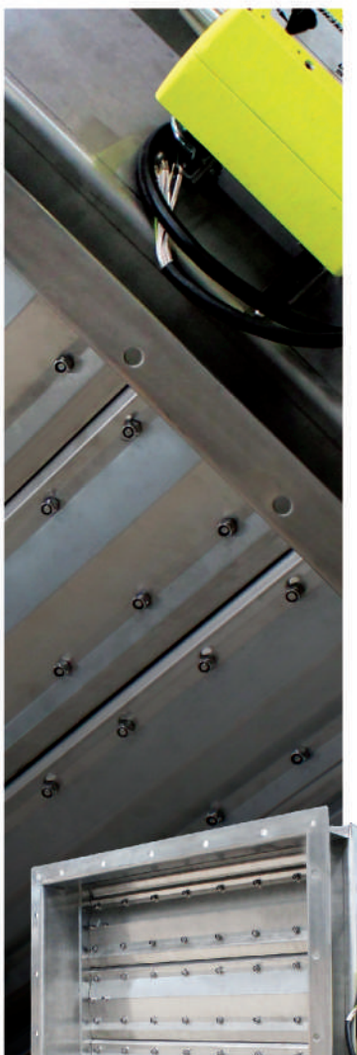
PRUDENTAIRE®



MD A60 Marine Fire Damper

MADE IN MALAYSIA

MD | A60 Marine Fire Damper

Introduction

Prudent Aire's A-60 Marine Fire and Gas dampers for use in offshore, marine and navy ventilation system. The A-60 Marine damper is able to be installing in rectangular or circular duct by add-on an accessory.

All marine dampers are with a thermal trigger and they prevent the spread of fire and gases within the ventilation ductwork. When damper blade are in fully open position will not cause significant pressure loss, floor disturbance or noise. Marine damper with non-standard sizes able to be supplied on request.

CONSTRUCTIONS

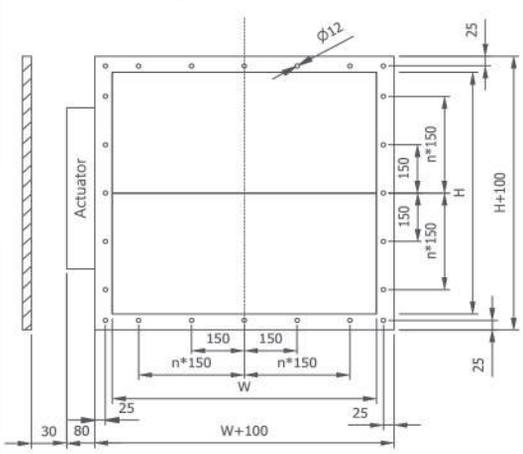
- Approved by Bureau Veritas as A60 Fire Damper.
- Parallel blade closing action
- Double skin blade with tape for better air-tight conditions
- Standard nominal fuse release temperature 74°C. Other temperatures available.
- Electrical, pneumatic or spring operation system available.
- High pressure rating up to 3KPa with Min leakage & deflections

MATERIALS

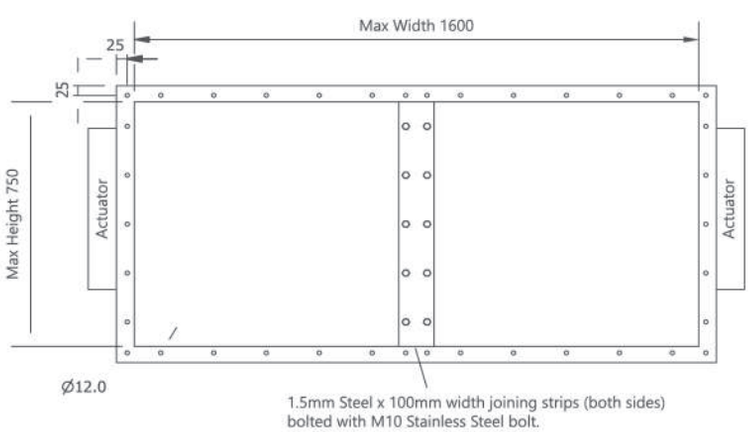
Frame	Blades	Shaft
SS 3.0mm	SS 1.5mm	SS 20 mm
Stainless Steel 316L / 304	Stainless Steel 316L / 304	Stainless Steel 20mm Dia

DIMENSIONS

Singular Damper Detail



Multiple Damper Arrangement



Note : The maximum tested multiple size is 1600mm width x 750mm height.
When the damper are joined togather to form assemblies larger than this size then approval from your local marine regulaive authority will be required.

DAMPER SPECIFICATION

APPLICATION

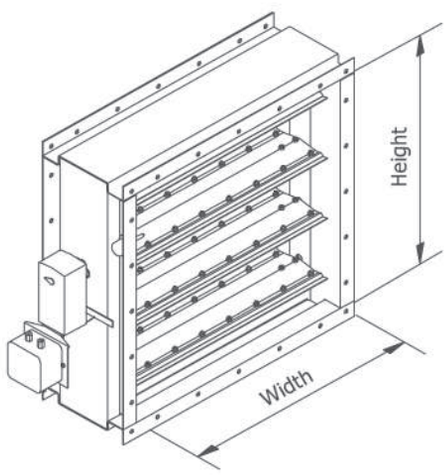
The A-60 Marine Fire Damper is tested and Bureau Veritas approved for fitting to Class A-60 Divisions (bulkheads and decks). It is constructed with aerodynamic stainless steel interlocking parallel blades and closes upon high temperature or loss of electric power connection. The A-60 is fitted with an electrical thermal release device (ExPro-TT) which includes a manual test switch that allows periodic operation of the damper for testing purposes.

Model A-60 Marine Fire Damper meets the following requirements:

- Tested and approvedfor class A-60 divisions (bulkheads and decks).
- Bureau Veritas Marine Approval to IMO Fire Test Procedures Code, Annex 1, Part 3.
- Complies to Marine Equipment Directive.

STANDARD CONSTRUCTION

- **Frame :**
  300 x 3mm thick stainless steel 316L with full welded construction. Pre-punched bolt holes are provided at 50mm flanges.
- **Blades :**
  Double skin of 1.5mm thick stainless steel 316L. Blades are been bolted togather to form airfoil shaped and internal filled with 128kg/m^3 mineral fiber.
- **Bearing :**
  20mm internal diameter flanged stainless steel bearing.
- **Sideseals :**
  Roll formed from 75 x 0.3mm stainless spring steel.
- **Linkage :**
  6mm thick stainless steel linkage are been concealed in frame.
- **Electrical Thermal Release :**
  72°C standard.



Damper Sizes

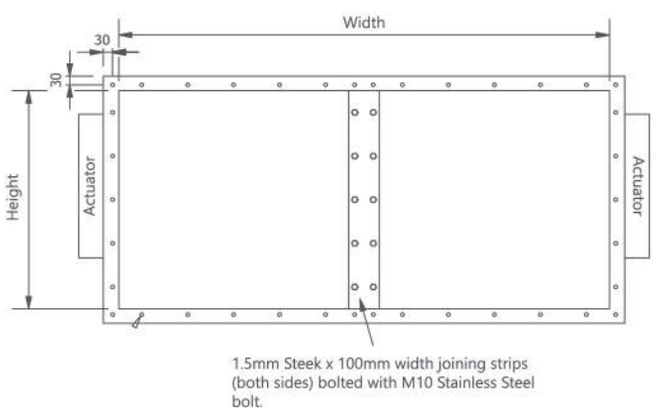
- **Minimum Size Single Section**
  Vertical or Horizontal - 200mm x 200mm
- **Maximum Size Single Section**
  Vertical or Horizontal - 750mm x 750mm
- **Maximum Size Multiple Section**
  Horizontal - 1600mm x 750mm

Optional Construction / Features

- 304 grade stainless steel construction
- Pneumatic actuator
- Actuator orientation
- Terminal Junction Box
- Limit Switch Box
- Manual Override Adaptor
- Adaptor w ith Round Spigot

ASSEMBLY INFORMATION

Multiple width assemblied (2 x 1) have been tested and approved to a size of 1600mm width x 750mm height. Stainless steel jointing strips for fitting both side of the damper multiple assembly are supplied for site fixing by others.



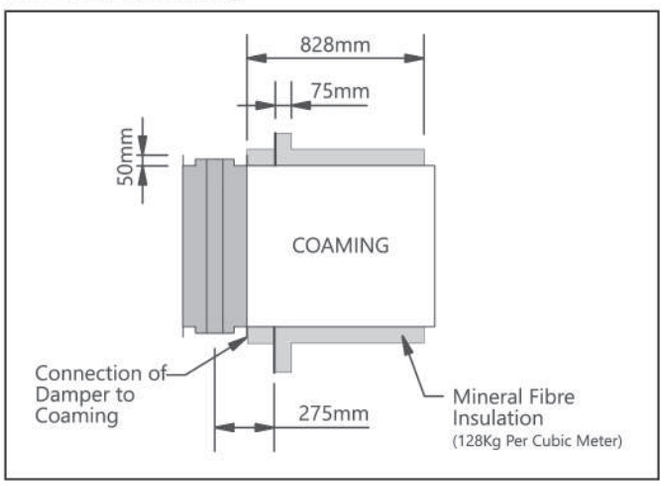
DAMPER INSTALLATION

All installations must be carried out in accordance with the relevant Marine/Offshore Authority requirements.

The damper should be installed in accordance with Insulation details (as shown below) that represent a typical installation. Both holes are provided as standard on the damper flanges (unless otherwise stated) at 150mm maximum centres. Matching hole positions are necessary on mating coaming/duct flanges. Apply approved fire resistant sealant/gasket to mating flanges and position damper. Bolt damper using M8 minimum diameter stainless steel bolts, at a maximum of 200mm centres.

INSULATION DETAILS

Bulkhead (Vertical)



Deck (Horizontal)

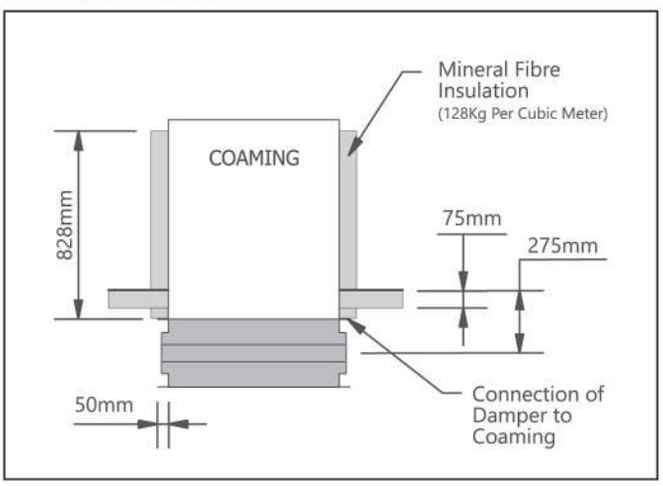


Table of Minimum Total Coaming Insulation Length (Applies to all approval bodies)

Application	Insulation Thickness	Minimum Total Insulation Length
Vertical bulkhead 200x200 (0.04 msq)	75mm	828mm Insulation with Mineral Fibre 128Kg PER Cubic Meter
Vertical bulkhead up to 750x750 (0.5625 msq)		
Horizontal deck 200x200 (0.04 msq)		
Horizontal deck up to 750x750 (0.5625 msq)		
Horizontal deck above 0.5625 msq		

The same area/insulation criteria applies for multiple arrangements

DAMPER WEIGHT DETAILS

3.0mm 316L Stainless Steel Casing, 300mm Deep

Weight (Kg) of A-60 Marine Fire Damper (Excluding Actuator)												
	200	250	300	350	400	450	500	550	600	650	700	750
200	19.5	20.3	21.2	21.9	22.7	23.5	24.3	25.2	26.1	26.9	27.7	28.5
250	20.6	21.4	22.3	23.2	24.2	25.1	26.1	27.1	27.9	28.8	29.7	30.7
300	21.7	22.7	23.7	24.8	25.9	26.9	28.1	29.2	30.2	31.4	32.6	33.7
350	22.9	24.1	25.2	26.4	27.6	28.8	29.9	31.1	32.3	33.5	34.6	35.7
400	24.1	25.4	26.7	28.1	29.6	31.1	32.3	33.6	34.8	36.2	37.5	38.8
450	25.2	26.8	28.4	30.1	31.6	33.2	34.8	36.3	37.9	39.5	41.2	42.8
500	26.2	28.1	29.9	31.7	33.5	35.3	37.1	38.9	40.7	42.5	44.3	46.2
550	27.4	29.4	31.5	33.5	35.6	37.6	39.5	41.6	43.5	45.5	47.6	49.2
600	28.5	30.7	33.1	35.2	37.5	37.7	41.9	44.2	46.4	48.6	50.9	53.1
650	29.6	32.1	34.5	36.9	39.4	41.8	44.3	46.7	49.2	51.6	54.1	56.5
700	30.7	33.4	36.1	38.7	41.3	44.1	46.7	49.3	51.9	54.6	57.3	59.9
750	31.7	34.6	37.5	40.3	43.2	46.1	48.9	51.8	54.7	57.6	60.5	63.4

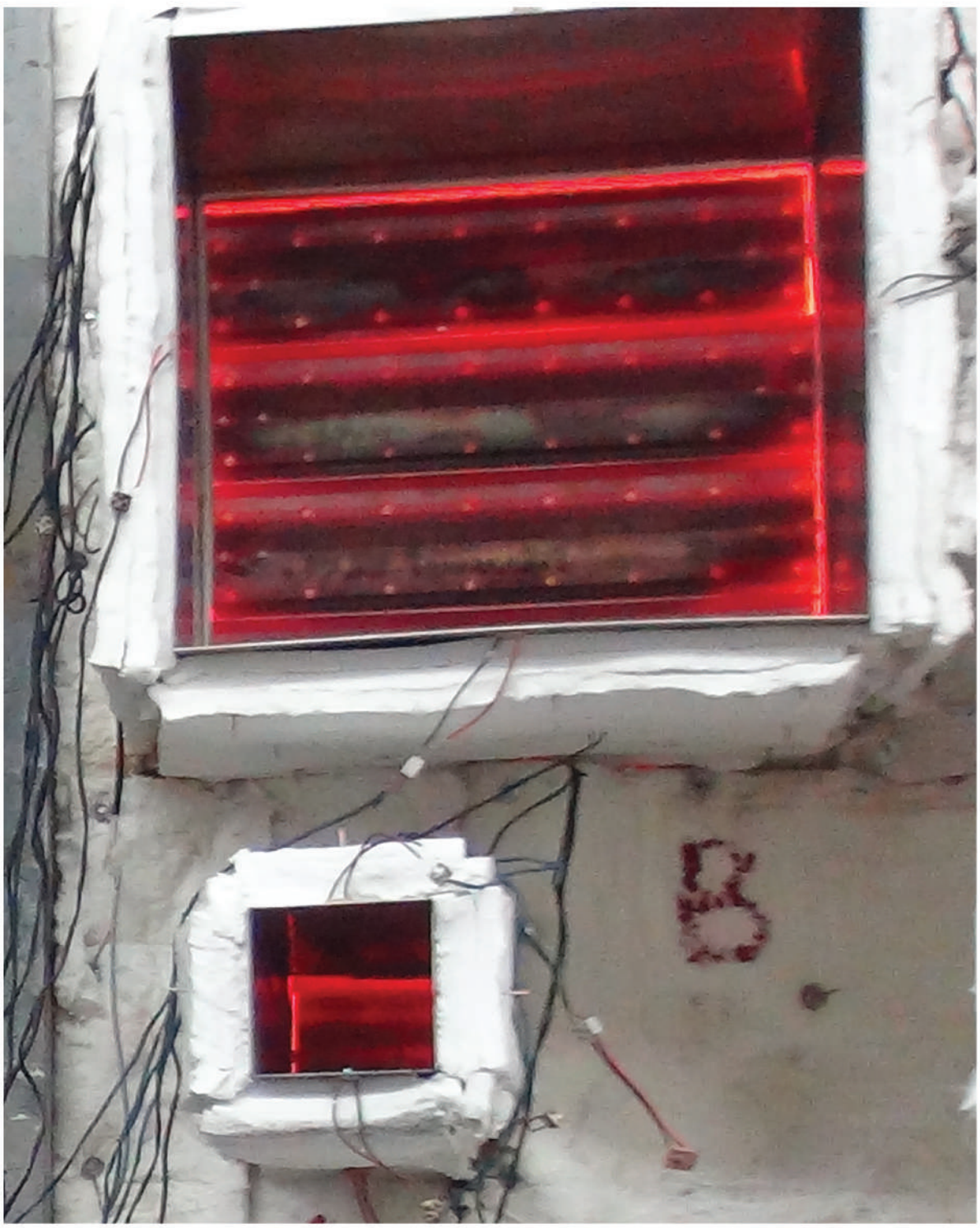
Weight (Kg) Of Actuator	
Standard actuator ExMax + Pro-TT	3.5Kg
Optional Actuator Spring Return Actuator + ETR	3.0Kg

TEST SPECIMENS PHOTO

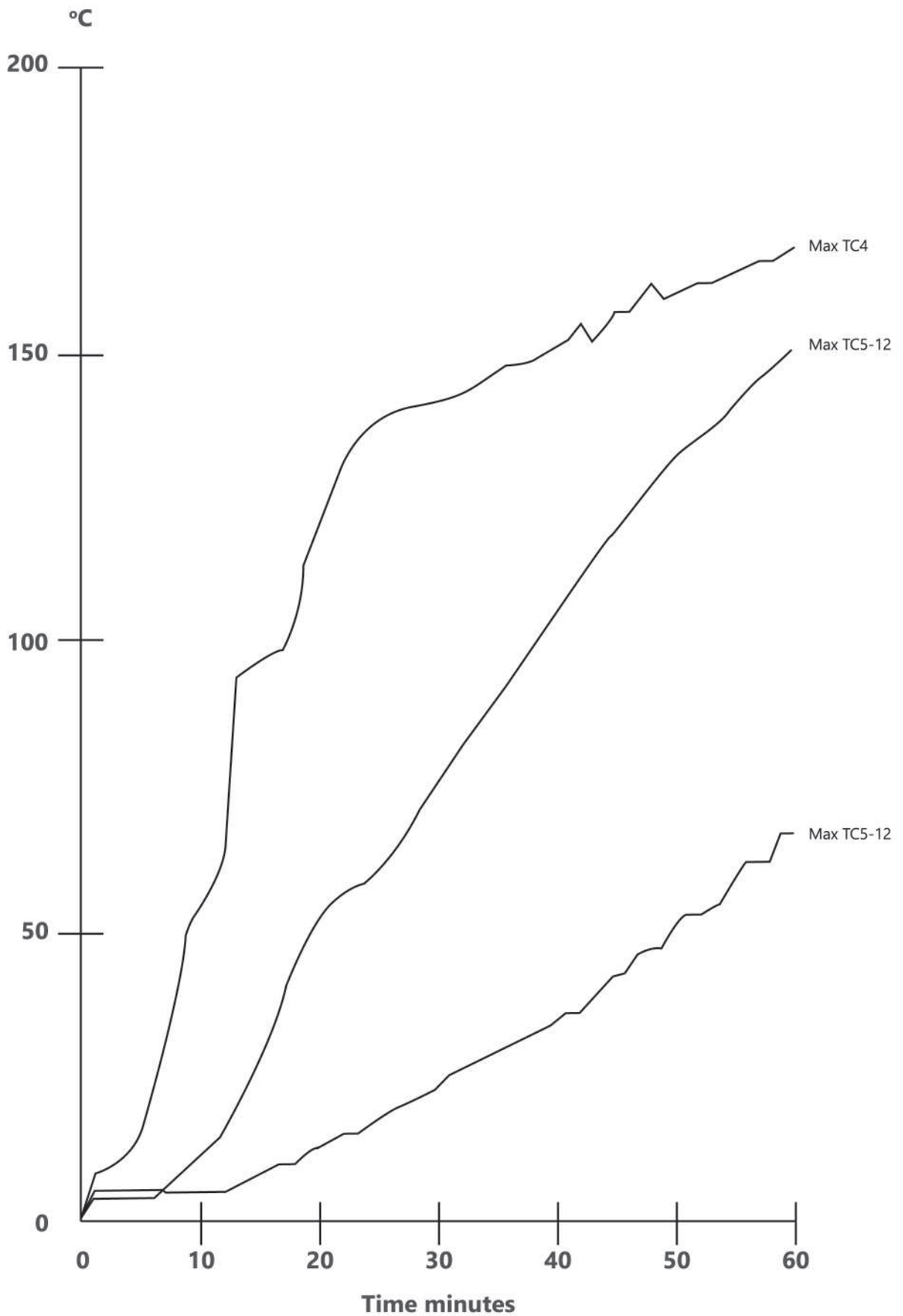
The Prudent Aire A-60 Marine Fire Damper has undergone extensive fire testing in single and multiple arrangements. The dampers were incorporated in steel bulkheads and decks and tested to the Marine Fire Resistance Test in accordance with IMO resolution MSC.307(88) for a duration of 60 minutes. Change to the originally supplied product may invalidate the certification and/or warranty.

Test, approvals and certification

Far East Fire Testing Center - Test accordance IMO resolution MSC.307(88)
Bureau Veritas (BV) Group - Approval to IMO Fire Test Procedures Code for class A60 Bulkhead and Deck
ISO 9001:2008 certification



TEST PERFORMANCE CHART



STANDARD ELECTRICAL ACTUATOR

ExMax 1/4 Turn Actuator

ExMax 1/4 turn actuator's are used as the standard electrical actuator for the A60 marine damper. The feature of the actuator are as below :

- Electrical, Explosion proof rotary actuators
- On-off control mode, 24...240 VAC/DC.
- 95 Deg angle of rotation include 5 deg pretension
- 8Nm with safety operation: fast spring return < 1s
- ATEX tested in according with directive 94/9/EC for zone 1, 2, 21, 22

The actuators are located outside of the duct work for ease of access and installation.

The actuator can be fitted in any one of the two orientations: Vertical or Horizontal.

The actuator are direct installed to the damper utilising a unique user friendly positive connection system.

This allows the dampers and actuator to be supplied separately, offering shipping and storage benefits.

ExPro-TT

The thermoelectric safety trigger ExPro-TT is to activate the motorized A60 Marine Fire Damper into its safety position by spring return operation of an actuator.

Two temperature fuses Tf1 and Tf2 are part of the trigger. In case that the ambient temperature outside the duct is more than +72°C the temperature fuse Tf1 triggers. If the temperature inside the duct is more than +71°C the temperature fuse Tf2 triggers. If Tf1 or Tf2 is switching off the power, the circuit to the actuator is irreversibly cut.

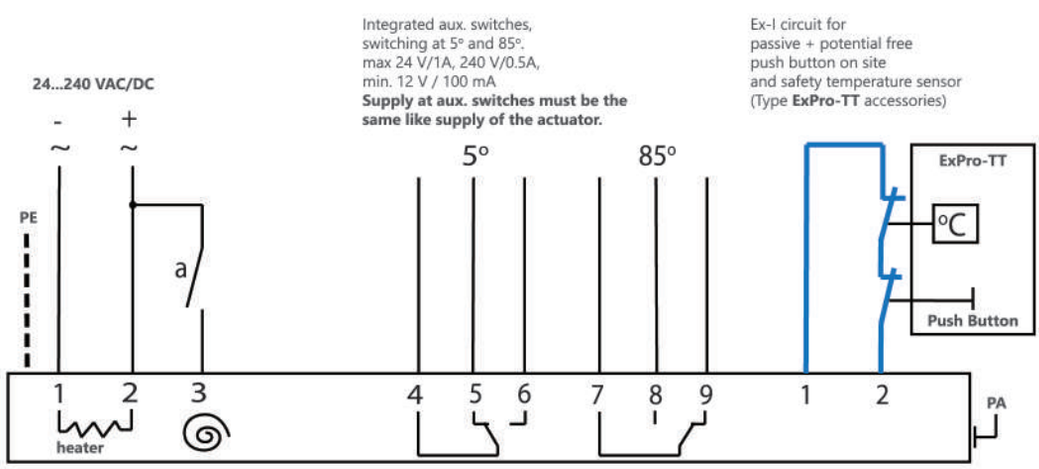
The spring return of the actuator moves the damper into its safety position.

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

The associated electrical Actuator are available in one Universal version with 24 - 230V AC/DC supply.

ACTUATOR APPLICATION AND WIRING

On-off - Spring Return + Ex-i trigger circuit



Power input depending on supply voltage

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 holding power is run time independently typical at ~5W. The power consumption for the heater is ~16W. In the heating phase the motor is not activate!

The initial starting supply voltage required by the actuators power supply unit is ~2.0A. The starting pulse takes about 1 sec. (please consider this while concepting the cross section of the supply line). The power factor is between 0.8 and 0.5 in dependence of motor running time. A line protection should be min. 2 AT.

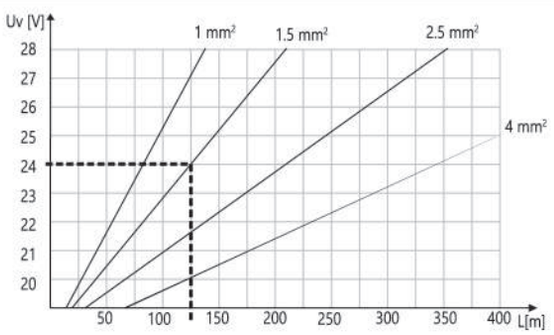
Voltage	Current	Rated current in acc. with motor running time				
		3/7.5s	15s	30s	60s	120s
24 VDC	$I_{Nominal}$	4.70 A	1.30 A	0.70 A	0.60 A	0.50 A
120 VDC	$I_{Nominal}$	0.75 A	0.30 A	0.25 A	0.20 A	0.17 A
240 VDC	$I_{Nominal}$	0.37 A	0.15 A	0.12 A	0.10 A	0.08 A

Cross section of the inlet line

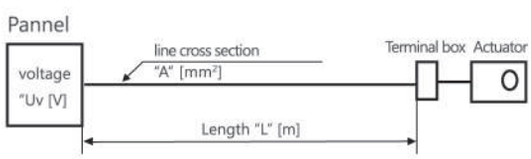
On long distance between voltage supply and drive, voltage drops occur due to line resistances. As a consequence with 24 VAC/DC the actuator receives a too low tension and does not start. In order to prevent this the cross section of the inlet line is to be dimensioned accordingly.

The accompanying formulas allow the calculation of the necessary line cross section respectively maximal permitted conduit length respectively utilizing the existing line cross section.

Alternatively the secondary voltage can be increased by selecting a transformer.



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



Required cable cross section A at existing cable length L

A=0.0714 x L : (Uv - 18V)

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

Maximum cable length L at existing cross section A

L = A x (Uv - 18 V) : 0.0714

Example: A = 1.5mm², Uv = 24 V
Length of cable L = 126mm

For calculation following characteristics are essential
Uv = supply voltage [V]
A = line cross section [mm²]
L = conduit length [m]
Factor 0.0714 = drive specific factor [Vmm²/m]
(based on the electrical conductivity of electrolytic copper with a coefficient of 56 m/Ω mm²

OPTIONAL ELECTRICAL ACTUATOR

Optional Spring Return Actuator

Spring return actuator combined with thermo-electric tripping device, BF230-T are available as an optional electrical actuator. This optional choice will give a more economic price. The features are as below:

- Electrical, IP54 rated rotary actuator
- On-off control mode, 240 VAC, 50/60 Hz
- 95 Deg angle of rotation, include 5 deg pretension
- 12Nm with safety operation
- Fast spring return with 16s
- 2x1 SPDT auxiliary switch cable available

The spring return actuator are located outside of the ductwork for ease of access and installation. Actuator fitted to dampers up to 400mm high, can be fitted in two orientations, vertical or horizontal.

The actuator are direct installed to the damper utilising a unque user friendly positive connection system. This allows the damper and actuators to be supplied separately, offring shiping and storage benefits.

Electrical Thermal Release (ETR)

Fail-safe is by means of a unique and patented Electrical Thermal Release (ETR) which operates at 72 DegC, 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. Additional 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.

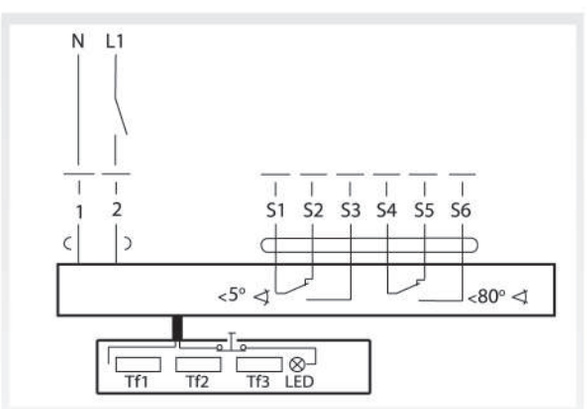
A manual test switch allows periodic operation of the damper for testing purpose, simulating actual fail-safe release under fire conditions.

Wiring Diagram

Voltage : 230 VAC

Supply On	- Damper motor Open
Supply off	- Damper spring off
ETR Operaes	- Damper spring off
End Switches	- 2 x SPDT

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



TERMINAL JUNCTION BOX

Terminal Junction Box is a device to connect the current from power supply to the electrical actuator. The main purpose to have a terminal junction box is to minimised the spark expose to the surrounding when during short circuit happend at the connection.

Below have two optional terminal junction box are available:

Stainless Steel Terminal Junction Box

Stainless Steel Terminal Junction Box are approved according to international standards such as: EN62208 and EN60079-0/7 (ATEX). Below are the features :

- Mirror-polished or electropolished stainless steel 1.4404 (316L), 1.5mm
- High-temperature-resistant seal as standard - extended temperature range of -60°C to +100°C.
- Approved according to ATEX, IECEx
- Flexible options for fastening the internal mounting rail
- IP66 protection
- Secure, permanent function of the seal is ensured by seal compression protection
- Earthing stud in the cover and base of the enclosure

EX-Box

ExMax actuators are delivered with 1m cable. In case of cable connection inside hazardous areas a certificated Ex-e terminal box is required. Terminal Boxes type EXBox are specially designed for ExMax actuators for installation in hazardous areas zone 1, 2, 21 and 22.
Below are the features for the ExBox:

- Powder-coated aluminium housing
- Certificaation according ATEX
- Cerification according IECEx
- IP66 protection in according with EN 60529
- Stainless steel housing are available
- Earthing stud in the cover and base of the enclosure

ACCESSORIES

Limit Switch Box

Limit switch box indicator offers clear location of the current damper blade opening position by 2 mechanical switches.

The operating position of the switches can be easily changed by adjusting the high resolution spline cams manually and independently without the need of additional tools (cam closed-up, cam open-down)

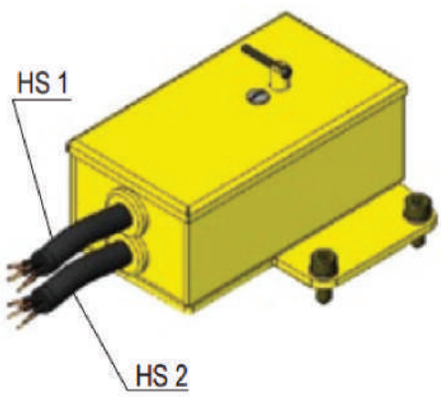
This limit switch box are equipped with 2 standard conduit entries with 1/2" diameter and 1 terminal strip with 8 point.

ExSwitch

ExSwitch are adaptable auxiliary switches for use in hazardous areas for end and interim position indication.

ExSwitch have 2 potential free contacts installed in a housing which can be fitted directly to ExMax actuators. Contacts are adjustable. adjustment during operation is possible.

ExSwitch is a explosion proof limit switch, been tested under ATEX, and have IP66 protection for switch.



Manual Override Adaptor

Manual override adaptor can bring the actuator into required position with the hand wheel. The adaptor will be install at the front of the ...Max actuator only. Either limit switch box or manual override adaptor are able to install at an actuator.

Adaptor with Round Spigot

Adaptor c/w round spigot are available as an accessory.
The main function for the round spigot is to easy the installation work for the round duct. Flange at the round spigot are pre-drille with M10 holes with equally spaced. The number of holes are as below table:

Damper Diameter	No. of Holes
200 - 250	4 off
200 - 250	8 off
200 - 250	12 off

Custom holes are available upon request Material are in Stainless Steel 316L.

MD | A60 Marine Fire Damper

Products Range

- Grilles 
- Diffusers 
- Dampers 
- Fire & Smoke Protection 
- VAV 
- Others 
- Accessories 

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