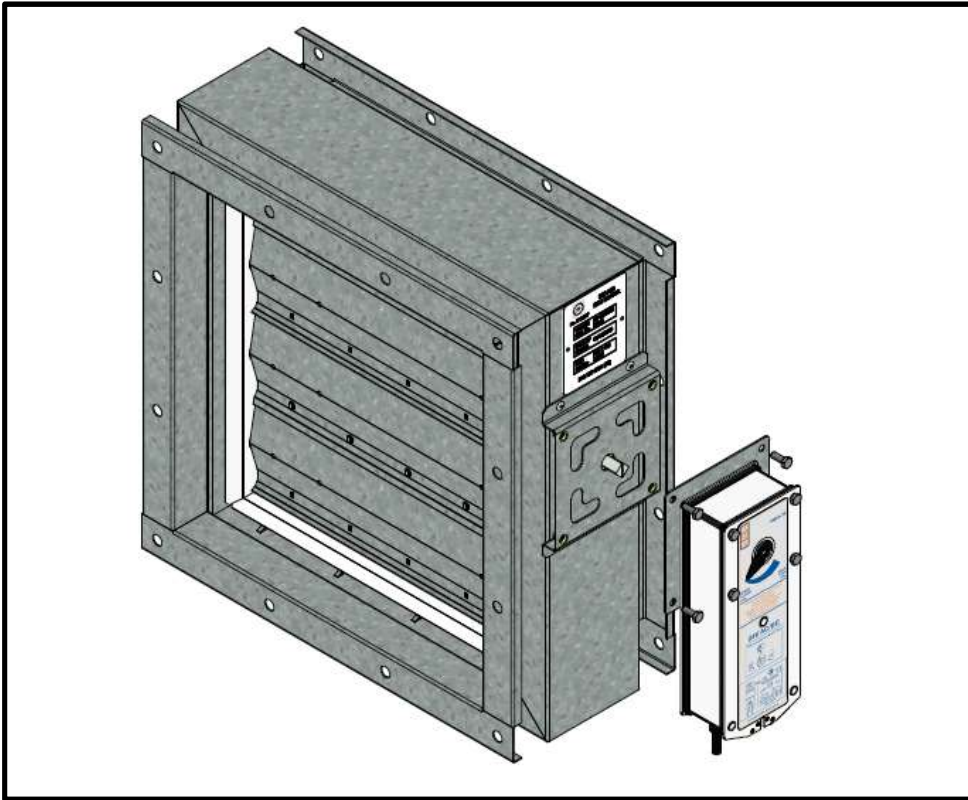


## A60 Installation, Operating and Maintenance Instructions



### 1 Health and Safety

- 1.1 Only competent personnel may carry out the work outlined within this document.
- 1.2 The wearing of appropriate Personal Protective Equipment (gloves, footwear, safety glasses etc.) is required for safe working and as the site dictates.
- 1.3 Dampers may be heavy. Large dampers will require suitable lifting and supporting equipment.
- 1.4 Do not lift damper by blades or actuator. Do not stand/put heavy object on blades.
- 1.5 Dampers may close without warning. Do not introduce limbs/fingers between blades whilst the actuator is fitted.
- 1.6 Where dampers are only accessible with the need for additional elevation, any equipment used should be done so with due consideration to the Work at Height regulations 2005 and current site rules.

### 2 Important

- 2.1 These instructions should be read in its entirety before commencing work. The installer must be Competent judged by meeting the ASFP Advisory Notice "Competent Person".
- 2.2 Actuators are IP54 rated – Check actuator (and connection box) is suitably located.
- 2.3 Do not cut/shorten the Thermal Fuse (TF) lead. This will render the unit inoperable and invalidate the warranty.
- 2.4 The Thermal Fuse MUST be fitted in accordance with instructions. Failure to meet this requirement will invalidate the warranty and the damper will fail to respond as designed/tested.
- 2.5 All Damper installations must be carried out to the satisfaction of the appropriate specifying/approving authority.
- 2.6 Refer to actuator label for wiring of actuator and fig 4 at back of this document.
- 2.7 Refer to section 13 for commissioning. Complete Insp Check List (section 15).
- 2.8 All installations are subject to local Local Surveyor's approval. Tested and certified Installations are detailed herein. If the proposed installation has minor variations to that shown, approval from Local Surveyor's should be sought before proceeding.

### 3 General information and Approvals

- 3.1 Dampers are available in a range of materials and thicknesses galvanised/316 stainless steel and 1.2mm, 2.0mm and 3.0mm.
- 3.2 Dampers up to and including 300mm square, are supplied with a PMC-A actuator which is a smaller version of the PM Actuator.
- 3.3 Dampers have been fire tested to IMO FTP code (2010), annex 1 part 3 for compliance to SOLAS as amended for use on ships and offshore installations classed with Lloyd's Register – certificate No: SAS F180117/M1.
- 3.4 Marine Equipment Directive (MED) approved – certificate no MED 1850080/M1 applies.
- 3.5 Single section up to 1000 x1000mm approved for fitting to bulkheads and decks to achieve A0 and A60 rating (where suitably insulated).
- 3.6 Coaming Insulation is to be same as the Insulation specification of the adjoining bulkhead/deck. Insulation specified within this document refers only to rating A60. Refer to specific insulation manufacturer's technical data for product type, thickness, density and means of fixing to structure.

#### 4 **Equipment required**

- 4.1 Assuming the bulkhead/deck and duct system, (including insulation of) is in place, equipment that is normally needed to fit damper and actuator is:-
- 4.2 Access-equipment as necessary.
- 4.3 Spanners / Allen keys to tighten flange fixings.
- 4.4 Temporary support equipment (to retain damper in position).
- 4.5 Cordless drill with 2,5mm and 10mm drill bits for fitting of Thermal Fuse.
- 4.6 Phillips №2 screwdriver/drill bit to suit thermal fuse screws.
- 4.7 Screwdriver to suit junction box terminals junction box cover.
- 4.8 8mm A/F spanner and torque wrench for motor fixing bolts.
- 4.9 12mm A/F Spanner for damper drive shaft.

#### 5 **Preparation for Installation**

- 5.1 For each damper installation type, refer to the relevant installation detail below.
- 5.2 Before installation, the damper should be inspected to ensure that it has not been damaged and is in good condition.
- 5.3 Remove packaging.
- 5.4 Check damper ID plate reference and size to site specification.
- 5.5 Determine required position/orientation of damper. Check sufficient space exists to fit the product. Ensure any services (e.g. electrical/plumbing) within the structure or running close to the structure will not be affected.
- 5.6 Insulation length required (minimum) to achieve A60 rating (refer to fig.1 & sec'n 3.6).

5.6.1 Bulkhead up to 300mm x 300mm damper	950mm
5.6.2 Bulkhead from 301mm x 301mm to 1000mm x 1000mm damper	1250mm
5.6.3 Bulkhead multiple 2 x 1 damper	2000mm
5.6.4 Deck up to 300mm x 300mm damper	950mm
5.6.5 Deck from 301mm x 301mm to 1000mm x 1000mm	1400mm
- 5.7 Multiple Note: - The 2x1 multiple arrangement up to 2080mm x 1000mm approved for vertical bulkhead installation only.

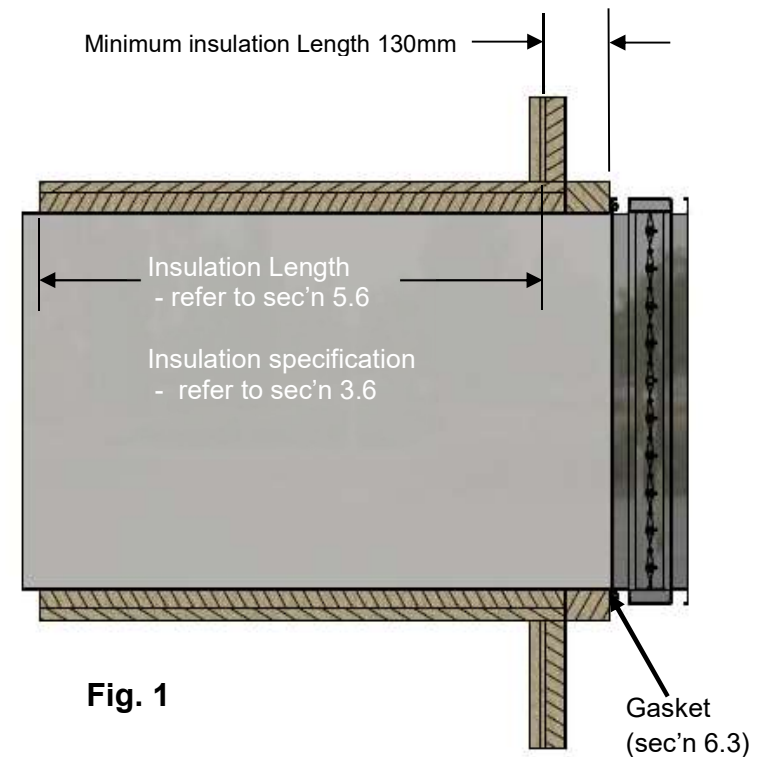
#### 6 **Damper Installation**

- 6.1 Fixing holes are provided to match up with mating duct flange holes.
  - 6.1.1 M6 up to 250mm dia.
  - 6.1.2 M8 up to 500mm dia.
  - 6.1.3 M10 above 500mm dia and rectangular flanges.
- 6.2 Damper blade axes must be in horizontal and not vertical.
- 6.3 Apply gasket (3mm millboard - Tenmat Firefly available from BSB) or fire-retardant sealant/foam seal as specified between coaming (duct) and damper flanges.
- 6.4 Starting at outermost fixing holes, fix nuts /bolts/washers, loosely to start until all fixings are located before tightening fully to fix damper into position.

- 6.5 For multiple assemblies, joining strips are provided with pre-punched holes for 5mm dia rivets. Fix both dampers to first flange leaving all fixings finger tight before fitting both joining strips. There is no need to apply sealant beneath the joining strip unless specifications dictate in which case apply appropriate compound. Fit 2<sup>nd</sup> flange to damper in normal way.

#### **Actuator Information**

- 6.6 Actuators are fitted to the 12mm square A/F damper drive square shaft.
- 6.7 Check that the actuator, thermal fuses and wires are undamaged.
- 6.8 Check the actuator label for correct voltage and operation as below:
  - 24V AC/DC or 230V AC
- 6.9 Actuators are already factory fitted to damper and fully tested. It is possible to change orientation of if services restrict default position. (refer to sec'n 8)

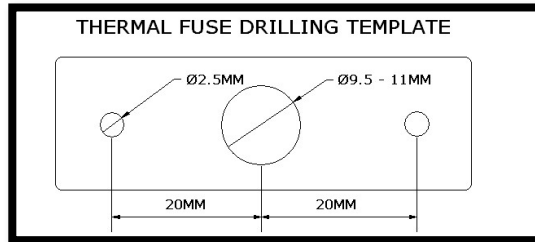


**Fig. 1**

## 7 Instructions for fitting Thermal Fuse (TF)

- 7.1 Fix a self-adhesive TF template (supplied) onto the duct. This should typically be above the actuator for vertical installations, but below for horizontal installations. For round ducts, the three drilled holes must be in-line with the duct axis. (For ductless installations, a TF bracket is available from BSB and can be fixed to the damper casing).
- 7.2 Drill holes in duct (sizes/positions are detailed on template label – see fig. 2). Remove burrs.
- 7.3 Fit the TF to the duct with the two screws provided using Philips №2 screwdriver/bit.

Fig. 2



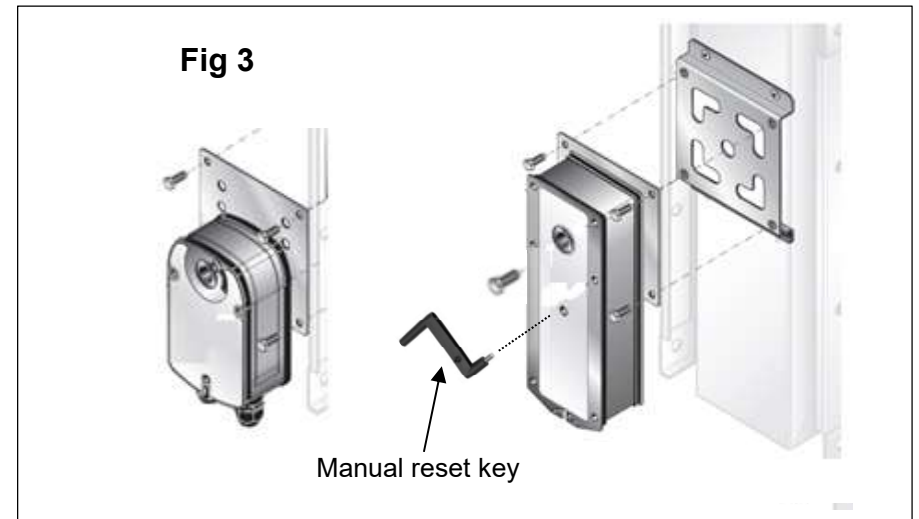
## 8 Instructions for removing / refitting, or changing orientation of actuator (refer to fig 3)

- 8.1 Actuators are normally factory fitted in released state (closed damper). It is possible to change orientation if services restrict default position.
- 8.2 Ensure actuator is without power. Ensure actuator is in 'released' state by inserting manual reset key (provided) and rotating in direction as shown on label and 'unlocking' the mechanism. Then, manually wind and lock the actuator with the manual reset key, 1.5 turns only to relieve the pre-set tension.
- 8.3 Damper must be in closed position.
- 8.4 Undo the 10mm short A/F bolts connecting the actuator fixing plate (see figure 3) to the damper actuator bracket and slide actuator completely off the damper drive shaft. Rotate actuator and actuator fixing plate assembly to desired position and refit all bolts tightening to ~5Nm. (to maintain synchronization, DO NOT alter actuator/damper positions).

## 9 Instruction for mechanically testing Damper/Actuator assembly

Test manually using the manual reset key provided. (Due care should be taken to stop winding when open and when slight resistance is encountered – over-winding can result in permanent damage to the damper/actuator which may invalidate the warranty).

- 9.1 Check damper blades fully open when actuator has been wound to end of its travel and close fully when actuator's spring return action has completed.



## 10 Instructions for Wiring the actuator

- 10.1 Terminate wires within a junction box (supplied by others) compliant with site rules and Electrical Installation Regulations (BS7671) in close proximity to actuator, referring to wiring diagram on actuator label, and fig 4 at back of this document.
- 10.2 As a pre-check BEFORE power is established, the actuator should be wound manually using the manual reset key provided. **(Due care should be taken to stop winding when slight resistance is encountered – over-winding can result in permanent damage to the damper/actuator which may invalidate the warranty).**

## 11 Commissioning

- 11.1 The damper cannot be commissioned unless it is fully installed and connected to mains power in compliance with regulations.
- 11.2 The installation needs to be inspected thoroughly, before the damper actuation is tested.
- 11.3 Actuation testing should be completed as follows:
  - 11.3.1 Isolate the power.
  - 11.3.2 Remove access door(s).

- 11.3.3 Test manually, using the reset key provided, to set the damper to the 'open' position. A quarter turn in the opposite direction locks it. Visually confirm that the damper is fully open.
- 11.3.4 Release the motor if it is locked, by turning the manual reset key a quarter turn an anti-clockwise direction before letting go, to allow the damper to travel to 'closed' position.
- 11.3.5 Visually confirm that the damper is closed.
- 11.3.6 Apply power to actuator. LED on TF will illuminate. The actuator will start to travel to 'open' position, reaching it within 60 seconds, visually check that the damper blade-position and signal corresponds.
- 11.3.7 **IMPORTANT:** Press and hold test switch lever on TF to allow damper to travel to its 'closed' position. Visually check that the damper blade position and signal corresponds. (This is to ensure that the actuator functions electrically and overrides the manual reset facility -should it have been used-, as it is feasible to leave the damper inadvertently reset without the TF being functional if this test is not carried out!).
- 11.4 Ensure the damper is left in its 'normal state' (damper open) before re-fitting access door/s.

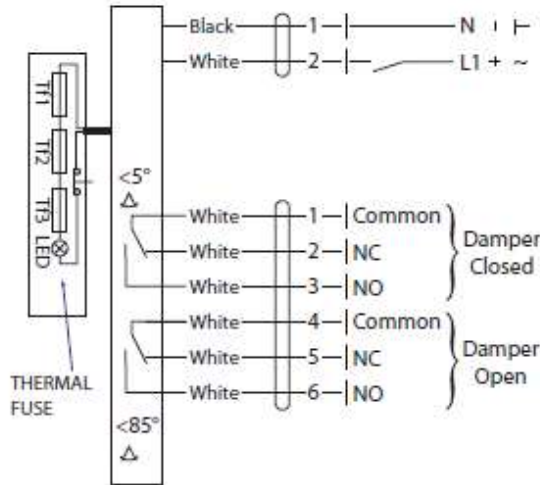
## 12 Routine Inspection, Testing and Maintenance

- 12.1 **Inspection** should be undertaken at least once a year. Local regulations/conditions may override this with periodic inspection being carried out more frequently where corrosive or dirty conditions prevail. The maintenance log should be reviewed at each inspection and the frequency adjusted as required dependent upon findings. (BSB recommend more frequent inspections to start with, reducing frequencies only if conditions are proven to allow).
- 12.2 **Regular cleaning** - 316 grade dampers are superior to galvanised steel dampers and are more likely to be specified for a corrosive environment (e.g. near fresh air intakes). It is even more important that regular cleaning takes place with dampers in these locations to prevent corrosion build up. Keeping all surfaces (inside and out) clean and very lightly oiled surfaces will considerably prolong life. In particular, joints, blade clinches / rivets etc. will attract crevice corrosion.
- 12.3 Check TF is correctly fitted to duct (Refer to section 7)
- 12.4 The LED on the thermal fuse will be illuminated when the actuator is powered.
- 12.5 Remove access door to reveal damper's internal elements.
- 12.6 Visually inspect the internal damper elements for signs of corrosion, obstruction or accumulated dirt/dust.
- 12.7 If there are obstructions or if the damper's blades/gasket seals are dirty, they need to be corrected/cleaned. It is recommended to remove the actuator before cleaning the internal elements to avoid trapping your fingers. (Refer to section 8)
- 12.8 Visually check that the damper is open. If it is not, refer to fault finding chart, (sec'n 14) otherwise continue.

- 12.9 Temporarily remove electrical power to the actuator by using the test switch on the thermal fuse.
- 12.10 The damper should close fully within 30 seconds. Confirm visually that the blade position and indication pointer on the actuator corresponds.
- 12.11 Release the TF test switch, damper should re-open within 60 seconds. Confirm visually that blade position and indication pointer on the actuator corresponds.
- 12.12 If the damper has seized (failing to reach either fully open or fully closed position).
  - 12.12.1 Isolate and remove actuator. (Refer to section 8).
  - 12.12.2 Using an aerosol with extending straw tube, spray a light lubricant (Connect Duck oil recommended) into blade end bearings through the gaps of the side gaskets, depressing the gaskets to aid access. It may be necessary to re-apply lubricant a couple of times, whilst operating the damper using the 12mm A/F spanner, until the torque has reduced to less than 4Nm for dampers up to 300mm x 300mm and 10Nm above this size.
  - 12.12.3 Open the damper using a 12mm A/F spanner. Check for foreign items in and around blades, paying particular attention to blade fishtails. Remove any obstructions.
  - 12.12.4 Clean the inside of the damper case in particular where the blades make contact with the gasket seals. Use a soft cloth with a light application of light lubricant. (Connect Duck Oil recommended).
  - 12.12.5 Wipe off excess lubricant with an absorbent cloth.
  - 12.12.6 Refit the actuator (Refer to sections 8).
  - 12.12.7 Switch on power to the actuator.
  - 12.12.8 The actuator should reach its 'powered state' position in <60 seconds. If it does not, refer to fault finding (sec'n 14).
  - 12.12.9 Replace access doors, and ensure the damper is left in its 'powered state'.
- 12.13 Record all work that has been undertaken in the maintenance log.
- 12.14 It is important to log and review maintenance frequency based on inspections and test history.
- 12.15 Notes:-
  - 12.15.1 The use of heavy oil is not recommended, as this can lead to a build-up of dust/dirt on damper surfaces.
  - 12.15.2 The actuator is maintenance-free.

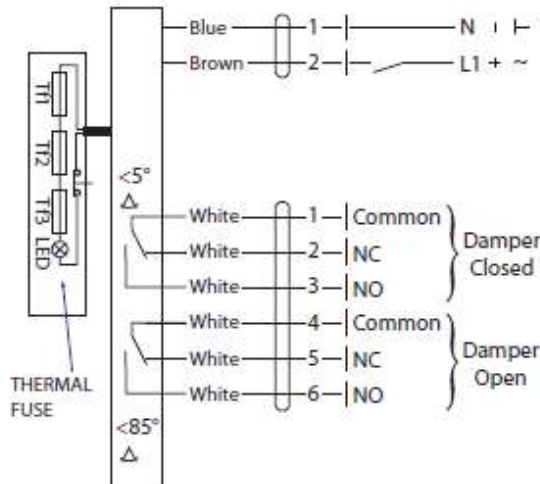
# Wiring diagrams (fig 4)

## BSB PM24 -TF



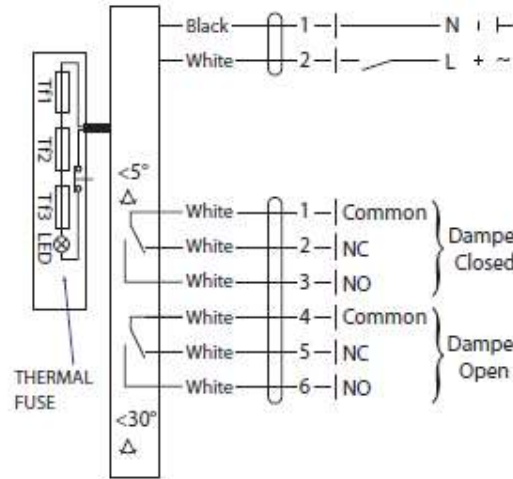
**24V AC/DC:**  
Connect via safety isolation transformer

## BSB PM230 -TF



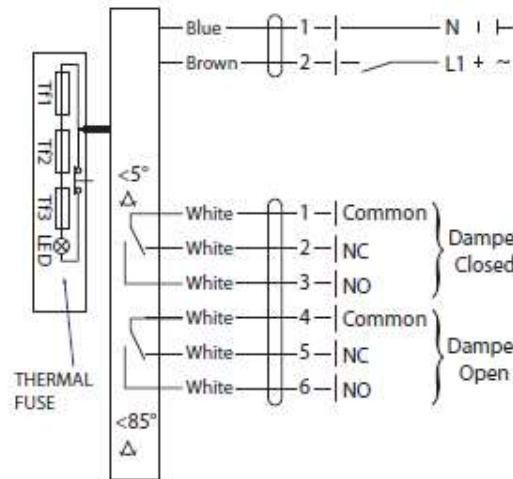
**230V AC/DC:**  
For disconnection from mains power supply, a separate device must be incorporated in the fixed wiring with at least 3mm contact gap in all poles.

## BSB PMCA24 -TF



**24V AC/DC:**  
Connect via safety isolation transformer

## BSB PMCA230 -TF



**230V AC/DC:**  
For disconnection from mains power supply, a separate device must be incorporated in the fixed wiring with at least 3mm contact gap in all poles.

Wiring diagram shows switch positions based on no power to the actuator.

Power on –  
Damper in open position.

Power off (or Thermal Fuse activation) –  
Damper in fail safe closed position.

Other notes:

LSF insulated cables.  
Actuator IP54 rated.  
Thermal fuse rated at 72°C.

Unused cores should be isolated.  
Connecting cables need to be protected from sharp edges.

For damper closed indication use terminals 1 & 2  
For damper open indication use terminals 4 & 6  
Terminals 1 & 4 can be linked where required as an option.

### 13 Fault finding

13.1

Symptom	Fault	Action
Green LED on the thermal fuse (TF) is not illuminated	No power / incorrect supply	Check supply / wiring
	TF tripped. Remove TF from duct, separate two halves, continuity check the two contacts within the probe section (or test with new probe)	If probe is open circuit, replace probe
	Actuator faulty	Replace actuator
Blades do not travel fully open / closed	Synchronization of actuator and damper incorrect	Remove actuator and refit. (Refer to section 8)
	Damper seized	Refer to section 12
	Incorrect voltage / power	Check voltage, check sufficient current available (cable size / length).
	Actuator faulty	Replace actuator

### 14 Installation Check List

**It is recommended this (completed) document be kept on board the vessel until the equipment referenced is removed.**

DAMPER REFERENCE NO.:	DAMPER LOCATION:
DAMPER SERIAL NO.:	✓
DAMPER SIZE:	✓
WIDTH	HEIGHT
DAMPER INSTALLED BY: .....	
(Print name)	
Signature:	Company:                      Date:
ACTUATOR ELECTRICALLY CONNECTED BY:	
.....	
(Print name)	
Signature:	Company:                      Date:
THERMAL FUSE FITTED BY: .....	
(Print name)	
Signature:	Company:                      Date:
FINAL INSPECTION BY: .....	
(Print name)	
Signature:	Company:                      Date:



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