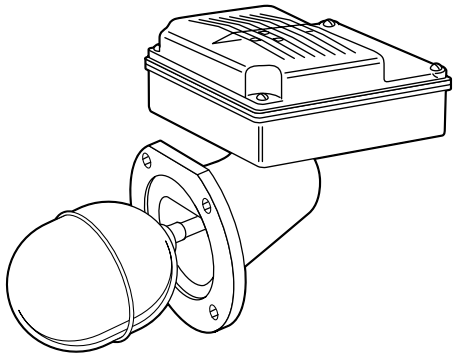
ITT

McDonnell & Miller

Installation & Maintenance Instructions
MM-243(C)

Replacement Head Mechanism

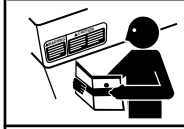
42S-HD
(Snap Switch)



Replacement Head Mechanism

Replacement head mechanisms can be installed without disturbing existing equalizing connections or disassembly of components, making repairs simple and easy.

⚠ WARNING

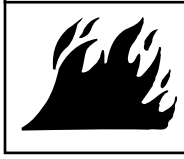


- **Before using this product read and understand instructions.**
- **Save these instructions for future reference.**

- **All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of plumbing, steam, and electrical equipment and/or systems in accordance with all applicable codes and ordinances.**
- **To prevent serious burns, the boiler must be cooled to 80˚F (27˚C) and the pressure must be 0 psi (0 bar) before servicing.**

- **To prevent electrical shock, turn off the electrical power before making electrical connections.**
- **This low water cut-off must be installed in series with all other limit and operating controls installed on the boiler. After installation, check for proper operation of all of the limit and operating controls, before leaving the site.**

- **To prevent serious personal injury from steam blow down, connect a drain pipe to the control opening to avoid exposure to steam discharge.**
- **To prevent a fire, do not use this low water cut-off to switch currents over 7.4A, 1/3 Hp at 120 VAC or 3.7A, 1/3 Hp at 240 VAC, unless a starter or relay is used in conjunction with it.**



Failure to follow this warning could cause property damage, personal injury or death.

Engineered for life

OPERATION

Maximum Pressure: 50 psi (3.5 kg/cm^2)

Electrical Ratings

Voltage	Pump Circuit Rating (Amperes)		Pilot Duty
	Full Load	Locked Rotor	
120 VAC	7.4	44.4	345 VA at 120 or 240 VAC
240 VAC	3.7	22.2	

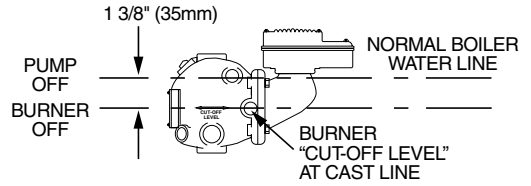
Motor Horsepower	
Voltage	Hp
120 VAC	1/3
240 VAC	1/3

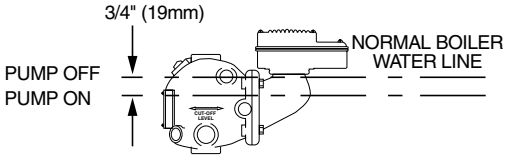
Settings and Differential Pressures

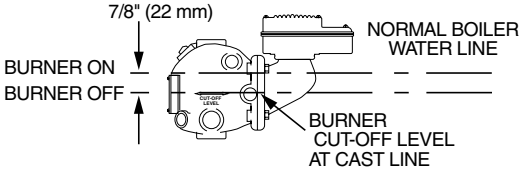
Values are ± ⅛" (3.2mm).

Series 42S

Pressure	Setting	Approximate Distance Above Cast Line In. (mm)	Differential In. (mm)
50 psi (3.5 kg/cm^2)	Pump Off	1 3/8 (35)	3/4 (19)
	Pump On	5/8 (16)	
	Burner On	7/8 (22)	7/8 (22)
	Burner Off	0 (0)	







INSTALLATION –

TOOLS NEEDED:
One (1) pipe wrench, one (1) flathead screwdriver, one (1) scraper, and one (1) 9/16" socket or wrench.

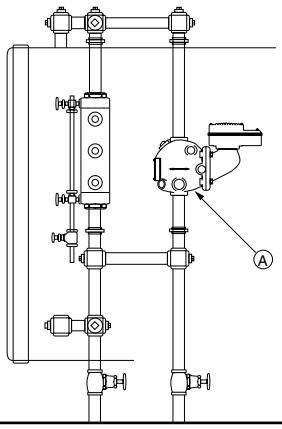
STEP 1 - Preparation

⚠ WARNING

- **To prevent serious burns, the boiler must be cooled to 80˚F (27˚C) and the pressure must be 0 psi (0 bar) before servicing.**
- **To prevent electrical shock, turn off the electrical power before disconnecting or making electrical connections.**

Failure to follow this warning could cause property damage, personal injury or death.

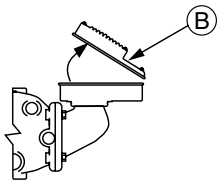
a. Drain water in the boiler to a level which is below the float chamber (A). Allow the boiler to cool to 80˚F (27˚C) and release the boiler pressure to 0 psi (0 bar).



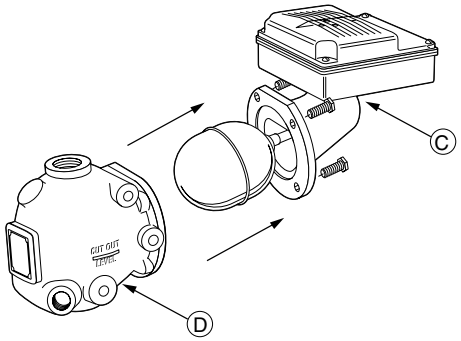
b. Using a flathead screwdriver, remove the junction box cover (B). Disconnect, mark, and remove the supply wires and conduit connections.

⚠ CAUTION

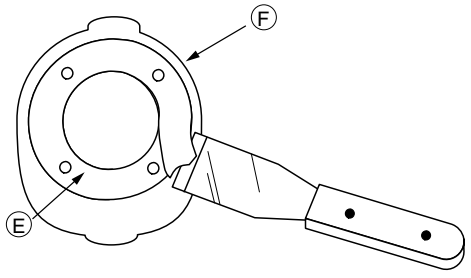
There may be more than one source of power to the boiler.



c. Remove the existing head mechanism (C) from the body (D).

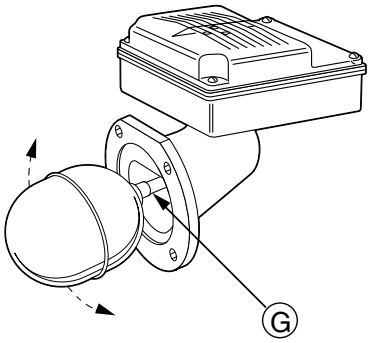


d. Using a scraper, remove the old gasket (E). Clean all debris from the float chamber. The gasket sealing surface (F) must be smooth and clean.

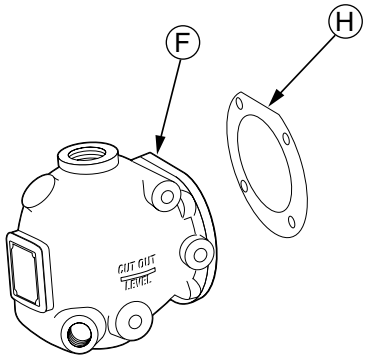


STEP 2 - Installing the Replacement Head Mechanism

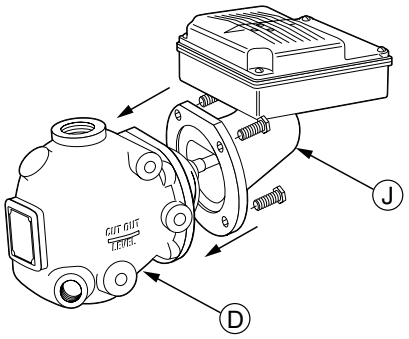
a. Carefully remove the new replacement head mechanism from the carton. Handle it carefully to prevent damage to the float rod (G).



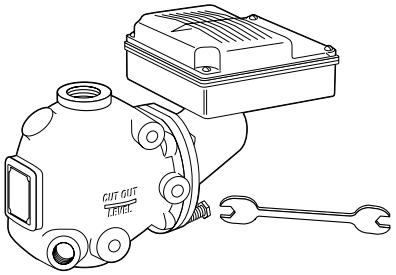
b. Align the bolt holes of the new head gasket (H) on the sealing surface (F) of the control body.



c. Install the new replacement head (J) on the body (D) by guiding the float into the control body and aligning the bolt holes.



d. Using a wrench, insert the four (4) bolts and tighten them to approximately 14-20 ft•lb (19-27 N•m) in an alternating star pattern.



STEP 3 - Electrical Wiring

⚠ WARNING

- **To prevent electrical shock, turn off the electrical power before making electrical connections.**
- **This low water cut-off must be installed in series with all other limit and operating controls installed on the boiler. After installation, check for proper operation of all of the limit and operating controls, before leaving the site.**

Failure to follow this warning could cause electrical shock, an explosion and/or a fire, which could result in property damage, personal injury or death.

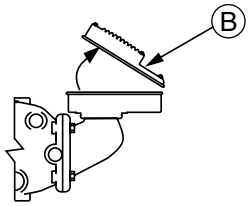
Switch Operation

Boiler feed pump off, burner on.

Boiler feed pump on, burner on.

Boiler feed pump on, burner off.

a. Using a flathead screwdriver, remove the junction box cover (B).

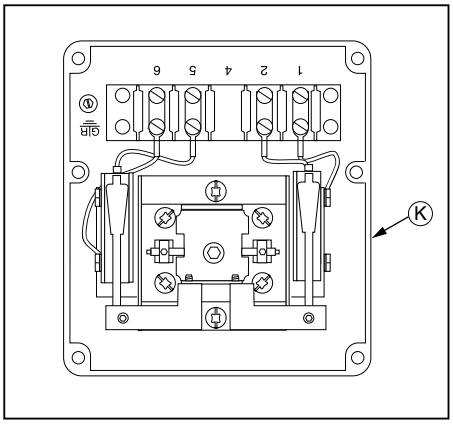


b. Following the appropriate wiring diagram, (refer to page 6) based on your application requirements, and using BX armored cable or Thinwall electrical metal tubing connector fittings, make electrical connections to the junction box (K).

Note: Follow local codes and standards when selecting the types of electrical fittings and conduit to connect to control.

IMPORTANT: There must be a minimum space of 1/2" (13mm) between connector fittings and electrical live metal parts.

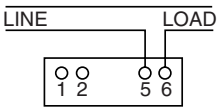
Snap Switches (Series 42S)



WIRING DIAGRAMS

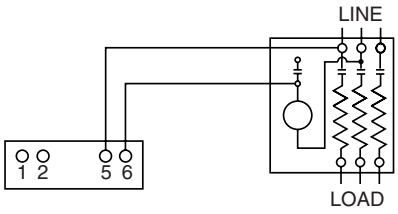
Low Water Cut-Off Only

1. Main Line Switch - For burner circuits within the switch's electrical rating.



OR

2. Pilot Switch - To holding coil of a starter when the burner circuit exceeds the switch's electrical rating.

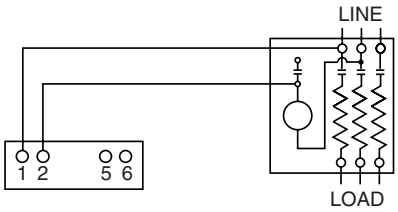


Pump Control Only

1. Install a starter or relay in pump control circuit, as shown, to prevent damage to snap switch and help insure proper switch/control operation. Failure to do so may shorten the life of the switch when actual amperage exceeds switch rating.

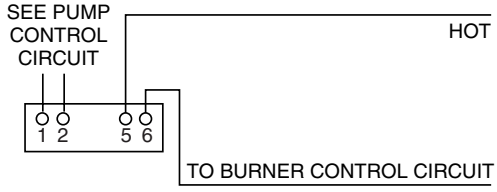
2. Connect wires from holding coil of pump starter or relay to terminals 1 and 2 as shown.

NOTE: To help insure most effective operation, balance boiler feed pump(s) to deliver required water feed rate to match boiler steaming requirements.



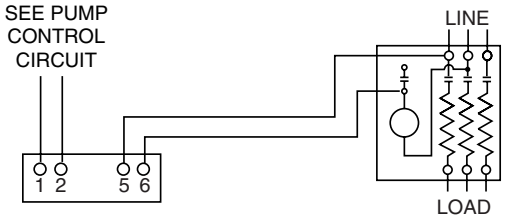
Combination Pump Control, Low Water Cut-Off and Alarm

1. Main Line Switch - For burner circuits within the switch's electrical rating.

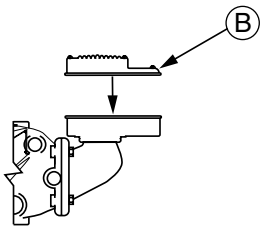


OR

2. Pilot Switch - To holding coil of a starter when the burner circuit exceeds the switch's electrical rating.



c. Re-attach the junction box cover (B).



STEP 4 - Testing

This control is factory calibrated for specific applications. The following testing procedure is only meant to serve as a verification of proper operating sequence.

Dimensions provided are typical for a boiler not being fired and/or not at pressure. Actual operating ranges are shown on page 2 in the "Operation" section.

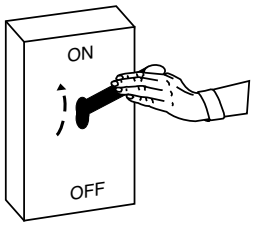
IMPORTANT: Follow the boiler manufacturer's start-up and operating instructions along with all applicable codes and ordinances.

a. Turn on the electric power to the boiler. With the boiler empty the pump should go on and the burner must remain off.

⚠ WARNING

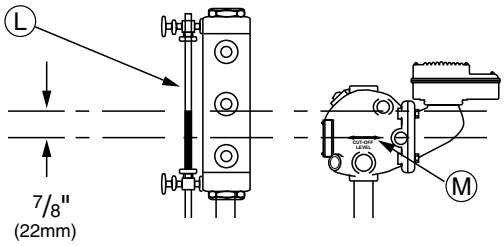
If the burner comes on, immediately turn the boiler off and make the necessary corrections.

Failure to follow this warning could cause an explosion or fire and result in property damage, personal injury or death.

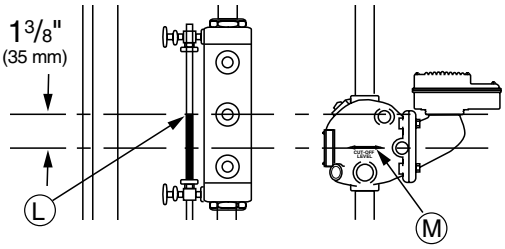


b. The boiler should begin to fill with water. Watch the gauge glass (L) until it reaches approximately 7⁄8" (22mm) above the horizontal cast line (M) on the low water cut-off. When the water level reaches approximately 7⁄8" (22mm) the burner should come on.

IMPORTANT: If water does not start filling the boiler, immediately turn off the the boiler and make the necessary corrections.



c. Continue watching the gauge glass (L) to see that the water continues to rise to approximately 1 3⁄8" (35mm) above the horizontal cast line (M). The pump should shut off.



MAINTENANCE

SCHEDULE:

Blow down control as follows when boiler is in operation.

- **Daily if operating pressure is above 15 psi.**
- **Weekly if operating pressure is below 15 psi.**

NOTE
More frequent blow-down may be necessary due to dirty boiler water and/or local codes.

- **Remove head assembly and inspect water side components annually.** Replace head assembly if any of the internal components are worn, corroded or damaged or if control no longer operates properly.
- **Inspect the float chamber and equalizing piping annually.** Remove all sediment and debris.

NOTE
The control may need to be inspected and cleaned more frequently on systems where there is the potential of excessive scale or sludge build-up. This includes systems: **• With high raw water make-up** **• With no condensate return** **• With untreated boiler water** **• Where significant changes have been made to the boiler-water chemical treatment process** **• With oil in the boiler water**

Replace head mechanism every 5 years.
More frequent replacement may be required when severe conditions exist.
Replacement parts are available from your local authorized McDonnell & Miller Distributor.
The use of parts or components other than those manufactured by McDonnell & Miller will void all warranties and may affect the units compliance with listings or regulating agencies.

BLOW DOWN PROCEDURE:

⚠ CAUTION	
	**To prevent serious personal injury from steam pipe blow down, connect a drain pipe to the control opening to avoid exposure to steam discharge.** **Failure to follow this caution could cause personal injury.**

When blowing down a control at pressure, the blow down valves should be opened slowly. The piping needs to be warmed up and stagnant water in the drain piping needs to be pushed out. Suddenly opening a blow down valve causes steam to condense, which can create water hammer. Damage to components can occur when water hammer occurs due to improper blow down piping. For these reasons, McDonnell & Miller recommends a dual valve blow-down system for each control.
Blow down the control when the water in the boiler is at its normal level and the burner is on.
NOTE: Refer to page 2 for switch operating points.

- Open upper valve (#1)
- Slowly open the lower valve (#2)
- Water in the sight glass should lower.
- As the water in the sight glass lowers, the pump should turn on.
- As the water continues to lower in the sight glass, the burner should turn off.
- Slowly close the lower valve (#2).
- Close the upper valve (#1)
- The water level in the sight glass should rise, first turning on the burner and then turning off the pump.

NOTE: On manual reset models, the reset button will need to be pressed after the water level has been restored before the burner will operate.

NOTE
If this sequence of operation does not occur as described, immediately close all the valves, turn off the boiler and correct the problem. Inspection/cleaning of the float mechanism may be required to determine why the control was not working properly. Retest the control after the problem has been identified and corrected.