

NEW

Includes new casing depths and thickness, Atex rated motor and visual indication options.

A-60 Marine Fire Damper

Designed for inclusion in Marine and Offshore Projects

Features

Blades

- 430 stainless steel and 316 stainless steel options.

Casings

- Lightweight cost effective design.
- Rectangular and circular flanges.
- Galvanised and 316 stainless steel options.
- 1.2, 2, and 3mm options.
- 150 and 210mm depths.
- Standard and customer flange drilling options.
- Visual indicator option.

Actuators

Electrical

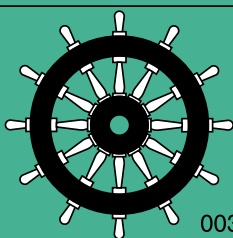
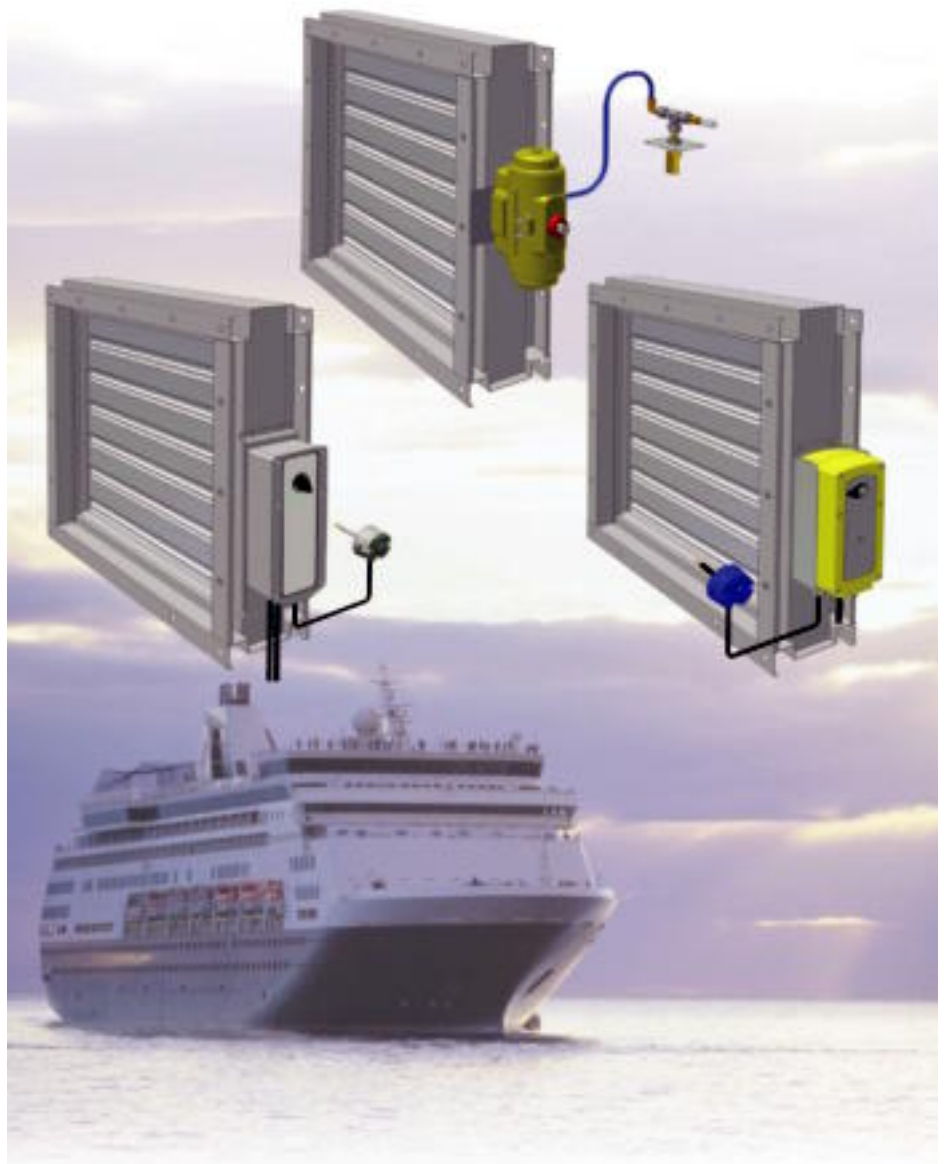
- 24, 120 and 230 volt options
- Factory fitted ETR option.

Pneumatic

- 3 second reset time.
- PTR release.

Atex rated

- Universal voltage 24 - 230V - AD/DC.
- Factory fitted STS option.



0038/YY

YY denotes last two digits of year that Wheelmark is affixed to damper.

*action*air

Dampers Controls Fancoils

Ruskin Air Management Limited

www.ruskinuk.co.uk

Introduction

Actionair has, for many years, been associated in the design, development and manufacture of life safety equipment, including the supply of fire damper products to the offshore and marine industry. The Actionair A-60 Marine Fire Damper has been specifically engineered to meet stringent legislation.

The A-60 Marine Fire Damper compliments the comprehensive range of automatic fire and smoke dampers and associated controls, provides the complete solution for shipboard air conditioning and ventilation systems fire safety engineering strategies.

The A-60 Marine Fire Damper has been designed for inclusion in air conditioning and ventilation systems, in dry filtered air, and is tested and approved for fitting to class A-60 divisions (bulkheads and decks), when suitably insulated (refer to insulation details).

With continuing research and development Actionair has extended the A-60 Product Range to include 2mm and 3mm thick casings and ATEX (Ex) rated motor options.

Specification

The Actionair A-60 Marine Fire Damper is constructed from galvanised steel 1.2mm thick, (2 and 3mm options available), 40mm flanged rectangular or circular casing, (All 316 stainless steel option available). 75mm interlocking 430 grade stainless steel aerodynamic blades, steel blade end bearings and 300 grade stainless steel peripheral gasketing. (316 grade stainless steel blade and blade end bearing available).

The totally enclosed precise movement opposed blade drive is positioned out of the airstream for protection against damage, and is hard wearing and free running.

Electrical

The Actionair direct-coupled spring return fail-safe electrical control modes are fitted with halogen free low smoke and fume electrical cable. They have a 60 second reset time and a 20 second release time. Each actuator has a 72°C rated electrical thermal release (ETR). The ETR incorporates a safety electrical interlock that only permits actuator operation when correctly fitted. A green 'Healthy' indication lamp is built into the ETR housing to give a simple and clear visual check that the actuator is receiving power, the ETR is correctly fitted, and the thermal fuse is intact. A manual test switch allowing periodic operation of the damper for testing purposes simulates actual fail-safe release under smoke/fire conditions. End switches are provided with each mode for reset and release monitoring.

Electrical ATEX (Ex) rated.

The Actionair direct-coupled spring return fail-safe ATEX (Ex) electrical control modes are fitted with 1 metre of cable for connection inside hazardous areas. They have the benefit of a Universal electrical supply using any Voltage between 24-230 V AC/DC, which is self adaptable. They have Variable (3-15-30-60-120 sec/90°C) Reset and (3-10 sec/90°C) Release times, which are selectable on site. Each actuator has a Integral safety temperature sensor (STS) rated at 72°C. The STS incorporates a triple fail-safe

thermal fuse arrangement, 2 induct and one outside, to ensure the fail-safe actuator operates in all conditions. A manual test switch allowing periodic operation of the damper for testing purposes simulates actual fail-safe release under smoke/fire conditions. End switches are provided with each mode for reset and release monitoring. An Integral heater allows the unit to be operated within ambient temperatures down to -40°C.

Pneumatic

The Actionair direct coupled spring return fail-safe pneumatic control mode requires an air pressure of between 5 to 8 bar (72 to 116 psi) to operate. They have 3 second reset and release time. Each actuator has a pneumatic thermal release (PTR). The PTR assembly is supplied with 500mm nylon tubing that connects to the quick fit couplings of the PTR and actuator. Incorporated is a fail-safe 74°C fusible link. When this operates, air exhausts from the actuator, permitting the spring return actuator to go to the fail-safe position, thus closing the damper. Switch box and solenoid accessories are available for monitoring and control.

Tests and Approval list

*Lloyds Register of Shipping Approval to IMO Fire Test Procedures Code, Annex 1, Part 3, for Class A60 bulkheads and decks.

*Marine Equipment Directive 96 /98 /EC.

*USCG Approved (product category 164.139).

*Germanischer Lloyds Approved to IMO Res. A.754. (18) and IMO Res. MSC61(67), Annex 1 Part 3.

*American Bureau of Shipping Approved to: 2005 Steel Vessel Rules 1-1-4/7.7.

Please note maximum size restrictions - see page 4.

Corrosion tested.
Vibration tested.

All certificates are available via the Actionair website. www.actionair.co.uk

Range and Application

The A-60 dampers can be used where the maximum system pressure is up to 1500 Pa and duct velocities to 15m/s.

A-60 Marine Fire Dampers are designed for applications in normal dry filtered air systems and should be subjected to a planned inspection programme, with cleaning and light oil lubrication, to the

blade and drive area, in accordance with good industry practice. When exposed to fresh air intakes and/or inclement conditions please refer to Actionair Technical Sales Office.

The A-60 Marine Fire Damper is suitable for both vertical and horizontal applications, with airflow in either direction.

The dampers are normally open, and fail-safe to the closed position.



Electrical Thermal Release (ETR)

Electrical

Fail-safe is by means of a unique and patented Electrical Thermal Release (ETR) which operates at 72 °C, or if power supply is interrupted. The ETR incorporates a safety feature, that ensures the fail-safe status of the damper if the ETR is not fitted on to the ductwork. Additionally a green LED lamp is built into the ETR housing. This gives the user a simple and clear visual check that the Actuator is receiving power, the ETR is correctly fitted, and the thermal fuse is intact.

A manual test switch allows periodic operation of the damper for testing purposes, simulating actual fail-safe release under fire conditions.

The associated electrical control Modes are available in 24 volt, 120 volt or 230 volt versions.



Safety Temperature Sensor (STS)

Electrical ATEX (Ex) rated. Fail-safe is by means of a Safety Temperature Sensor (STS) which operates at 72 °C, or if power supply is interrupted.

A manual test switch allows periodic operation of the damper for testing purposes, simulating actual fail-safe release under fire conditions.

The associated electrical control Modes are available in one Universal version with 24 – 230 volt AC/DC supply.



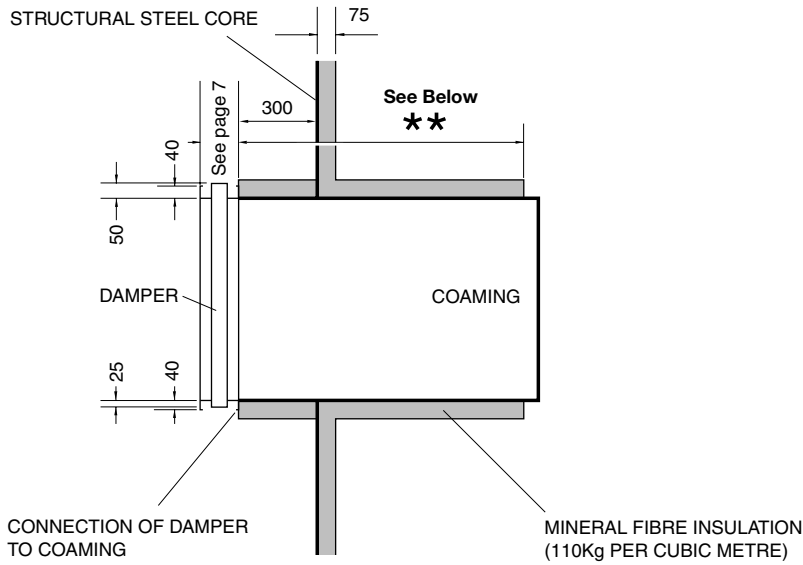
Pneumatic Thermal Release (PTR)

Pneumatic

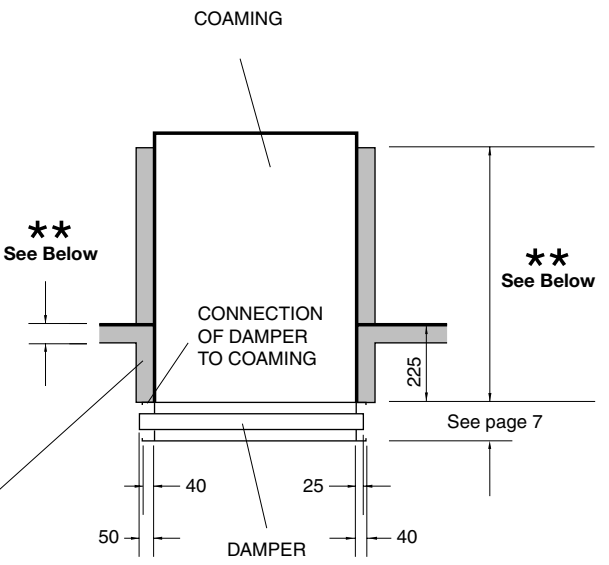
The special purpose design Pneumatic Thermal Release (PTR) assembly is supplied with 500mm nylon tubing that connects to the quick fit couplings of the PTR and actuator. Incorporated is a failsafe 74°C fusible link. When this activates, air exhausts from the actuator, enabling the PTR to spring return to the fail-safe position, thus closing the damper.

Insulation Details

Bulkhead (Vertical)



Deck (Horizontal)

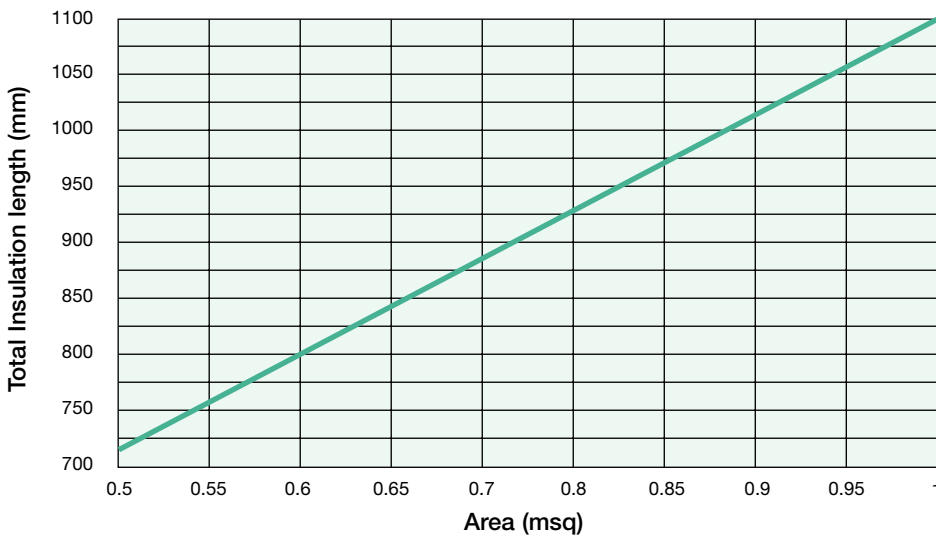


★ Table of Minimum Total Coaming Insulation Length (Applies to all approval bodies)

Application	Insulation Thickness	Minimum Total Insulation Length
Vertical bulkhead up to 750 x 750 (0.5625msq)	75mm	725mm
Vertical bulkhead above 0.5625 msq		refer to graph below
Horizontal deck up to 750 x 750 (0.5625msq)	40mm	725mm
Horizontal deck above 0.5625 msq		refer to graph below
Horizontal deck (all sizes)	75mm	725mm

The same area/insulation criteria applies for multiple arrangements

Graph Showing Minimum Insulation length for Damper above 750mm x 750mm Base Damper (Applies to all approval bodies with the exception of ABS)



Coaming Insulation Example

For a damper size of 910mm x 925mm.
Area = 0.85 msq

Vertical Installation

Insulation Thickness = 75mm (line 2 of table)
Insulation Length = 975mm (refer to graph)

Horizontal Installation

Insulation Thickness = 40mm (line 4 of table)
Insulation Length = 975mm (refer to graph)
Insulation Thickness = 75mm (line 5 of table)
Insulation Length = 725mm (line 5 of table)

Note: for circular, use square base damper area.

Testing



The Actionair A-60 Marine Fire Damper has undergone extensive fire testing in single and multiple arrangements. The dampers were incorporated in steel bulkheads and decks and tested to the Marine Fire Resistance Test in accordance with IMO resolution A754. (18) for a duration of 60 minutes. Changes to the originally supplied product may invalidate the certification and/or warranty.

Certification

EC Type Examination (Module B) Certificate.

EC (Module D) Certificate of Conformity.

Certificate of Fire Approval.

Germanischer Lloyds Fire Certification.

ABS Approved.

ISO 9001; 2000 Certification.

*Corrosion Tested to BSEN 60068-2-52, severity 2 conditions.

*Vibration Tested to BS EN 60068-2-6 (5Hz to 350Hz @ 2g).

Copies of All Certification and Test Reports are available from our website.

Changes/ modifications to the original supplied product may invalidate certification and/or warranty.

Casing Features

The standard 1.2mm galvanised steel flanged type casing, (optional 2 and 3mm thick), having a single penetration for the drive control, complies to Class A & B of Eurovent 2/2 and Test Procedures for Classes A, B, & C of the HVCA Ductwork Specification DW144.

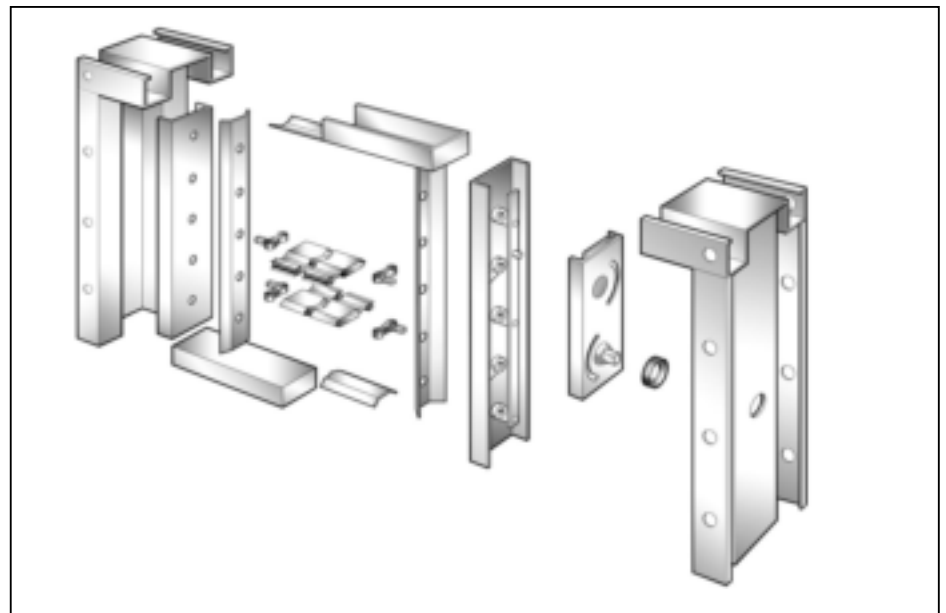
Pre-punched bolt holes are provided as standard (refer to page 7 and 8).

In addition Stainless Steel peripheral gasketing is included, which allows for expansion under full fire conditions.

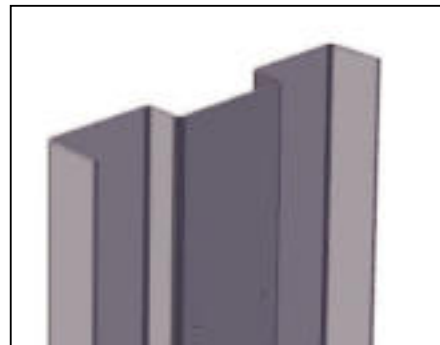
The 1.2mm casing has obvious benefits, for example being lighter in weight, allowing easier installation.

Casings manufactured in Type 1.4401 (316 grade) Austenitic Stainless Steel are available as an optional extra.

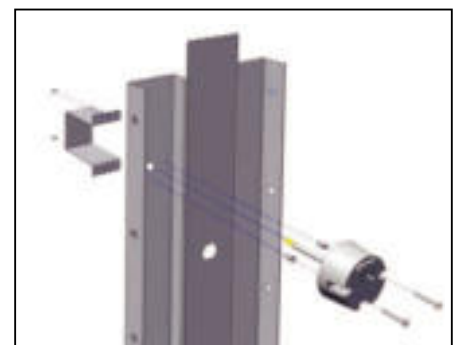
1.2mm Casing



2 and 3mm Casing



Casing Mounted ETR



Factory fitted Actuator Options (Electrical only)



A-60 Electrical with fitted ETR



A-60 Atex with fitted STS

Electrical Control Modes

Standard Control Modes

The IP54 rated Control Modes, are located outside of the ductwork for ease of access and installation. Control Modes fitted to dampers up to 400mm high, can be fitted in any one of three orientations i.e. vertically down, horizontally or vertically up. Positions 1, 2, or 3). Two sizes (Compact and Universal) of Control Mode are utilised. This flexibility ensures that the smaller damper sizes and Control Mode require the minimal amount of room. For damper sizes above 400mm high the control mode is fitted vertically. Correctly sized Control Modes are designed to fit only to the relevant sized damper.

The control modes are direct coupled to the damper utilising a unique user friendly positive connection system. This allows the dampers and actuators to be supplied separately, offering shipping and storage benefits.

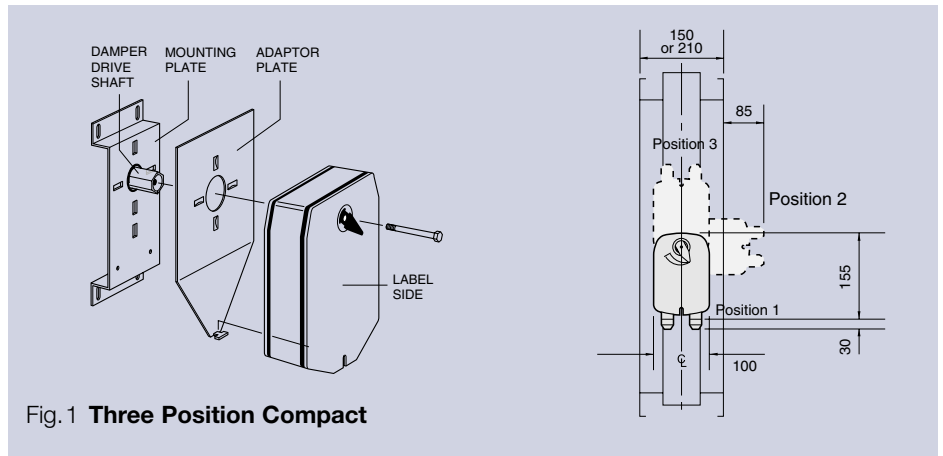


Fig. 1 Three Position Compact

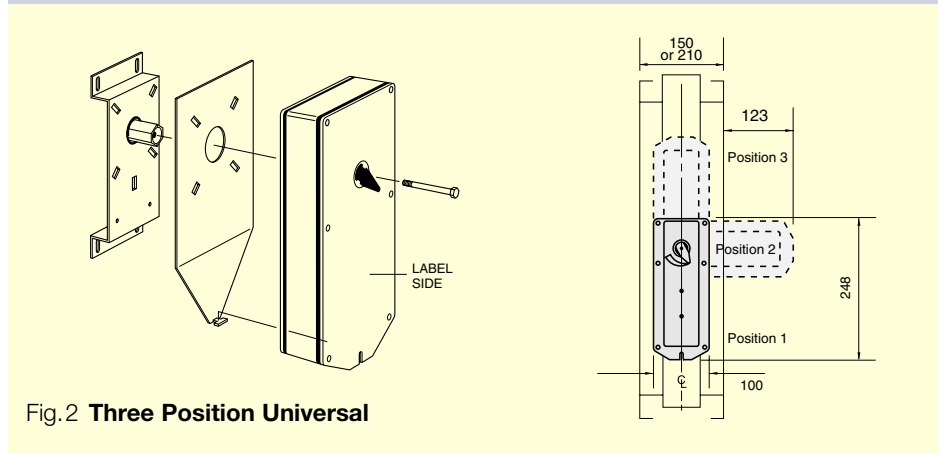


Fig. 2 Three Position Universal

Control Mode Standard Parameters

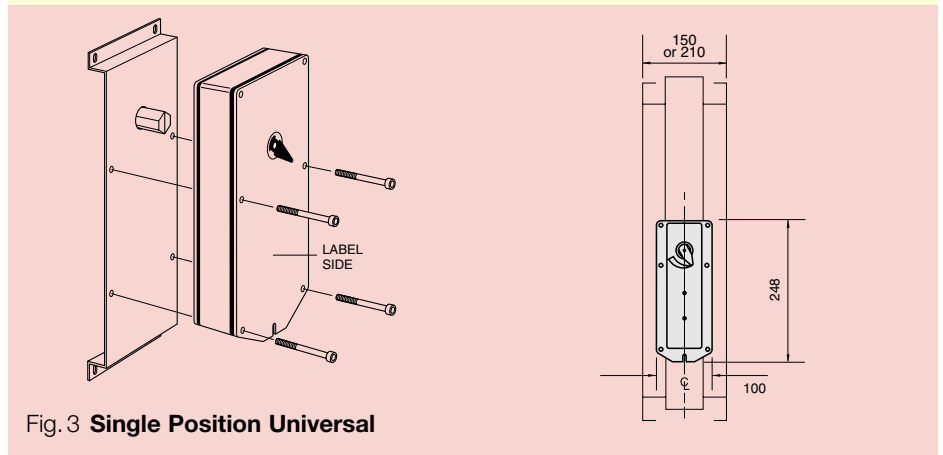
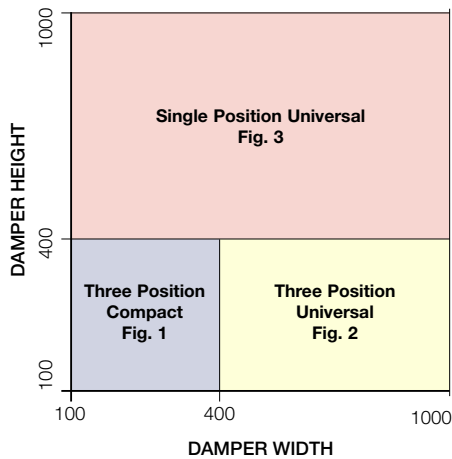
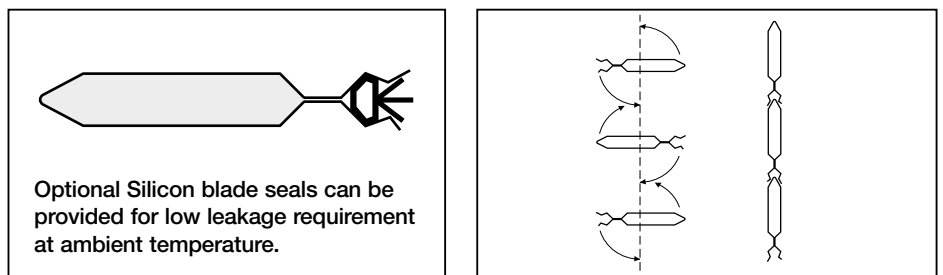


Fig. 3 Single Position Universal

Blade Features

The damper blades are aerodynamic double skin, Type 1.4016 (430 grade) Ferritic Stainless Steel, which are 75mm wide and when closed interlock to form a positive fire resisting shield. Incorporated in the blade are steel blade end bearings. Optional blades in Type 1.4401 (316 grade) Austenitic Stainless can be provided. Incorporated in the blade are 316 Stainless Steel blade end bearings.



Optional Silicon blade seals can be provided for low leakage requirement at ambient temperature.



Electrical Application and Wiring

Standard Application and Wiring

Control Mode 5 24V A.C. or D.C.
Control Mode 6 230V A.C. 50/60Hz
Control Mode 120 120V A.C. 50/60Hz

Power On - Damper motors open.
 Power Off - Damper springs closed.
 ETR Operates - Damper springs closed.

12W (Maximum Motoring).
 4W (Maximum Reset).

End Switches Rated at 250V 1.5 Amp (Maximum).

To isolate from main power supply, the system must incorporate a device, which disconnects the phase conductors, with at least 3mm contact gap.

2 x 1 metre of halogen free, low smoke and fume electric cables are included with each control mode. The ETR is also pre-wired with 0.5 metre halogen free low smoke and fume cable.

Mode 5 24V System

A.C./D.C. 24V
50 / 60 Hz

12.5 V A
10 / 2 W

Imax
8.3A @ 5ms

-30...+50°C
CONTINUOUS

SUPPLY
24V A.C. or D.C.
TYPICALLY 10W (MOTORING)
2W (RESET)

CONTACT MADE BETWEEN 1 AND 2 WHEN DAMPER FULLY RELEASED

CONTACT MADE BETWEEN 4 AND 6 WHEN DAMPER FULLY RESET

ELECTRICAL THERMAL RELEASE (MUST BE FITTED FOR DAMPER OPERATION). (SPRING BIASED TEST SWITCH)

DIAGRAM SHOWS ACTUATOR IN FULLY RELEASED STATE

Mode 6 230V System (Also 120V Typical)

A.C. 230V
50 / 60 Hz

14 V A
12 / 4 W

-30...+50°C
CONTINUOUS

SUPPLY
230V A.C. 50/60 Hz
TYPICALLY 12W (MOTORING)
4W (RESET)

CONTACT MADE BETWEEN 1 AND 2 WHEN DAMPER FULLY RELEASED

CONTACT MADE BETWEEN 4 AND 6 WHEN DAMPER FULLY RESET

ELECTRICAL THERMAL RELEASE (MUST BE FITTED FOR DAMPER OPERATION). (SPRING BIASED TEST SWITCH)

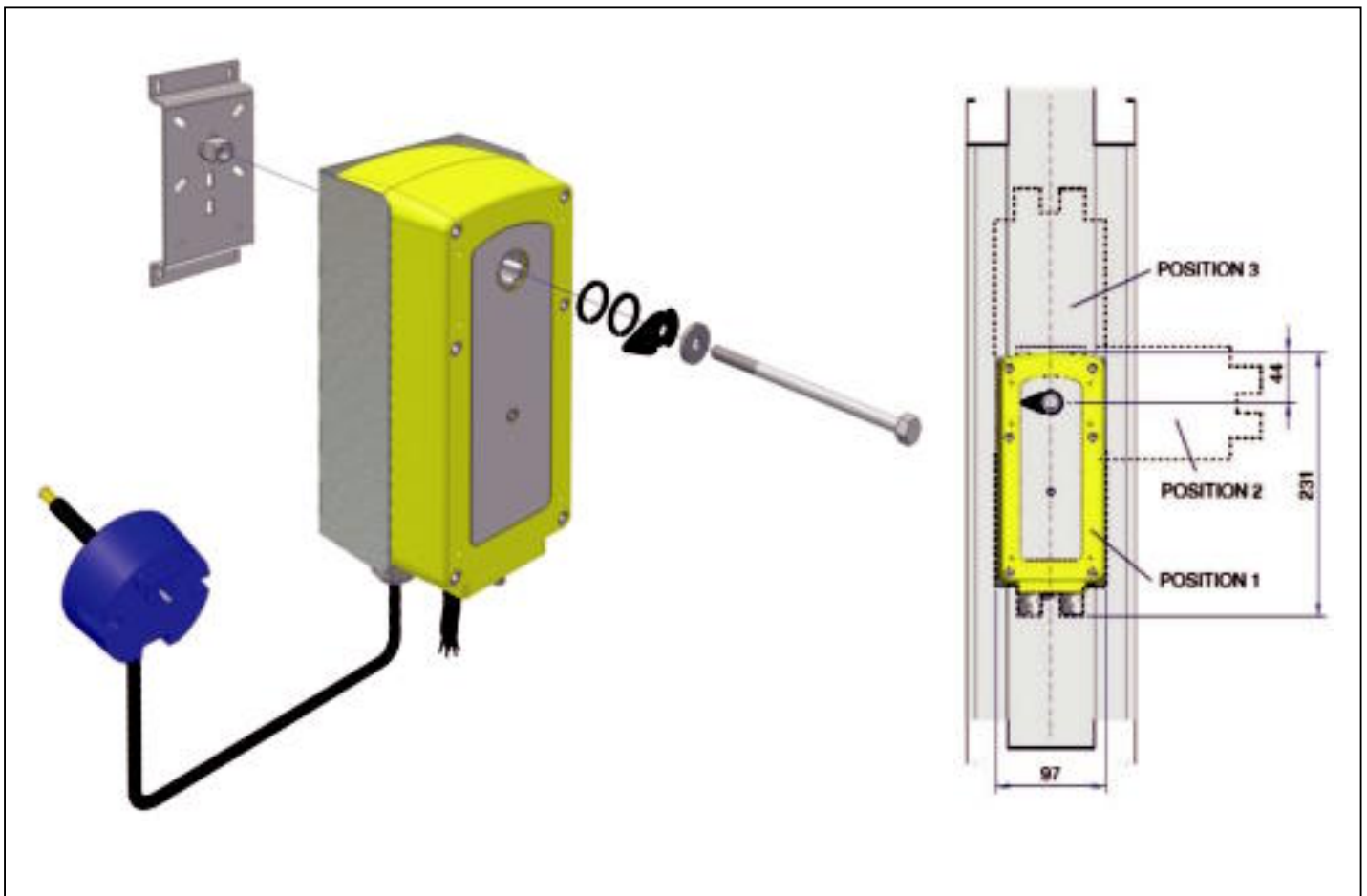
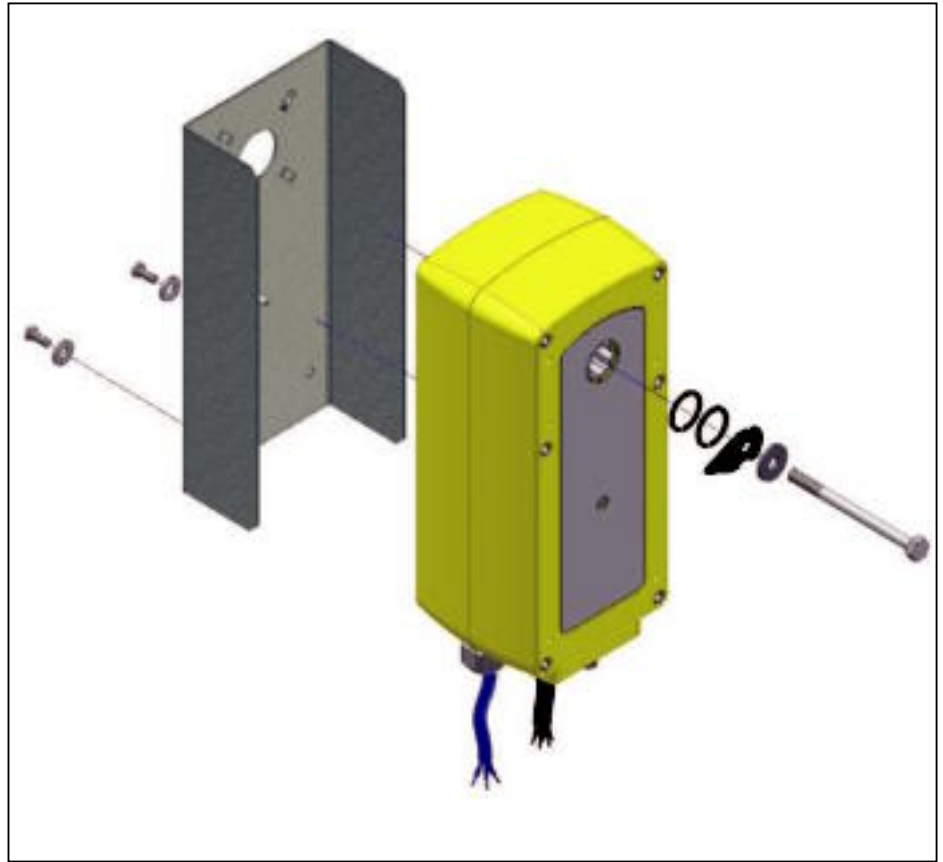
DIAGRAM SHOWS ACTUATOR IN FULLY RELEASED STATE

ATEX (Ex) Rated Control Modes

The ATEX rated Control Modes, are located outside of the ductwork for ease of access and installation.

Control Modes can be fitted in any one of three orientations, i.e. vertically down, horizontally or vertically up. Positions 1, 2, or 3.

The control modes are direct coupled to the damper utilising a unique user friendly positive connection system. This allows the dampers and actuators to be supplied separately, offering shipping and storage benefits.



ATEX (Ex) Rated Actuator, Application and Wiring

Atex (Ex) Rated Electrical Control Modes

Universal supply unit from 24 to 230V-AC/DC.

- Power On - Damper motors open.
- Power Off - Damper springs closed.
- STS Operates - Damper springs closed.
- 20W (Maximum Blocking),

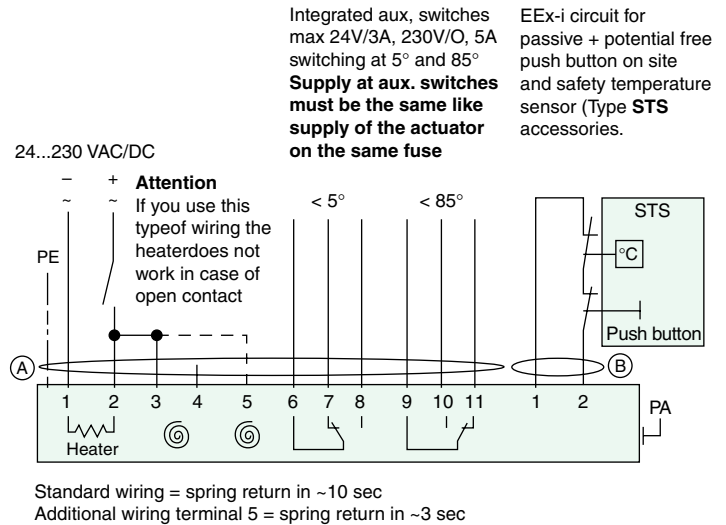
16W (Heater).

End Switches Rated at 250V 1.5 Amp (Maximum).

To isolate from main power supply, the system must incorporate a device, which disconnects the phase conductors, with at least 3mm contact gap.

A metre of halogen free, low smoke and fume electric cable is included with each control mode. The STS is also prewired with a metre of halogen free low smoke and fume cable.

On-off 1-wire-spring return + EEx-i circuit

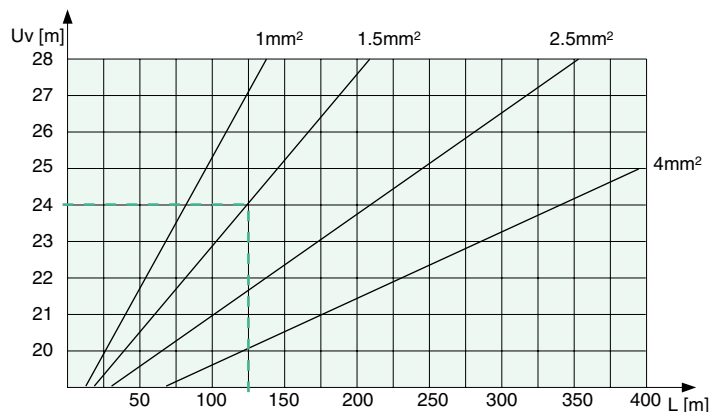


Power input depending on supply voltage

Power supply design

The design of the on-site supply, depends on the selected motor running time and selected supply voltage. Accompanying values are "about values", since there can be construction unit dispersions within electronics. The power consumption in the blocking position is run time independently with max 20W. The power consumption for the heater is approximately 16W. The heading is running only if the motor is in idle position. The initial starting supply voltage required by the actuators power supply unit is around 2.0A for about 1 sec. (Please consider this while concepting the cross section of the supply line.)

Voltage	Current	Rated current in acc. with motor running time				
		3/7,5s	15s	30s	60s	120s
230V	Irated	0.5A	0.3A	0.15A	0.10A	0.10A
120V	Irated	0.75A	0.4A	0.3A	0.25A	0.25A
48V	Irated	2.0A	0.5A	0.3A	0.2A	0.2A
24V	Irated	4.7A	1.45A	0.52A	0.4A	0.4A



Example:
24V power supply with diameter 1.5mm² = 126m

Dimensioning of the line cross section with 24...48 Volt AC/DC supply voltages

Dimensioning / Design of the supply line

On long distances between voltage and drive, voltage drops occur due to line resistances. As a consequence with 24V AC/DC the actuator receives a too low tension and does not start. In order to prevent this, the cross section of the inlet line is to be designed/dimensioned accordingly. The accompanying formula allows the calculation of the necessary line cross section, perhaps provides the maximally conduit length utilising the existing line cross section. Alternatively the secondary voltage can be increased by selecting a transformer.

For calculation purposes, following characteristics are essential:

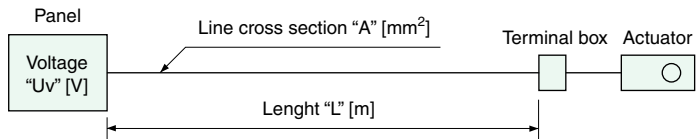
UV = supply voltage in [V]

A = line cross section in [mm²]

L = conduit length in [m]

Factor 0.0714 = drive-specific factor

[Vmm²/m] 9 based on the electrical conductivity of electrolytic copper with a coefficient of 56/Wmm²)



Formula for maximum cable length "L" at cable cross section "A"

$$L = A \cdot (Uv - 18V) : 0.0714$$

Example:

A = 1.5mm², Uv = 24V
Length of cable L = 126m

Formula of needed cable cross section "A" at a cable length of "L"

$$A = 0.0714 \cdot L : (Uv - 18V)$$

Example:

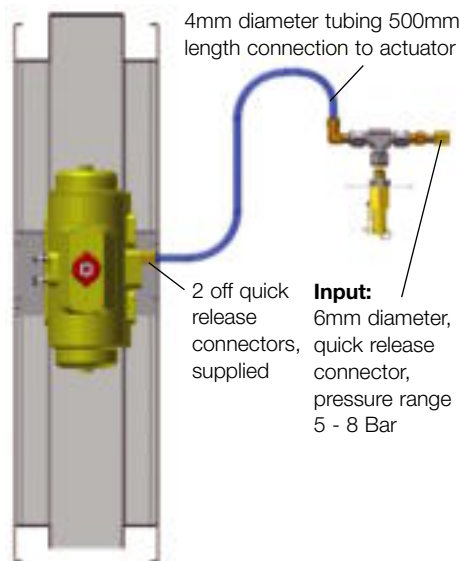
L = 250m, Uv = 30V
Cross section of A = 1.5mm²

Pneumatic Control Mode

All dimension are in millimetres



Pneumatic Thermal Release (PTR)



Pneumatic Operation

Air On - Damper opens.
Air Off - Spring closure.

Release time \approx 2 - 4 secs.
Reset time \approx 2 - 4 secs.

Air inlet 6mm dia. quick fit coupling.

74 °C Pneumatic Thermal Release (PTR).

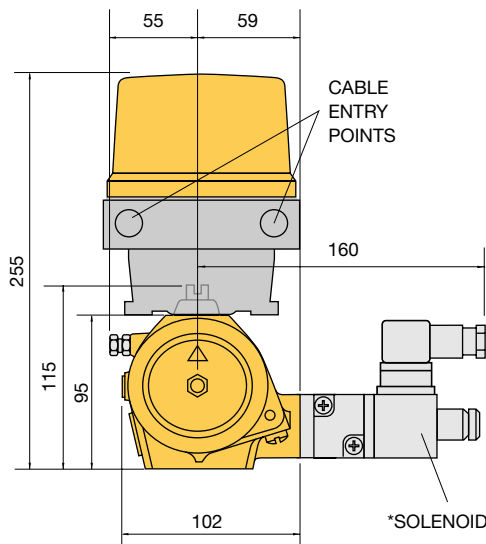
Air consumption to reset @ 5.5 bar = 535cc.

External mechanical position indicator.

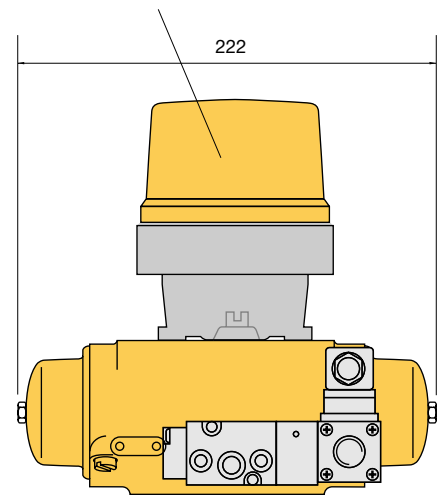
Test operation by removing fusible link element.

Dimensional Data

Pneumatic Spring Return Actuator

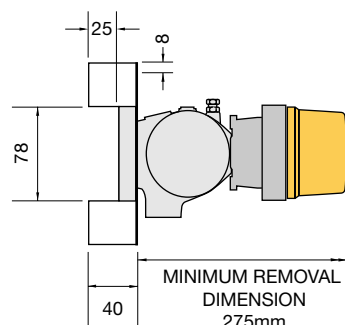


*SWITCHBOX / STATUS BEACON



*Optional Extras

Pneumatic Actuator

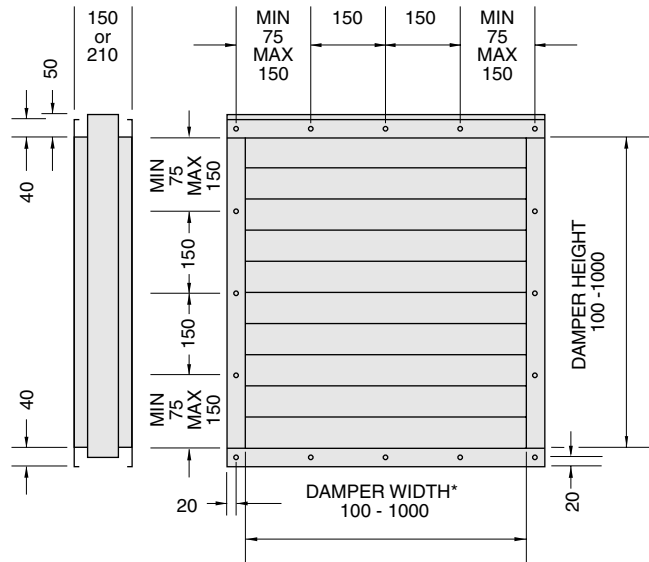


Plan view cross section showing Control Mode dimensions

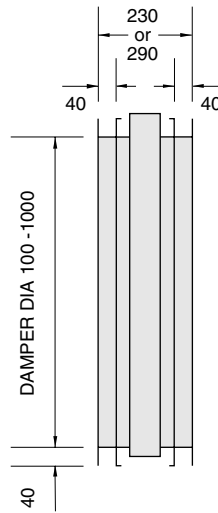
Dimensional Data

All dimension are in millimetres

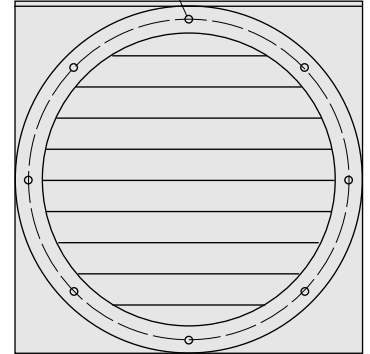
Square and Rectangular (A-60 RECT)



Circular (A-60 CIRC)



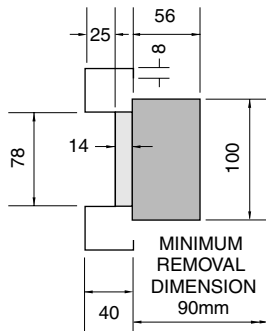
SEE TABLE BELOW FOR NUMBER OF HOLES, TO BE EQUALLY SPACED ON PCD
ALIGNMENT OF HOLES TAKEN FROM CENTRE LINE OF SQUARE SECTION PLATE



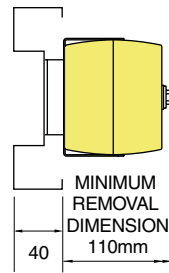
PCD = NOM .
DIA. + 40mm

HOLE DIM.
SEE TABLE
BELOW

Electrical Actuator



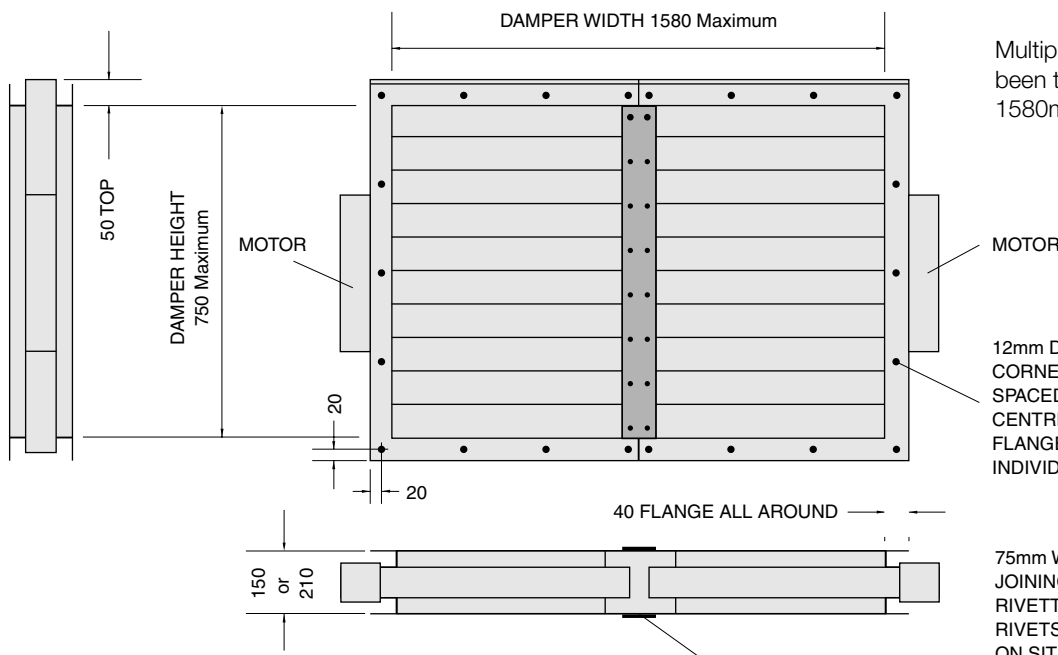
Atex Electrical



Circular Damper Fixing Hole Details

Damper Dia.	No. of Holes	Hole Dia.
100 - 250	4 off	7.0
251 - 500	8 off	10.0
501 - 750	12 off	12.0
751 - 1000	16 off	12.0

Multiple Assemblies



Multiple width assemblies (2 x 1) have been tested and approved to a size of 1580mm wide x 750mm high.

12mm DIA. HOLES IN EACH CORNER AND EQUALLY SPACED AT 150mm MAX. CENTRES BOTH SIDES OF FLANGES ON EACH INDIVIDUAL DAMPER

75mm WIDE JOINING STRIP. (BOTH SIDES) RIVETTED WITH 3.2mm STEEL RIVETS AT 100mm CENTRES, ON SITE BY OTHERS

Weights 1.2mm Galvanised Casings, 150mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)

	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
100	3.0	3.4	3.8	4.2	4.6	5.1	5.5	5.9	6.3	6.7	7.1	7.6	8.0	8.4	8.8	9.2	9.7	10.1	10.5
150	3.9	4.3	4.8	5.2	5.7	6.1	6.6	7.0	7.5	7.9	8.4	8.8	9.3	9.7	10.2	10.6	11.1	11.5	12.0
200	4.1	4.6	5.0	5.5	5.9	6.4	6.9	7.3	7.8	8.2	8.7	9.1	9.6	10.0	10.5	10.9	11.4	11.8	12.3
250	4.7	5.2	5.7	6.2	6.7	7.2	7.6	8.1	8.6	9.1	9.6	10.1	10.5	11.0	11.5	12.0	12.5	13.0	13.5
300	5.3	5.8	6.4	6.9	7.4	7.9	8.4	8.9	9.5	10.0	10.5	11.0	11.5	12.1	12.6	13.1	13.6	14.1	14.7
350	5.6	6.1	6.6	7.2	7.7	8.2	8.7	9.2	9.7	10.3	10.8	11.3	11.8	12.3	12.9	13.4	13.9	14.4	14.9
400	6.2	6.7	7.3	7.8	8.4	8.9	9.5	10.0	10.6	11.1	11.7	12.2	12.8	13.3	13.9	14.5	15.0	15.6	16.1
450	7.1	7.7	8.3	8.9	9.5	10.1	10.6	11.2	11.8	12.4	13.0	13.6	14.2	14.7	15.3	15.9	16.5	17.1	17.7
500	7.4	8.0	8.6	9.2	9.7	10.3	10.9	11.5	12.1	12.7	13.3	13.8	14.4	15.0	15.6	16.2	16.8	17.4	18.0
550	8.0	8.6	9.2	9.9	10.5	11.1	11.7	12.3	13.0	13.6	14.2	14.8	15.4	16.1	16.7	17.3	17.9	18.5	19.2
600	8.6	9.3	9.9	10.6	11.2	11.9	12.5	13.2	13.8	14.5	15.1	15.8	16.4	17.1	17.7	18.4	19.0	19.7	20.4
650	8.9	9.5	10.2	10.8	11.5	12.1	12.8	13.4	14.1	14.8	15.4	16.1	16.7	17.4	18.0	18.7	19.3	20.0	20.6
700	9.5	10.2	10.9	11.5	12.2	12.9	13.6	14.3	15.0	15.7	16.3	17.0	17.7	18.4	19.1	19.8	20.5	21.2	21.8
750	10.1	10.8	11.5	12.2	13.0	13.7	14.4	15.1	15.8	16.6	17.3	18.0	18.7	19.4	20.2	20.9	21.6	22.3	23.0
800	10.3	11.1	11.8	12.5	13.2	13.9	14.7	15.4	16.1	16.8	17.5	18.3	19.0	19.7	20.4	21.2	21.9	22.6	23.3
850	11.0	11.7	12.5	13.2	14.0	14.7	15.5	16.2	17.0	17.7	18.5	19.2	20.0	20.7	21.5	22.3	23.0	23.8	24.5
900	11.5	12.3	13.1	13.9	14.7	15.5	16.3	17.1	17.8	18.6	19.4	20.2	21.0	21.8	22.6	23.4	24.1	24.9	25.7
950	11.8	12.6	13.4	14.2	15.0	15.8	16.5	17.3	18.1	18.9	19.7	20.5	21.3	22.1	22.8	23.6	24.4	25.2	26.0
1000	12.4	13.2	14.1	14.9	15.7	16.5	17.4	18.2	19.0	19.8	20.6	21.5	22.3	23.1	23.9	24.7	25.6	26.4	27.2

Calculated Weights (kg) of A-60 Circular (Excluding Actuator)

100 Dia.	4.6
150 Dia.	6.8
200 Dia.	8.1
250 Dia.	9.8
300 Dia.	12.0
350 Dia.	13.4
400 Dia.	15.4
450 Dia.	18.2
500 Dia.	19.8
550 Dia.	22.0
600 Dia.	24.6
650 Dia.	26.4
700 Dia.	28.9
750 Dia.	31.7
800 Dia.	33.6
850 Dia.	36.3
900 Dia.	39.4
950 Dia.	41.5
1000 Dia.	44.5

Compact Including Adaptor Plate 1.85kg

Pneumatic Including Adaptor Plate 3.00kg

Universal Including Adaptor Plate 3.00kg

Electrical Atex Including Adaptor Plate 3.50kg

Weights 2mm Galvanised Casings, 150mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)

	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
100	4.1	4.7	5.3	5.9	6.4	7.0	7.6	8.2	8.8	9.4	10.0	10.6	11.1	11.7	12.3	12.9	13.5	14.1	14.7
150	5.2	5.8	6.4	7.0	7.6	8.3	8.9	9.5	10.1	10.7	11.3	12.0	12.6	13.2	13.8	14.5	15.1	15.7	16.3
200	5.6	6.2	6.8	7.4	8.1	8.7	9.3	9.9	10.5	11.2	11.8	12.4	13.0	13.6	14.3	14.9	15.5	16.1	16.7
250	6.3	7.0	7.6	8.3	8.9	9.6	10.2	10.9	11.5	12.2	12.8	13.5	14.2	14.8	15.5	16.1	16.8	17.4	18.1
300	7.1	7.8	8.4	9.1	9.8	10.5	11.2	11.9	12.6	13.2	13.9	14.6	15.3	16.0	16.7	17.4	18.0	18.7	19.4
350	7.5	8.2	8.9	9.6	10.2	10.9	11.6	12.3	13.0	13.7	14.4	15.0	15.7	16.4	17.1	17.8	18.5	19.2	19.9
400	8.2	8.9	9.7	10.4	11.1	11.8	12.5	13.3	14.0	14.7	15.4	16.1	16.9	17.6	18.3	19.0	19.7	20.5	21.2
450	9.3	10.1	10.8	11.6	12.3	13.1	13.9	14.6	15.4	16.1	16.9	17.6	18.4	19.1	19.9	20.6	21.4	22.2	22.9
500	9.8	10.5	11.3	12.0	12.8	13.5	14.3	15.0	15.8	16.5	17.3	18.1	18.8	19.6	20.3	21.1	21.8	22.6	23.3
550	10.5	11.3	12.1	12.9	13.7	14.5	15.2	16.0	16.8	17.6	18.4	19.2	20.0	20.8	21.5	22.3	23.1	23.9	24.7
600	11.3	12.1	12.9	13.7	14.5	15.4	16.2	17.0	17.8	18.7	19.5	20.3	21.1	21.9	22.8	23.6	24.4	25.2	26.0
650	11.7	12.5	13.3	14.2	15.0	15.8	16.6	17.4	18.3	19.1	19.9	20.7	21.5	22.4	23.2	24.0	24.8	25.6	26.5
700	12.4	13.3	14.2	15.0	15.9	16.7	17.6	18.4	19.3	20.1	21.0	21.8	22.7	23.6	24.4	25.3	26.1	27.0	27.8
750	13.2	14.1	15.0	15.9	16.7	17.6	18.5	19.4	20.3	21.2	22.1	23.0	23.9	24.7	25.6	26.5	27.4	28.3	29.2
800	13.6	14.5	15.4	16.3	17.2	18.1	18.9	19.8	20.7	21.6	22.5	23.4	24.3	25.2	26.1	26.9	27.8	28.7	29.6
850	14.4	15.3	16.2	17.1	18.1	19.0	19.9	20.8	21.7	22.7	23.6	24.5	25.4	26.4	27.3	28.2	29.1	30.0	31.0
900	15.1	16.1	17.0	18.0	18.9	19.9	20.9	21.8	22.8	23.7	24.7	25.6	26.6	27.5	28.5	29.5	30.4	31.4	32.3
950	15.5	16.5	17.5	18.4	19.4	20.3	21.3	22.2	23.2	24.1	25.1	26.1	27.0	28.0	28.9	29.9	30.8	31.8	32.8
1000	16.3	17.3	18.3	19.3	20.3	21.2	22.2	23.2	24.2	25.2	26.2	27.2	28.2	29.2	30.2	31.1	32.1	33.1	34.1

Calculated Weights (kg) of A-60 Circular (Excluding Actuator)

100 Dia.	6.1
150 Dia.	8.8
200 Dia.	10.7
250 Dia.	12.9
300 Dia.	15.6
350 Dia.	17.6
400 Dia.	20.1
450 Dia.	23.4
500 Dia.	25.6
550 Dia.	28.4
600 Dia.	31.6
650 Dia.	33.9
700 Dia.	37.0
750 Dia.	40.5
800 Dia.	43.0
850 Dia.	46.3
900 Dia.	50.1
950 Dia.	52.7
1000 Dia.	56.4

Compact Including Adaptor Plate 1.85kg

Pneumatic Including Adaptor Plate 3.00kg

Universal Including Adaptor Plate 3.00kg

Electrical Atex Including Adaptor Plate 3.50kg

Weights 3mm Galvanised Casings, 150mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)																				Calculated Weights (kg) of A-60 Circular (Excluding Actuator)	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	100 Dia.	150 Dia.
100	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.1	11.9	12.7	13.5	14.3	15.1	15.9	16.7	17.5	18.3	19.1	19.9	8.4	
150	6.8	7.6	8.4	9.3	10.1	10.9	11.8	12.6	13.4	14.3	15.1	15.9	16.8	17.6	18.4	19.3	20.1	20.9	21.8	11.9	
200	7.4	8.2	9.1	9.9	10.7	11.6	12.4	13.2	14.0	14.9	15.7	16.5	17.4	18.2	19.0	19.9	20.7	21.5	22.4	14.5	
250	8.3	9.2	10.1	10.9	11.8	12.7	13.5	14.4	15.2	16.1	17.0	17.8	18.7	19.6	20.4	21.3	22.2	23.0	23.9	17.6	
300	9.3	10.2	11.1	12.0	12.9	13.8	14.7	15.6	16.5	17.4	18.2	19.2	20.1	20.9	21.8	22.8	23.6	24.5	25.4	21.1	
350	9.9	10.8	11.7	12.6	13.5	14.4	15.3	16.2	17.1	18.0	18.9	19.8	20.7	21.6	22.5	23.4	24.3	25.2	26.1	23.9	
400	10.8	11.7	12.7	13.6	14.5	15.5	16.4	17.3	18.3	19.2	20.1	21.1	22.0	22.9	23.9	24.8	25.7	26.7	27.6	27.3	
450	12.1	13.1	14.0	15.0	16.0	16.9	17.9	18.9	19.8	20.8	21.8	22.7	23.7	24.7	25.6	26.6	27.6	28.5	29.5	31.5	
500	12.7	13.7	14.7	15.6	16.6	17.6	18.5	19.5	20.5	21.4	22.4	23.4	24.3	25.3	26.3	27.2	28.2	29.2	30.1	34.5	
550	13.7	14.7	15.7	16.7	17.7	18.7	19.7	20.7	21.7	22.7	23.7	24.7	25.7	26.7	27.7	28.7	29.7	30.7	31.7	38.2	
600	14.6	15.6	16.7	17.7	18.7	19.8	20.8	21.8	22.9	23.9	24.9	26.0	27.0	28.0	29.1	30.1	31.1	32.2	33.2	42.4	
650	15.2	16.3	17.3	18.3	19.4	20.4	21.4	22.5	23.5	24.5	25.6	26.6	27.6	28.7	29.7	30.7	31.8	32.8	33.8	45.6	
700	16.2	17.2	18.3	19.4	20.4	21.5	22.6	23.6	24.7	25.8	26.8	27.9	29.0	30.1	31.1	32.2	33.3	34.3	35.4	49.7	
750	17.1	18.2	19.3	20.4	21.5	22.6	23.7	24.8	25.9	27.0	28.1	29.2	30.3	31.4	32.5	33.6	34.7	35.8	36.9	54.1	
800	17.7	18.8	19.9	21.0	22.1	23.2	24.3	25.4	26.5	27.6	28.7	29.8	31.0	32.0	33.1	34.3	35.3	36.5	37.6	57.6	
850	18.7	19.8	21.0	22.1	23.2	24.4	25.5	26.6	27.8	28.9	30.0	31.2	32.3	33.4	34.6	35.7	36.8	38.0	39.1	61.9	
900	19.6	20.8	22.0	23.1	24.3	25.5	26.6	27.8	29.0	30.1	31.3	32.5	33.6	34.8	36.0	37.2	38.3	39.5	40.7	66.7	
950	20.2	21.4	22.6	23.8	24.9	26.1	27.3	28.4	29.6	30.8	31.9	33.1	34.3	35.4	36.6	37.8	38.9	40.1	41.3	70.4	
1000	21.2	22.4	23.6	24.8	26.0	27.2	28.4	29.6	30.8	32.0	33.2	34.4	35.6	36.8	38.0	39.2	40.4	41.6	42.8	75.1	

Compact	Including Adaptor Plate	1.85kg	Pneumatic	Including Adaptor Plate	3.00kg
Universal	Including Adaptor Plate	3.00kg	Electrical Atex	Including Adaptor Plate	3.50kg

Weights 1.2mm 316 Stainless Steel Casings, 150mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)																				Calculated Weights (kg) of A-60 Circular (Excluding Actuator)	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	100 Dia.	150 Dia.
100	3.0	3.4	3.9	4.3	4.7	5.1	5.6	6.0	6.4	6.8	7.3	7.7	8.1	8.5	9.0	9.4	9.8	10.2	10.7	4.7	
150	3.9	4.4	4.8	5.3	5.8	6.2	6.7	7.1	7.6	8.1	8.5	9.0	9.5	9.9	10.4	10.8	11.3	11.8	12.2	6.9	
200	4.2	4.6	5.1	5.6	6.0	6.5	7.0	7.4	7.9	8.3	8.8	9.3	9.7	10.2	10.6	11.1	11.6	12.0	12.5	8.2	
250	4.8	5.3	5.8	6.3	6.8	7.3	7.8	8.3	8.8	9.3	9.7	10.2	10.7	11.2	11.7	12.2	12.7	13.2	13.7	10.0	
300	5.4	5.9	6.4	7.0	7.5	8.0	8.6	9.1	9.6	10.2	10.7	11.2	11.8	12.3	12.8	13.4	13.9	14.4	15.0	12.2	
350	5.7	6.2	6.7	7.3	7.8	8.3	8.9	9.4	9.9	10.5	11.0	11.5	12.1	12.6	13.1	13.6	14.2	14.7	15.2	13.7	
400	6.2	6.8	7.4	8.0	8.5	9.1	9.7	10.2	10.8	11.4	11.9	12.5	13.1	13.6	14.2	14.8	15.3	15.9	16.5	15.7	
450	7.2	7.8	8.4	9.0	9.6	10.2	10.8	11.4	12.0	12.7	13.2	13.9	14.5	15.1	15.7	16.3	16.9	17.5	18.1	18.5	
500	7.5	8.1	8.7	9.3	9.9	10.5	11.1	11.7	12.3	12.9	13.5	14.1	14.7	15.3	15.9	16.5	17.1	17.8	18.4	20.1	
550	8.1	8.7	9.4	10.0	10.7	11.3	11.9	12.6	13.2	13.9	14.5	15.1	15.8	16.4	17.1	17.7	18.3	19.0	19.6	22.4	
600	8.7	9.4	10.1	10.7	11.4	12.1	12.8	13.4	14.1	14.8	15.5	16.1	16.8	17.5	18.2	18.8	19.5	20.2	20.9	25.1	
650	9.0	9.7	10.3	11.0	11.7	12.4	13.0	13.7	14.4	15.1	15.7	16.4	17.1	17.8	18.4	19.1	19.8	20.5	21.1	26.9	
700	9.6	10.3	11.0	11.7	12.4	13.1	13.9	14.6	15.3	16.0	16.7	17.4	18.1	18.8	19.5	20.3	21.0	21.7	22.4	29.5	
750	10.2	10.9	11.7	12.4	13.2	13.9	14.7	15.4	16.2	16.9	17.7	18.4	19.2	19.9	20.6	21.4	22.1	22.9	23.6	32.4	
800	10.5	11.2	12.0	12.7	13.5	14.2	15.0	15.7	16.4	17.2	17.9	18.7	19.4	20.2	20.9	21.7	22.4	23.2	23.9	34.3	
850	11.1	11.9	12.6	13.4	14.2	15.0	15.8	16.6	17.3	18.1	18.9	19.7	20.5	21.2	22.0	22.8	23.6	24.4	25.2	37.1	
900	11.7	12.5	13.3	14.1	15.0	15.8	16.6	17.4	18.2	19.0	19.9	20.7	21.5	22.3	23.1	24.0	24.8	25.6	26.4	40.4	
950	12.0	12.8	13.6	14.4	15.2	16.1	16.9	17.7	18.5	19.3	20.1	21.0	21.8	22.6	23.4	24.2	25.0	25.9	26.7	42.4	
1000	12.6	13.4	14.3	15.1	16.0	16.8	17.7	18.5	19.4	20.3	21.1	22.0	22.8	23.7	24.5	25.4	26.2	27.1	27.9	45.5	

Compact	Including Adaptor Plate	1.85kg	Pneumatic	Including Adaptor Plate	3.00kg
Universal	Including Adaptor Plate	3.00kg	Electrical Atex	Including Adaptor Plate	3.50kg

Weights 2mm 316 Stainless Steel Casings, 150mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)																				Calculated Weights (kg) of A-60 Circular (Excluding Actuator)	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	100 Dia.	150 Dia.
100	4.2	4.8	5.3	5.9	6.5	7.1	7.7	8.3	8.9	9.5	10.1	10.7	11.3	11.9	12.5	13.1	13.7	14.3	14.9	6.2	
150	5.2	5.8	6.5	7.1	7.7	8.4	9.0	9.6	10.3	10.9	11.5	12.2	12.8	13.4	14.1	14.7	15.3	16.0	16.6	9.0	
200	5.6	6.3	6.9	7.5	8.2	8.8	9.4	10.1	10.7	11.3	12.0	12.6	13.2	13.9	14.5	15.1	15.7	16.4	17.0	10.8	
250	6.4	7.1	7.7	8.4	9.1	9.7	10.4	11.1	11.7	12.4	13.1	13.7	14.4	15.1	15.7	16.4	17.1	17.7	18.4	13.1	
300	7.2	7.8	8.6	9.3	10.0	10.7	11.4	12.1	12.8	13.5	14.2	14.9	15.6	16.3	17.0	17.7	18.4	19.1	19.8	15.9	
350	7.6	8.3	9.0	9.7	10.4	11.1	11.8	12.5	13.2	13.9	14.6	15.3	16.0	16.7	17.4	18.1	18.8	19.5	20.2	17.9	
400	8.3	9.1	9.8	10.5	11.3	12.0	12.8	13.5	14.2	15.0	15.7	16.4	17.2	17.9	18.7	19.4	20.1	20.9	21.6	20.5	
450	9.4	10.2	11.0	11.8	12.5	13.3	14.1	14.9	15.6	16.4	17.2	18.0	18.7	19.5	20.3	21.1	21.8	22.6	23.4	23.8	
500	9.9	10.6	11.4	12.2	13.0	13.7	14.5	15.3	16.1	16.8	17.6	18.4	19.2	19.9	20.7	21.5	22.3	23.0	23.8	26.0	
550	10.6	11.4	12.3	13.1	13.9	14.7	15.5	16.3	17.1	17.9	18.7	19.5	20.4	21.2	22.0	22.8	23.6	24.4	25.2	28.9	
600	11.4	12.2	13.1	13.9	14.8	15.6	16.5	17.3	18.2	19.0	19.8	20.7	21.5	22.4	23.2	24.1	24.9	25.8	26.6	32.2	
650	11.8	12.7	13.5	14.4	15.2	16.1	16.9	17.7	18.6	19.4	20.3	21.1	22.0	22.8	23.7	24.5	25.4	26.2	27.0	34.6	
700	12.6	13.5	14.4	15.2	16.1	17.0	17.9	18.8	19.6	20.5	21.4	22.3	23.2	24.0	24.9	25.8	26.7	27.6	28.5	37.8	
750	13.4	14.3	15.2	16.1	17.0	17.9	18.9	19.8	20.7	21.6	22.5	23.4	24.4	25.3	26.2	27.1	28.0	28.9	29.9	41.3	
800	13.8	14.7	15.6	16.5	17.4	18.4	19.3	20.2	21.1	22.0	22.9	23.9	24.8	25.7	26.6	27.5	28.4	29.4	30.3	43.8	
850	14.5	15.5	16.4	17.4	18.4	19.3	20.3	21.2	22.2	23.1	24.1	25.0	26.0	26.9	27.9	28.8	29.8	30.7	31.7	47.3	
900	15.3	16.3	17.3	18.3	19.3	20.2	21.2	22.2	23.2	24.2	25.2	26.2	27.2	28.1	29.1	30.1	31.1	32.1	33.1	51.1	
950	15.7	16.7	17.7	18.7	19.7	20.7	21.7	22.6	23.6	24.6	25.6	26.6	27.6	28.6	29.6	30.6	31.5	32.5	33.5	53.9	
1000	16.5	17.5	18.5	19.6	20.6	21.6	22.6	23.7	24.7	25.7	26.7	27.8	28.8	29.8	30.8	31.9	32.9	33.9	34.9	57.6	

Compact Including Adaptor Plate 1.85kg

Universal Including Adaptor Plate 3.00kg

Pneumatic Including Adaptor Plate 3.00kg

Electrical Atex Including Adaptor Plate 3.50kg

Weights 3mm 316 Stainless Steel Casings, 150mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)																				Calculated Weights (kg) of A-60 Circular (Excluding Actuator)	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	100 Dia.	150 Dia.
100	5.6	6.4	7.2	8.0	8.8	9.6	10.4	11.2	12.0	12.9	13.7	14.5	15.3	16.1	16.9	17.7	18.5	19.3	20.1	8.5	
150	6.8	7.7	8.5	9.4	10.2	11.1	11.9	12.7	13.6	14.4	15.3	16.1	17.0	17.8	18.6	19.5	20.3	21.2	22.0	12.1	
200	7.5	8.3	9.1	10.0	10.8	11.7	12.5	13.4	14.2	15.1	15.9	16.7	17.6	18.4	19.3	20.1	20.9	21.8	22.6	14.7	
250	8.4	9.3	10.2	11.0	11.9	12.8	13.7	14.5	15.4	16.3	17.2	18.1	18.9	19.8	20.7	21.6	22.5	23.3	24.2	17.8	
300	9.3	10.3	11.2	12.1	13.0	13.9	14.8	15.7	16.7	17.6	18.5	19.4	20.3	21.2	22.2	23.1	24.0	24.9	25.8	21.4	
350	10.0	10.9	11.8	12.7	13.6	14.5	15.5	16.4	17.3	18.2	19.1	20.0	20.9	21.9	22.8	23.7	24.6	25.5	26.4	24.2	
400	10.9	11.8	12.8	13.8	14.7	15.7	16.6	17.5	18.5	19.5	20.4	21.4	22.3	23.3	24.2	25.2	26.1	27.1	28.0	27.7	
450	12.2	13.2	14.2	15.2	16.2	17.1	18.1	19.1	20.1	21.1	22.1	23.1	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.9	
500	12.8	13.8	14.8	15.8	16.8	17.8	18.8	19.7	20.7	21.7	22.7	23.7	24.7	25.7	26.6	27.6	28.6	29.6	30.6	35.0	
550	13.8	14.8	15.8	16.9	17.9	18.9	19.9	20.9	22.0	23.0	24.0	25.0	26.1	27.1	28.1	29.1	30.1	31.2	32.2	38.8	
600	14.7	15.8	16.9	17.9	19.0	20.0	21.1	22.1	23.2	24.3	25.3	26.4	27.4	28.5	29.5	30.6	31.7	32.7	33.8	43.1	
650	15.4	16.4	17.5	18.5	19.6	20.7	21.7	22.8	23.8	24.9	25.9	27.0	28.1	29.1	30.2	31.2	32.3	33.3	34.4	46.4	
700	16.3	17.4	18.5	19.6	20.7	21.8	22.9	24.0	25.1	26.2	27.3	28.3	29.4	30.5	31.6	32.7	33.8	34.9	36.0	50.5	
750	17.3	18.4	19.5	20.7	21.8	22.9	24.0	25.2	26.3	27.4	28.6	29.7	30.8	31.9	33.1	34.2	35.3	36.5	37.6	55.1	
800	17.9	19.0	20.2	21.3	22.4	23.5	24.7	25.8	26.9	28.1	29.2	30.3	31.4	32.6	33.7	34.8	36.0	37.1	38.2	58.6	
850	18.9	20.0	21.2	22.3	23.5	24.7	25.8	27.0	28.2	29.3	30.5	31.7	32.8	34.0	35.2	36.3	37.5	38.7	39.8	63.0	
900	19.8	21.0	22.2	23.4	24.6	25.8	27.0	28.2	29.4	30.6	31.8	33.0	34.2	35.4	36.6	37.8	39.0	40.2	41.4	67.9	
950	20.4	21.6	22.8	24.0	25.2	26.4	27.6	28.8	30.0	31.2	32.4	33.6	34.8	36.0	37.2	38.4	39.6	40.8	42.0	71.7	
1000	21.4	22.6	23.9	25.1	26.3	27.6	28.8	30.0	31.3	32.5	33.7	35.0	36.2	37.4	38.7	39.9	41.2	42.4	43.6	76.5	

Compact Including Adaptor Plate 1.85kg

Universal Including Adaptor Plate 3.00kg

Pneumatic Including Adaptor Plate 3.00kg

Electrical Atex Including Adaptor Plate 3.50kg

Weights 2mm Galvanised Casings, 210mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)																				Calculated Weights (kg) of A-60 Circular (Excluding Actuator)	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	100 Dia.	150 Dia.
100	4.8	5.5	6.1	6.8	7.5	8.2	8.9	9.5	10.2	10.9	11.6	12.3	12.9	13.6	14.3	15.0	15.7	16.3	17.0	6.8	
150	5.9	6.6	7.3	8.1	8.8	9.5	10.2	10.9	11.6	12.3	13.1	13.8	14.5	15.2	15.9	16.6	17.3	18.1	18.8	9.7	
200	6.4	7.1	7.9	8.6	9.3	10.0	10.7	11.4	12.1	12.9	13.6	14.3	15.0	15.7	16.4	17.1	17.9	18.6	19.3	11.7	
250	7.3	8.0	8.8	9.5	10.3	11.0	11.8	12.5	13.2	14.0	14.7	15.5	16.2	17.0	17.7	18.5	19.2	20.0	20.7	14.2	
300	8.1	8.9	9.7	10.5	11.2	12.0	12.8	13.6	14.4	15.1	15.9	16.7	17.5	18.3	19.0	19.8	20.6	21.4	22.2	17.0	
350	8.6	9.4	10.2	11.0	11.8	12.5	13.3	14.1	14.9	15.7	16.4	17.2	18.0	18.8	19.6	20.3	21.1	21.9	22.7	19.2	
400	9.5	10.3	11.1	11.9	12.7	13.5	14.3	15.2	16.0	16.8	17.6	18.4	19.2	20.0	20.9	21.7	22.5	23.3	24.1	21.9	
450	10.7	11.5	12.4	13.2	14.0	14.9	15.8	16.6	17.4	18.3	19.1	20.0	20.8	21.7	22.5	23.4	24.2	25.1	25.9	25.4	
500	11.2	12.0	12.9	13.7	14.6	15.4	16.3	17.1	18.0	18.8	19.7	20.5	21.4	22.2	23.1	23.9	24.7	25.6	26.5	27.8	
550	12.0	12.9	13.8	14.7	15.6	16.4	17.3	18.2	19.1	20.0	20.8	21.7	22.6	23.5	24.4	25.3	26.1	27.0	27.9	30.8	
600	12.9	13.8	14.7	15.6	16.5	17.4	18.4	19.3	20.2	21.1	22.0	22.9	23.9	24.8	25.7	26.6	27.5	28.4	29.4	34.2	
650	13.4	14.3	15.2	16.1	17.0	18.0	18.9	19.8	20.7	21.6	22.5	23.5	24.4	25.3	26.2	27.1	28.0	29.0	29.9	36.7	
700	14.2	15.2	16.1	17.1	18.0	19.0	19.9	20.9	21.8	22.8	23.7	24.7	25.6	26.6	27.5	28.5	29.4	30.4	31.3	40.0	
750	15.1	16.1	17.0	18.0	19.0	20.0	21.0	22.0	22.9	23.9	24.9	25.9	26.9	27.9	28.8	29.8	30.8	31.8	32.8	43.6	
800	15.6	16.6	17.6	18.6	19.5	20.5	21.5	22.5	23.5	24.4	25.4	26.4	27.4	28.4	29.4	30.3	31.3	32.3	33.3	46.3	
850	16.5	17.5	18.5	19.5	20.5	21.5	22.6	23.6	24.6	25.6	26.6	27.6	28.7	29.7	30.7	31.7	32.7	33.7	34.8	49.8	
900	17.3	18.3	19.4	20.4	21.5	22.5	23.6	24.6	25.7	26.7	27.8	28.8	29.9	30.9	32.0	33.0	34.1	35.1	36.2	53.8	
950	17.8	18.9	19.9	21.0	22.0	23.1	24.1	25.2	26.2	27.3	28.3	29.4	30.4	31.5	32.5	33.6	34.6	35.7	36.7	56.6	
1000	18.7	19.7	20.8	21.9	23.0	24.1	25.2	26.2	27.3	28.4	29.5	30.6	31.7	32.7	33.8	34.9	36.0	37.1	38.2	60.4	

Compact	Including Adaptor Plate	1.85kg	Pneumatic	Including Adaptor Plate	3.00kg
Universal	Including Adaptor Plate	3.00kg	Electrical Atex	Including Adaptor Plate	3.50kg

Weights 3mm Galvanised Casings, 210mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)																				Calculated Weights (kg) of A-60 Circular (Excluding Actuator)	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	100 Dia.	150 Dia.
100	6.5	7.5	8.4	9.4	10.3	11.2	12.2	13.1	14.0	15.0	15.9	16.9	17.8	18.7	19.7	20.6	21.6	22.5	23.4	9.4	
150	7.9	8.9	9.9	10.8	11.8	12.8	13.8	14.7	15.7	16.7	17.6	18.6	19.6	20.6	21.5	22.5	23.5	24.5	25.4	13.2	
200	8.7	9.7	10.6	11.6	12.6	13.5	14.5	15.5	16.5	17.4	18.4	19.4	20.4	21.3	22.3	23.3	24.2	25.2	26.2	16.1	
250	9.8	10.8	11.8	12.8	13.8	14.8	15.8	16.8	17.8	18.8	19.8	20.8	21.8	22.8	23.8	24.9	25.9	26.9	27.9	19.4	
300	10.8	11.9	12.9	14.0	15.0	16.0	17.1	18.1	19.2	20.2	21.2	22.3	23.3	24.4	25.4	26.4	27.5	28.5	29.6	23.2	
350	11.6	12.6	13.7	14.7	15.7	16.8	17.8	18.9	19.9	21.0	22.0	23.0	24.1	25.1	26.2	27.2	28.2	29.3	30.3	26.3	
400	12.7	13.7	14.8	15.9	16.9	18.0	19.1	20.2	21.2	22.3	23.4	24.5	25.5	26.6	27.7	28.8	29.8	30.9	32.0	30.0	
450	14.1	15.2	16.3	17.4	18.5	19.6	20.7	21.8	23.0	24.1	25.2	26.3	27.4	28.5	29.6	30.7	31.8	32.9	34.0	34.4	
500	14.9	16.0	17.1	18.2	19.3	20.4	21.5	22.6	23.7	24.8	25.9	27.0	28.2	29.3	30.4	31.5	32.6	33.7	34.8	37.8	
550	15.9	17.1	18.2	19.4	20.5	21.7	22.8	23.9	25.1	26.2	27.4	28.5	29.6	30.8	31.9	33.1	34.2	35.4	36.5	41.8	
600	17.0	18.2	19.4	20.6	21.7	22.9	24.1	25.3	26.4	27.6	28.8	30.0	31.1	32.3	33.5	34.7	35.8	37.0	38.2	46.2	
650	17.8	19.0	20.1	21.3	22.5	23.7	24.8	26.0	27.2	28.4	29.5	30.7	31.9	33.1	34.2	35.4	36.6	37.8	38.9	49.7	
700	18.9	20.1	21.3	22.5	23.7	24.9	26.1	27.3	28.5	29.8	31.0	32.2	33.4	34.6	35.8	37.0	38.2	39.4	40.6	54.1	
750	20.0	21.2	22.4	23.7	24.9	26.2	27.4	28.7	29.9	31.1	32.4	33.6	34.9	36.1	37.4	38.6	39.8	41.1	42.3	58.8	
800	20.7	22.0	23.2	24.4	25.7	26.9	28.2	29.4	30.7	31.9	33.1	34.4	35.6	36.9	38.1	39.4	40.6	41.8	43.1	62.5	
850	21.8	23.1	24.4	25.6	26.9	28.2	29.5	30.7	32.0	33.3	34.6	35.8	37.1	38.4	39.7	40.9	42.2	43.5	44.8	67.2	
900	22.9	24.2	25.5	26.8	28.1	29.4	30.8	32.1	33.4	34.7	36.0	37.3	38.6	39.9	41.2	42.5	43.8	45.2	46.5	72.2	
950	23.7	25.0	26.3	27.6	28.9	30.2	31.5	32.8	34.1	35.4	36.7	38.1	39.4	40.7	42.0	43.3	44.6	45.9	47.2	76.2	
1000	24.7	26.1	27.4	28.8	30.1	31.5	32.8	34.1	35.5	36.8	38.2	39.5	40.9	42.2	43.5	44.9	46.2	47.6	48.9	81.2	

Compact	Including Adaptor Plate	1.85kg	Pneumatic	Including Adaptor Plate	3.00kg
Universal	Including Adaptor Plate	3.00kg	Electrical Atex	Including Adaptor Plate	3.50kg

Weights 2mm 316 Stainless Steel Casings, 210mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)																				Calculated Weights (kg) of A-60 Circular (Excluding Actuator)	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	100 Dia.	150 Dia.
100	4.8	5.5	6.2	6.9	7.6	8.3	9.0	9.7	10.4	11.1	11.7	12.4	13.1	13.8	14.5	15.2	15.9	16.6	17.3	6.9	9.8
150	6.0	6.7	7.4	8.2	8.9	9.6	10.4	11.1	11.8	12.5	13.3	14.0	14.7	15.4	16.2	16.9	17.6	18.4	19.1	11.9	14.4
200	6.5	7.2	8.0	8.7	9.4	10.2	10.9	11.6	12.3	13.1	13.8	14.5	15.2	16.0	16.7	17.4	18.2	18.9	19.6	17.3	19.5
250	7.4	8.1	8.9	9.6	10.4	11.2	11.9	12.7	13.5	14.2	15.0	15.8	16.5	17.3	18.0	18.8	19.6	20.3	21.1	22.3	23.1
300	8.2	9.0	9.8	10.6	11.4	12.2	13.0	13.8	14.6	15.4	16.2	17.0	17.8	18.6	19.4	20.2	21.0	21.8	22.6	25.9	28.3
350	8.7	9.5	10.3	11.1	11.9	12.7	13.5	14.3	15.1	15.9	16.7	17.5	18.3	19.1	19.9	20.7	21.5	22.3	23.1	31.3	34.8
400	9.6	10.4	11.2	12.1	12.9	13.7	14.6	15.4	16.2	17.1	17.9	18.8	19.6	20.4	21.3	22.1	22.9	23.8	24.6	37.4	40.7
450	10.8	11.7	12.5	13.4	14.3	15.1	16.0	16.9	17.8	18.6	19.5	20.4	21.2	22.1	23.0	23.8	24.7	25.6	26.5	44.5	47.2
500	11.3	12.2	13.1	13.9	14.8	15.7	16.5	17.4	18.3	19.2	20.0	20.9	21.8	22.6	23.5	24.4	25.2	26.1	27.0	50.9	55.9
550	12.2	13.1	14.0	14.9	15.8	16.7	17.6	18.5	19.4	20.3	21.2	22.1	23.1	24.0	24.9	25.8	26.7	27.6	28.5	61.7	
600	13.0	14.0	14.9	15.9	16.8	17.7	18.7	19.6	20.6	21.5	22.4	23.4	24.3	25.3	26.2	27.2	28.1	29.0	30.0		
650	13.6	14.5	15.4	16.4	17.3	18.3	19.2	20.1	21.1	22.0	23.0	23.9	24.9	25.8	26.7	27.7	28.6	29.6	30.5		
700	14.4	15.4	16.4	17.4	18.3	19.3	20.3	21.3	22.2	23.2	24.2	25.2	26.2	27.1	28.1	29.1	30.1	31.0	32.0		
750	15.3	16.3	17.3	18.3	19.3	20.3	21.4	22.4	23.4	24.4	25.4	26.4	27.4	28.4	29.5	30.5	31.5	32.5	33.5		
800	15.8	16.8	17.8	18.8	19.8	20.9	21.9	22.9	23.9	24.9	25.9	26.9	28.0	29.0	30.0	31.0	32.0	33.0	34.0		
850	16.7	17.7	18.8	19.8	20.9	21.9	23.0	24.0	25.1	26.1	27.1	28.2	29.2	30.3	31.3	32.4	33.4	34.5	35.5		
900	17.5	18.6	19.7	20.8	21.8	22.9	24.0	25.1	26.2	27.3	28.4	29.4	30.5	31.6	32.7	33.8	34.9	35.9	37.0		
950	18.0	19.1	20.2	21.3	22.4	23.5	24.5	25.6	26.7	27.8	28.9	30.0	31.1	32.1	33.2	34.3	35.4	36.5	37.6		
1000	18.9	20.0	21.1	22.3	23.4	24.5	25.6	26.7	27.9	29.0	30.1	31.2	32.3	33.5	34.6	35.7	36.8	37.9	39.1		

Compact Including Adaptor Plate 1.85kg
Universal Including Adaptor Plate 3.00kg

Pneumatic Including Adaptor Plate 3.00kg
Electrical Atex Including Adaptor Plate 3.50kg

Weights 3mm 316 Stainless Steel Casings, 210mm Deep

Calculated Weights (kg) of A-60 Rectangular (Excluding Actuator)																				Calculated Weights (kg) of A-60 Circular (Excluding Actuator)	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	100 Dia.	150 Dia.
100	6.6	7.6	8.5	9.5	10.4	11.4	12.3	13.3	14.2	15.2	16.1	17.1	18.0	19.0	19.9	20.9	21.8	22.8	23.7	9.6	13.4
150	8.0	9.0	10.0	11.0	11.9	12.9	13.9	14.9	15.9	16.9	17.9	18.9	19.8	20.8	21.8	22.8	23.8	24.8	25.8	16.3	19.7
200	8.8	9.7	10.7	11.7	12.7	13.7	14.7	15.7	16.7	17.7	18.6	19.6	20.6	21.6	22.6	23.6	24.6	25.5	26.5	23.5	26.7
250	9.8	10.9	11.9	12.9	13.9	15.0	16.0	17.0	18.0	19.1	20.1	21.1	22.1	23.1	24.2	25.2	26.2	27.2	28.3	30.4	30.4
300	10.9	12.0	13.1	14.1	15.2	16.2	17.3	18.3	19.4	20.5	21.5	22.6	23.6	24.7	25.8	26.8	27.9	28.9	30.0	35.0	38.4
350	11.7	12.8	13.8	14.9	15.9	17.0	18.1	19.1	20.2	21.2	22.3	23.3	24.4	25.5	26.5	27.6	28.6	29.7	30.8	42.4	47.0
400	12.8	13.9	15.0	16.1	17.2	18.3	19.3	20.4	21.5	22.6	23.7	24.8	25.9	27.0	28.1	29.2	30.3	31.4	32.5	50.6	55.0
450	14.2	15.4	16.5	17.6	18.8	19.9	21.0	22.1	23.3	24.4	25.5	26.7	27.8	28.9	30.1	31.2	32.3	33.5	34.6	63.6	68.4
500	15.0	16.1	17.3	18.4	19.5	20.7	21.8	22.9	24.0	25.2	26.3	27.4	28.6	29.7	30.8	32.0	33.1	34.2	35.3	73.5	77.7
550	16.1	17.3	18.4	19.6	20.8	21.9	23.1	24.3	25.4	26.6	27.8	28.9	30.1	31.3	32.4	33.6	34.8	35.9	37.1	82.7	
600	17.2	18.4	19.6	20.8	22.0	23.2	24.4	25.6	26.8	28.0	29.2	30.4	31.6	32.8	34.0	35.2	36.4	37.6	38.8		
650	18.0	19.2	20.4	21.6	22.8	24.0	25.2	26.4	27.6	28.8	30.0	31.2	32.4	33.6	34.8	36.0	37.2	38.4	39.6		
700	19.1	20.3	21.5	22.8	24.0	25.3	26.5	27.7	29.0	30.2	31.4	32.7	33.9	35.1	36.4	37.6	38.9	40.1	41.3		
750	20.2	21.4	22.7	24.0	25.2	26.5	27.8	29.1	30.3	31.6	32.9	34.2	35.4	36.7	38.0	39.3	40.5	41.8	43.1		
800	20.9	22.2	23.5	24.7	26.0	27.3	28.6	29.8	31.1	32.4	33.7	34.9	36.2	37.5	38.7	40.0	41.3	42.6	43.8		
850	22.0	23.3	24.6	26.0	27.3	28.6	29.9	31.2	32.5	33.8	35.1	36.4	37.7	39.0	40.3	41.7	43.0	44.3	45.6		
900	23.1	24.5	25.8	27.2	28.5	29.8	31.2	32.5	33.9	35.2	36.6	37.9	39.3	40.6	41.9	43.3	44.6	46.0	47.3		
950	23.9	25.2	26.6	27.9	29.3	30.6	32.0	33.3	34.6	36.0	37.3	38.7	40.0	41.4	42.7	44.1	45.4	46.7	48.1		
1000	25.0	26.4	27.7	29.1	30.5	31.9	33.3	34.6	36.0	37.4	38.8	40.2	41.6	42.9	44.3	45.7	47.1	48.4	49.8		

Compact Including Adaptor Plate 1.85kg
Universal Including Adaptor Plate 3.00kg

Pneumatic Including Adaptor Plate 3.00kg
Electrical Atex Including Adaptor Plate 3.50kg

Acoustic Data

The data presented is from the Laboratory Determination of Acoustic and Aerodynamic Performance of A-60 Marine Fire Dampers.

A programme of extensive tests was carried out by an independent test facility, approved under the NAMAS Scheme, in accordance with BRITISH STANDARDS Nos. 4196, 4773, 4856, 4857 and 4954.

From the selection of a duct velocity within the operational parameters of the damper a resultant pressure drop from Table 1 can be determined and the sum of these two components applied to the Velocity x Pressure Drop Vs Sound Power Level Graph. (Table 2).

The graph is the result of a full range of acoustic tests with the blades set in the fully open position.

The Spectrum Correction Data is applied to the number obtained from the graph and a complete Sound Spectrum of Flow Generated Noise for both Outlet (in duct) and Breakout (casing radiated) is obtained.

Example:

Duct with a design velocity of 8 m/sec and the A-60 Marine Fire Damper RECT damper blades in the fully open position.

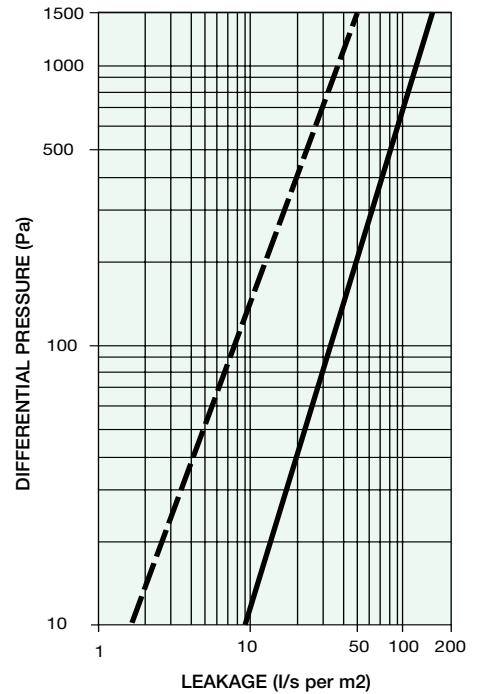
Pressure Drop = 22 Pa (Table 1).
 Multiply Velocity x Pressure Drop
 $8 \times 22 = 176$.

From Sound Power Graph (Table 2) plot 176 on horizontal Velocity/Pressure axis against the A-60 Marine Fire Damper RECT outlet (in duct) graph to obtain 47 dBW on Vertical Sound Power Level Axis. Add or subtract corrections to the 47dBW to provide full spectrum analysis.

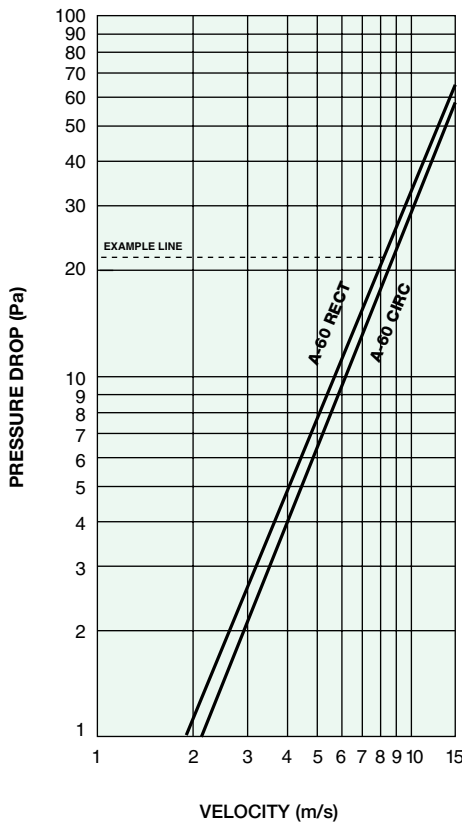
Damper Leakage Table 3

A-60 Marine Fire Damper damper closed blade leakage.

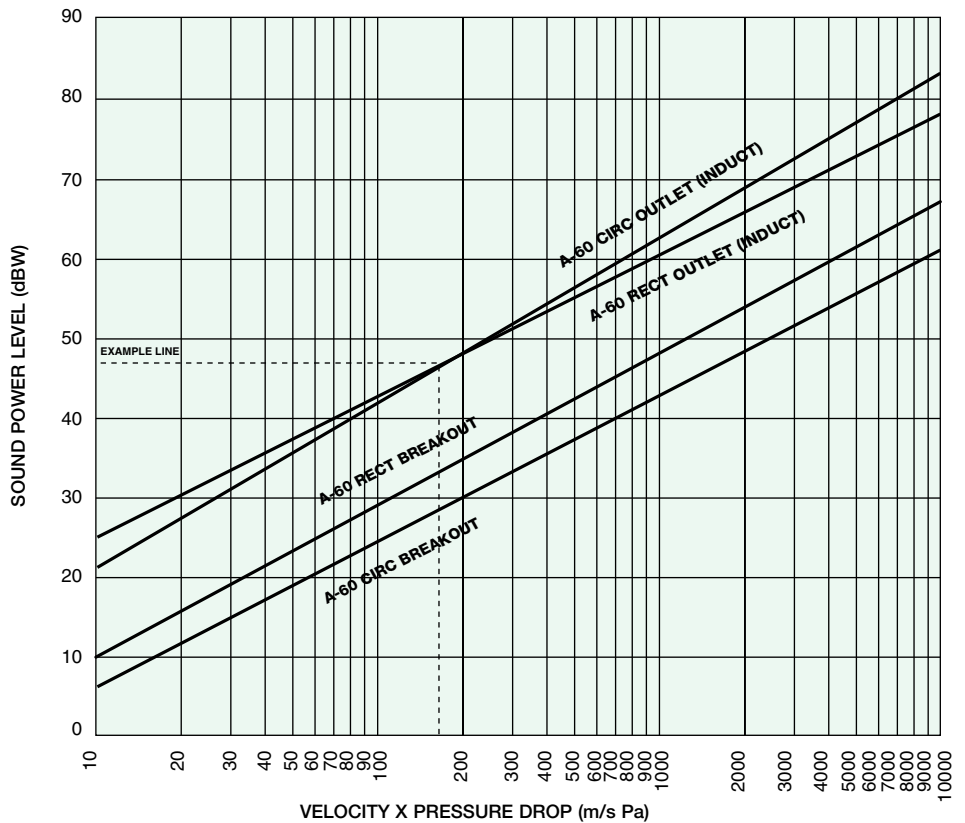
Standard (without blade seals)
Optional (with blade seals)



Pressure Drop Vs Velocity Table 1



Velocity (m/s) X Pressure Drop (Pa) Vs Sound Power Level (dBW) Table 2



Outlet (Induct) Spectrum Corrections

Octave Band	63	125	250	500	1k	2k	4k	8k
A-60 RECT	5	4	5	5	3	1	-3	-5
A-60 CIRC	9	4	4	5	3	1	-3	-6

Breakout Spectrum Corrections

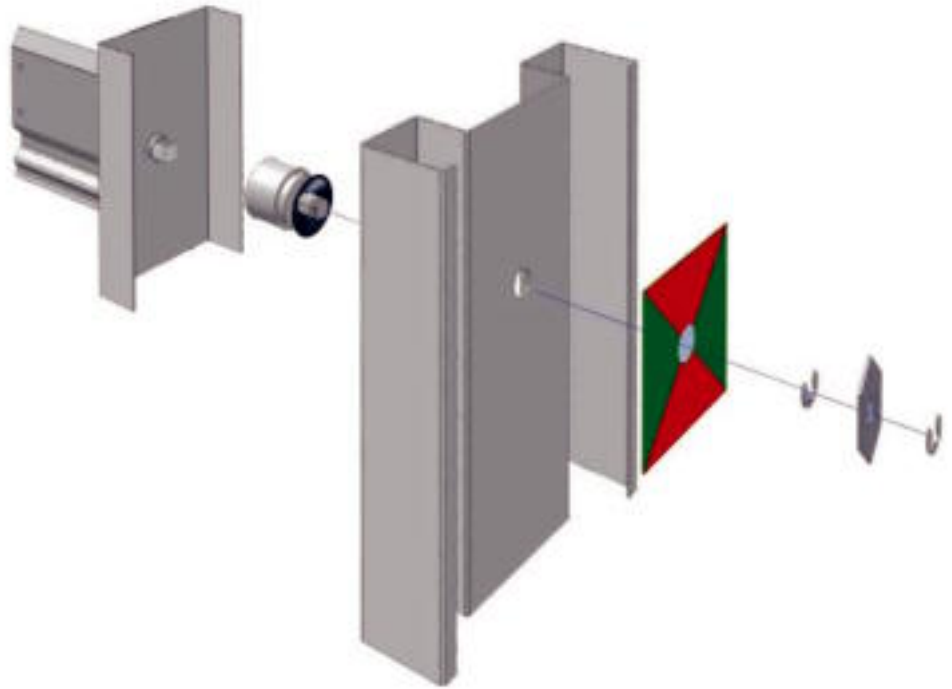
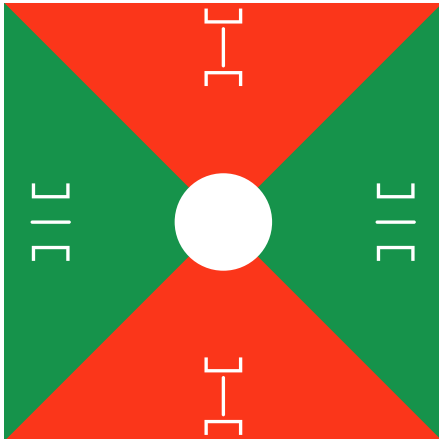
63	125	250	500	1k	2k	4k	8k	Hz
8	11	9	6	-3	-6	-14	-17	dB
6	10	8	4	-3	-3	-11	-14	dB

Visual Indication

Visual indication non drive side

Option to have drive blade visual indication, non drive side only.

Red indicates damper closed
Green indicates damper open.



Damper Release and Indication Module

Damper Release and Indication Module (DRIM)

This is designed for control and monitoring of the electrically operated A-60 Marine Fire Dampers.

It will operate from 24, 120 or 230 volt supplies, 50 or 60 Hz.

Selection of the operating voltage is by use of internal links on the PCB, prior to installation and connection of actuator and supply.

The DRIM may be used singly to provide local damper control, or in pairs to provide control from either side of a damper. It can also operate 2 actuators when dampers are provided in 2 multiple sections

LED position and operation indication is provided.

Operation is by push button to close and twist to re-open damper.

Tested to BS EN 61010 -1: 2001 and is CE compliant.

IP44 rated.

Operating range 5 - 40 degrees C.



Standard Ordering Procedure

Please Specify

Series

A-60 RECT (Galv) A-60 Marine Fire Damper 430 Ferritic Stainless Steel Blades Square or Rectangular Flanges Galvanised Casing 1.2, 2 or 3mm Casing	A-60 CIRC (Galv) A-60 Marine Fire Damper 430. Ferritic Stainless Steel Blades. Circular Flanged. Galvanised Casing. 1.2, 2 or 3mm Casing.	A-60 RECT (316) A-60 Marine Fire Damper 316 Austenitic Stainless Steel Blades. Square or Rectangular Flanges. Stainless Steel Casing. 1.2, 2 or 3mm Casing.	A-60 CIRC (316) A-60 Marine Fire Damper 316. Austenitic Stainless Steel Blades. Circular Flanged. Stainless Steel Casing. 1.2, 2 or 3mm Casing.
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Control Modes

Electric Control Mode 5	24V A.C. or D.C.
Electric Control Mode 6	230V A.C. 50/60Hz
Electric Control Mode 120	120V A.C. 50/60Hz
Pneumatic	5 - 8 Bar Air Supply
Electrical Atex	Universal voltage.

Seals

Standard	(without blade seals)
Optional	(with blade seals)
Visual Indication	- Non drive side
Casing Thickness	1.2, 2 or 3mm

Flange Holes

Drilled	(Standard)
Undrilled	(Optional)
Customer Drilling	(Optional)

Casing Depth

150 or 210mm (210 in 2 or 3mm only)

Accessories (Electrical)

Part Number



Damper Release and Indication Module
Push off, Twist on,
for control and monitoring

24, 120 or 230V XNNN00588



Damper Connection Box Galvanised Mild Steel (DCB24) 120/230

24 - 230V AC XNNN00312



ETR Probe

DNNN00359

Accessories (ATEX Electrical)



Atex Ex Rated Safety Temperature Sensor (STS)

MNNN00141



Manual Override Handwheel

XNNN00579



EX Rated Auxiliary Switches

XNNN00577



Ex Rated Terminal Box

XNNN00578

Accessories (Pneumatic)

Solenoid, (24, 120, or 230 volt).

—

Switchbox (Status Beacon).

—

PTR

XNNN05017

Example

3	/	A-60 RECT (Galv)	/	1.2mm	/	150mm	/	400 (W) x 250 (H)	/	M5	/	Standard	/	Customer	/	DRIM
Quantity		Series		Thickness		Depth		Duct size		Control Modes		Seals		Flange Holes		Accessories

Ruskin Air Management Limited
a BS EN ISO 9000 registered company

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Due to a policy of continuous product development the specification and details contained herein are subject to alteration without prior notice.

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Dampers Controls Fancoils