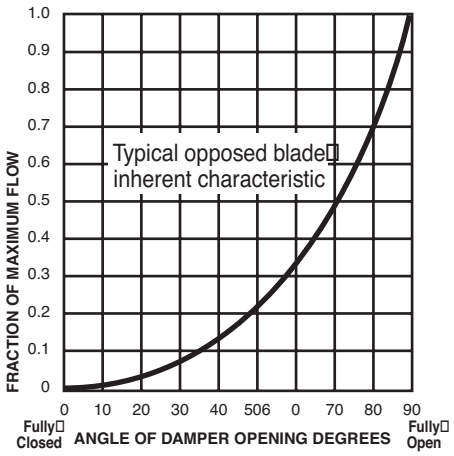
Where:
PD - Pressure Drop
VP - Velocity Pressure
C - Loss Coefficient

$$\frac{L}{R} = \frac{NW}{2(H+W)}$$

Where:
N - Number of damper blades
W - Duct dimension parallel to blade axis
L - Sum of damper blade lengths
R - Perimeter of duct
H - Duct Height

Inherent Characteristic

The inherent characteristic of Opposed Blade Dampers at varying angles of opening follow a parabolic curve as shown.

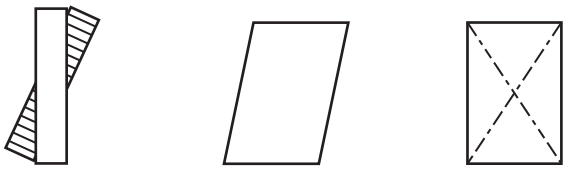


Installation Guidelines

The following installation requirements must be observed to achieve the desired performance and trouble free damper operation.

1. Ensure correct ALIGNMENT with ductwork. To assist with alignment, the damper should be set in the fully-open position during installation and FREE BLADE OPERATION MUST BE CHECKED AFTER FIXING.
2. Damper must be SQUARE AND FLAT. (fig. 1)
3. SHIMS MUST BE USED to compensate for distorted ductwork or openings.
4. Fabricated penetrations must be STIFFENED OR FRAMED to provide stable aligned fixing.
5. Frame fixings MUST NOT BE OVER TIGHTENED as distortion may occur.
6. It may be necessary to SEAL AROUND FRAME to eliminate air leaks.
7. ACTUATORS MUST BE SUPPORTED RIGIDLY in line and square, off damper frame or structure.
8. Extended drive shafts must be fitted with OUTRIGGER BEARINGS.
9. Dampers MUST NOT BE OVERDRIVEN in either direction.
10. STROKE all drives from closed position.
11. Dampers EXPOSED TO THE WEATHER must have flashing over the top of the damper frame.

Fig. 1



Ensure damper is not out of flat. Out of flat blades will not fully close.

Out of square dampers will result in blades jamming against the frame.

Ensure both diagonal dimensions are the same

Modular Assembly

Damper Modules are assembled with tie bolts, designed to ensure accurate frame alignment and a sturdy integral damper assembly (figs. 2 & 3). The modules should be assembled prior to fixing to the opening or duct frame, however should the overall damper size be unmanageable the damper can be installed in pre-assembled sections.

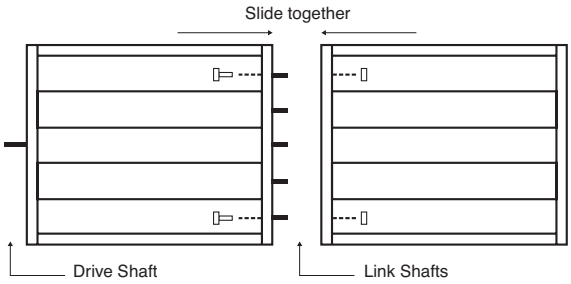


Fig. 1

Should it be required to interlink modules horizontally, this is easily achieved during assembly with interfacing Link Shafts (figs. 1 & 2). Vertical modules can be interlinked with an interfacing Drive Link Bar after installation (fig. 3).

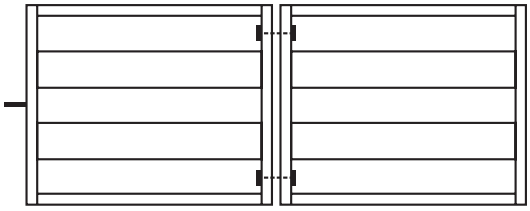


Fig. 2

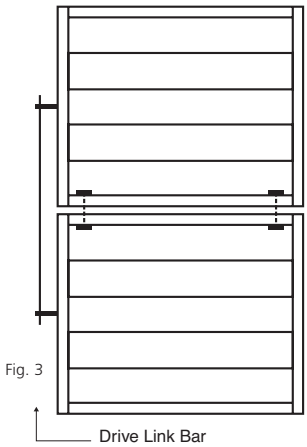


Fig. 3

To demonstrate the flexibility of the modular system, fig. 4 depicts a fresh air damper where three modules are driven by one actuator and a Minimum Fresh Air module is controlled independently.

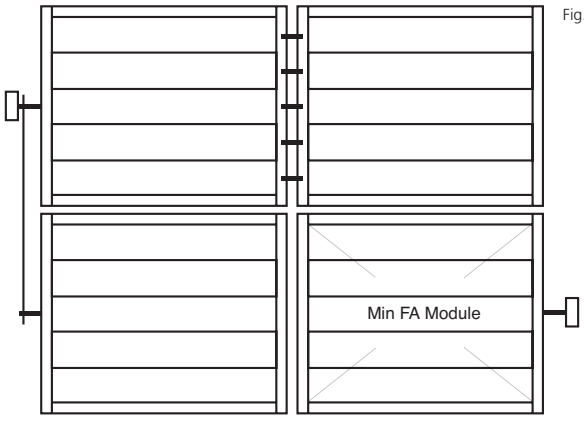


Fig. 4

Note: Overall damper face area per actuator must not exceed 3m^2, refer motor applications guide page 13.

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