



# Instruction Sheet

## Electric Water Feeder

102-170

SUPERCEDES: REVISION DATED AUGUST 1, 2004

EFFECTIVE: NOVEMBER 10, 2004

#5401148-REVB



Input Power:		
Model	Voltage	Power Consumption
EWF120-1	120 VAC	12 VA
EWF024-1	24 VAC**	10 VA

\*\* 24 VAC to be supplied by an EXTERNAL Class 2 power source

### Listings/Approvals:

- UL GUIDE (MBPR) for Limit Controls per UL Standard 353 Limit Controls
- CUL per CSA Standard C22.2 No. 24-93 for temperature indicating and regulating equipment.

**Process Connections:** 3/8" FNPT or 3/8" NPT to 1/2" copper fittings (included)

### Enclosure:

NEMA Type 1 (For indoor use only.) Formed sheet metal with powder coat/plated finish. Five openings for 1/2" conduit fittings. (Not for use in hazardous locations.)

**Maximum Inlet Pressure:** 150 PSI (10.5kg/cm<sup>2</sup>)

**Maximum Outlet (Boiler) Pressure:** 15 PSI (1kg/cm<sup>2</sup>)

**Maximum Media Temperature:** 160° F (71° C)

**Maximum Ambient Temperature:** 100°F (38°C)

**Feed Rate:** 1 gpm (3.8 lpm)

**Feed Choices:** LWCO Mode, Fixed Feed, or Manual Feed

**Flood Protection Lockout**

**Excess Feed Indicator**

### GENERAL

The Electric Water Feeder (EWF), is an electronics based water feeder for steam boilers. The EWF monitors the output from a Low Water Cutoff (LWCO). When the LWCO detects a low water condition, it signals the EWF, which initiates a water-feed cycle. Since the EWF is fully programmable, it can feed as long as the low water cutoff detects a low water condition (LWCO mode) or fixed feed amounts. In addition, the EWF allows the user to set Delays Before Feeding (DBF),

or hold delays after the low water cutoff signals water is restored (HAW). The EWF also includes a programmable excess feed indicator, (patent pending). The EWF blinks this LED after it has fed more than a settable number of gallons into the boiler over the past 30 days. This will help identify systems that may need maintenance.

### OPERATION

#### LWCO Mode

When the mode switch of S1 (See fig. 9a) is set to the ON position, the EWF will operate in LWCO mode. This causes the EWF to feed water whenever the LWCO signals a low water condition. Both the Delay Before Feeding (DBF), and the Hold After Water OK (HAW), settings may be set in LWCO mode. As soon as the EWF receives a low water signal from the LWCO, the EWF starts feeding water to the boiler after the DBF delay expires, if enabled. The EWF continues feeding water to the boiler until the LWCO signals that the water condition is normal and any HAW delay expires. If the EWF feeds 10 gallons, Flood Protection Lockout occurs and feeding stops immediately and a red LED is illuminated.

#### Fixed Feed

When the mode switch of S1 is set to the OFF position, the EWF will operate in Fixed Feed, (FF), mode. While in this mode, the EWF will feed the number of gallons set by switch S3 (See fig. 9a & c). While in Fixed Feed mode, only DBF delays may be used. HAW settings only apply to LWCO mode. After a feed cycle completes, if the LWCO still signals a low water condition, the EWF will start another feed cycle. If the EWF completes the second feed cycle and the LWCO still signals a low water condition, the EWF will enter the Flood Protection Lockout and a red LED is illuminated.

**CAUTION**

•If the LWCO signals a normal water condition while the EWF is feeding a fixed amount, the EWF will NOT stop feeding until the number of gallons set at DIP switch S3 has been fed to the boiler. Be sure S3 is set to feed the correct amount of water.

•Flooding or property damage may result.

**Manual Feed**

The Manual Feed button on the EWF allows the user to manually feed water to the boiler system as long as the user presses the button. Up to 5 gallons may be manually fed continuously before the EWF automatically closes the feed valve. If the EWF automatically closes the feed valve, the Manual Feed button must be released and re-pressed to manually feed more water. Manually fed water counts towards Excess Feed settings.

**Excess Feed Indication**

The Feed/Status Indicator will be rapidly blinking amber when the EWF has dispensed more water over the past 30 days than the setting of the Excess Feed switch (S4). Pressing and holding switch S5 will reset the Excess Feed Condition. See Fig. 2 for location of Excess Feed Reset Button. Once this reset button is pressed and held for 2 seconds the EWF briefly turns off the Feed/Status Indicator indicating reset has occurred. Once the EWF completes the

reset process, the Feed/Status Indicator will resume its normal state. Once the EWF is installed and the system is filled with water, reset the Excess Feed Condition to start normal operation of the system.

**Flood Protection Lockout**

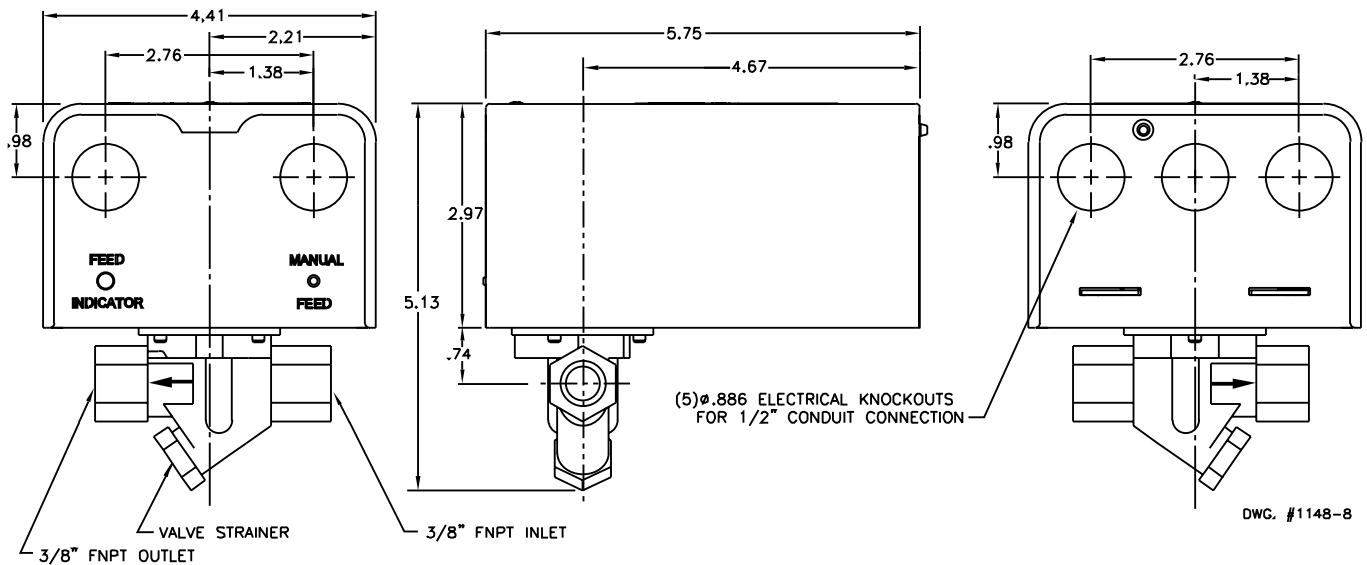
If the EWF dispenses 10 gallons in LWCO mode or completes two feed cycles in Fixed Feed mode, without the LWCO signaling a normal water level, the EWF enters Flood Protection Lockout. In this condition the EWF shuts off its feed valve, illuminates the Feed/Status Indicator LED to red, and waits for the user to correct the problems and reset the EWF. Entering the Flood Protection Lockout prevents flooding the boiler in the event that water is not actually needed by the boiler. Pressing and holding the Manual Feed button for 2 seconds will reset the Flood Protection Lockout condition. See Fig. 2 for location of the Manual Feed button. If the EWF enters Flood Protection Lockout, the user must trouble-shoot the system and correct the cause of the condition.

**Feed/Status Indicator**

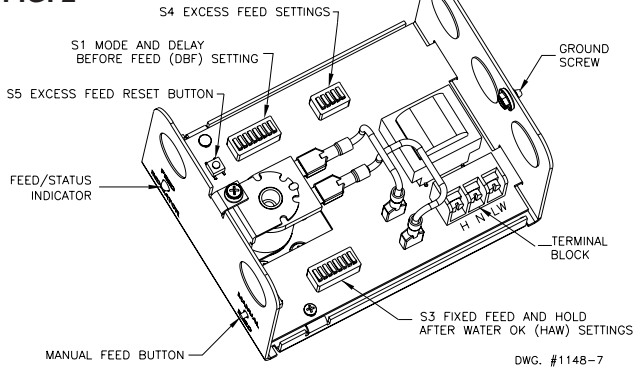
A multi-color LED indicates the status of the EWF as follows:

Condition	Status LED Color	State
Power/Normal	Green	Steady
Feeding	Green	Blinking-two times per second
Excess Feed	Amber	Blinking-four times per second
Flood Protection Lockout	Red	Steady
Control Failure	Red	Blinking-once every second

**CONTROL UNIT OUTLINE DRAWING  
FIG. 1**

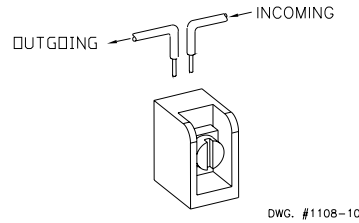


**EWF**  
**FIG. 2**



**TERMINAL BLOCK CONNECTIONS**  
**CLAMPING PLATE TERMINAL**

**FIG. 3**



**CAUTION**

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire becomes dislodged from under the terminal. Use 18 AWG (min.), or as required by local code. Wire insulation rating must be at least 167°F (75°C).

**WARNING**

- Shock hazard. Disconnect power source before servicing. Serious injury or death could result.
- Installation must be performed by qualified personnel and in accordance with all national and local codes and ordinances.
- Not for use in hazardous locations.
- To prevent damage to the device and/or electrical fire, wire insulation must be rated at 167° F (75° C) – over copper wire only.
- When installations are complete, check for correct operation of ALL limit and operating controls!

**CAUTION**

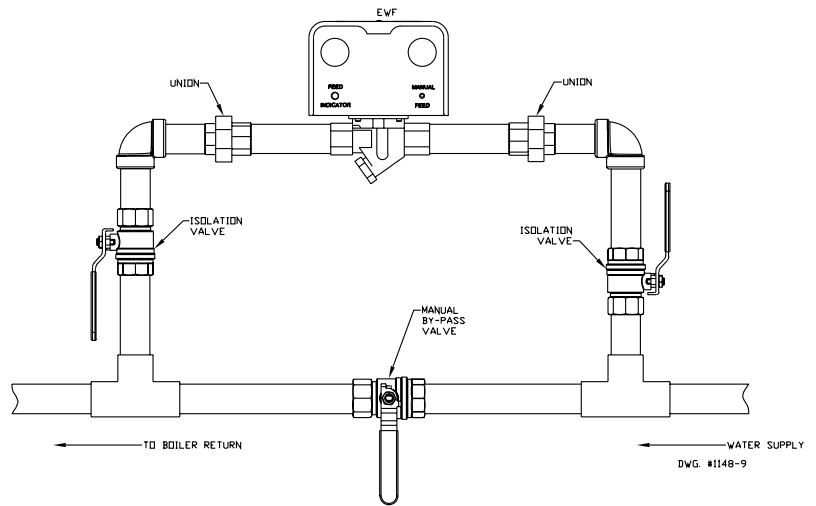
- Read all instructions carefully and understand them before starting installation and save for future use.
- Instruct user how to test and operate this feeding device as described in these instructions.
- Do not use manual reset low water cutoff with automatic water feeders like the EWF or flooding and property damage can occur.
- If using mixed voltages, DO NOT install jumper wire on LWCO.
- Wire the water feeder and low water cutoff from the same power sources. Failure to do so could result in flooding and property damage can occur

**INSTALLATION**

**Piping**

Plumb the EWF water feeder as shown in Figure 4. The EWF must be installed with a manual bypass. To permit ease of removal for servicing or replacement, install unions and isolation valves. Install the EWF with the flow direction arrow toward the boiler. Fill the boiler by manually opening the bypass valves until the water level is at a normal level for the boiler, (refer to the boiler manufacturer's literature for proper fill levels). Check the system for leaks before proceeding. Once the system is full, close the bypass valve and verify that both isolation valves are open. This routes water through the EWF.

**FIG. 4**





●Shock hazard. Disconnect power source before servicing. Serious injury or death could result.

## EFW Wiring

**Standard Wiring – EWF to LWCO with same voltages, see Figure 5.**

1. Verify that the supply and burner circuit voltages connected to the LWCO are the same as the EWF
2. Verify that factory-installed jumpers connecting the hot lead on the LWCO to the burner source are installed.
3. Connect the hot lead wire from the power source to terminal **H** on the EWF.
4. Connect the neutral lead wire from the power source to terminal **N** on the EWF.
5. Connect the NO/water feeder/alarm terminal on the LWCO to terminal **LW** on the EWF.

**Wiring EWF to LWCO with different burner circuit voltages, see Figure 6a & b.**

1. Verify that the burner circuit voltages connected to the LWCO are the same as the EWF
2. Verify that factory-installed jumpers connecting the hot lead on the LWCO to the burner source are removed.
3. Connect the hot lead wire from the burner power source to terminal **H** on the EWF.
4. Connect the neutral lead wire from the burner power source to terminal **N** on the EWF.
5. Connect the NO/water feeder/alarm terminal on the LWCO to terminal **LW** on the EWF.

FIG. 5

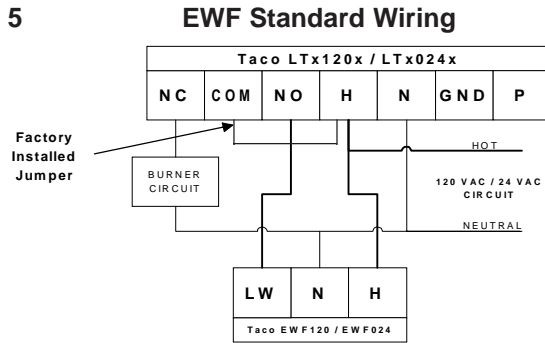
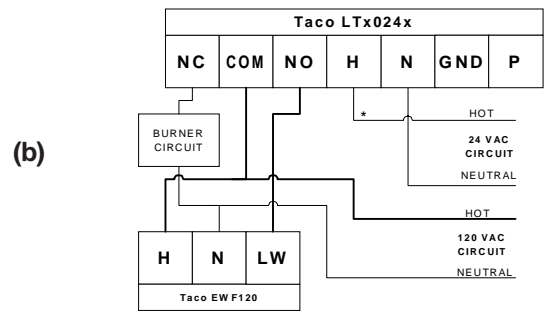
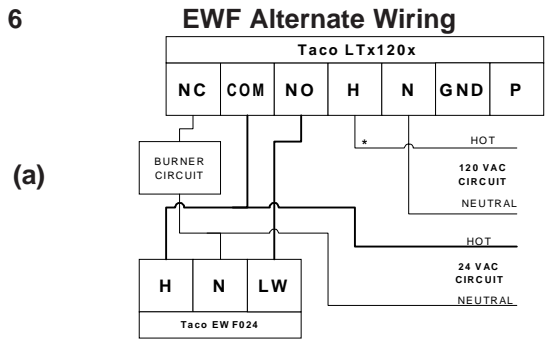


FIG. 6

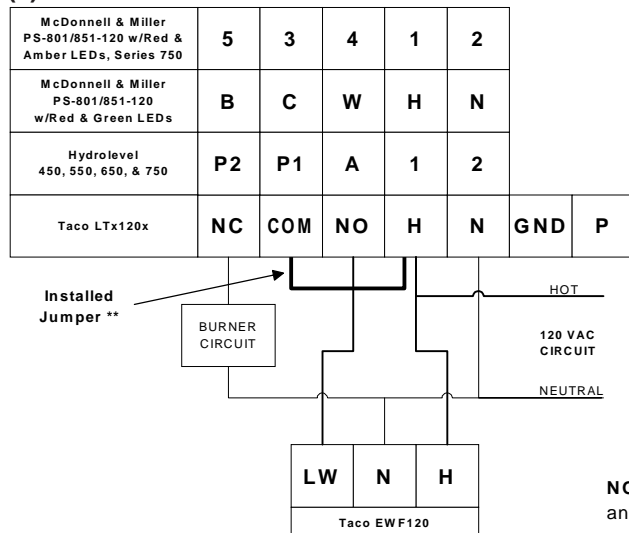


\* NOTE: Remove factory installed jumper between H and COM terminals

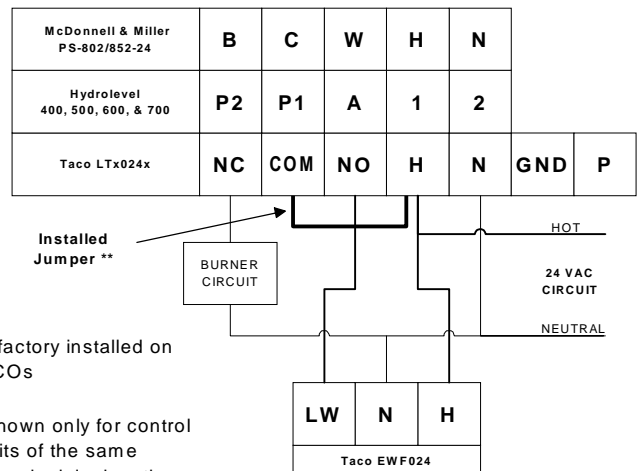
## Wiring the EWF to Various LWCO's

FIG. 7

(a)



(b)



\*\* May be factory installed on some LWCOs

**NOTE:** Wiring shown only for control and burner circuits of the same voltage. Some terminal designations are not in their actual order on the LWCOs.

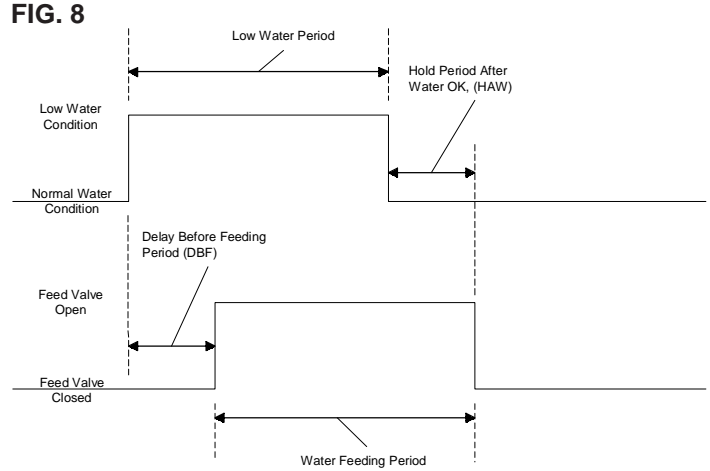
**DEFINITION OF DELAYS (SEE FIG. 8)**

**DBF (Delay Before Feed)**  
The amount of time before the EWF starts feeding once a low water condition has been detected by the low water cutoff.

**HAW (Hold After Water OK)**  
The amount of time before the EWF stops feeding after a normal water condition has been detected by the low water cutoff. This delay allows the EWF to feed additional water to the boiler after the LWCO is satisfied, and it is only available when the EWF is in LWCO mode. Use this setting when a water level higher than that set by the LWCO is required or if the LWCO does not have an appropriate delay on make, (DOM), feature.

**Water Feeding Period**  
The amount of time that the EWF feeds the boiler. The EWF feeds 1 gallon each minute\*\*.

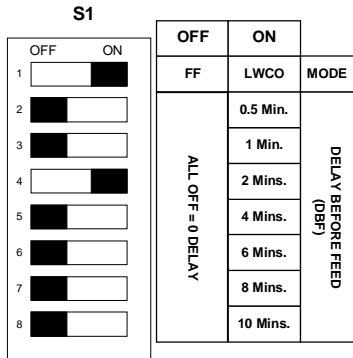
**\*\* The EWF will feed 1 gpm for inlet pressures of 20 to 120 PSI as long as the inlet/outlet pressure differential is at least 20 PSI. (For example, with a boiler pressure of 15 PSI, the inlet pressure of the EWF should be at least 35 PSI.) When pressures fall outside this range, test the system and set the EWF operating controls to compensate for your application.**



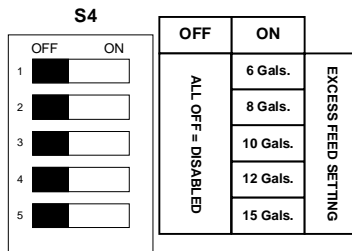
**Programming EWF**

Three DIP style switch blocks program the EWF operation mode.

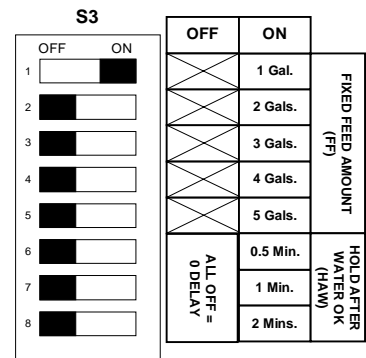
**FIG.9 (a):Delay Before Feed Mode**



**(b):Excess Feed Mode**



**(c):Fixed Feed and Hold After Water OK Mode**



Factory settings (shown above):

- MODE = LWCO
  - DBF = 2 minutes
  - Excess Feed = Disabled
  - FF = 1 Gallon
  - HAW = 0 delay
- If all DBF switches are set to OFF, DBF delay is zero.  
 If all FF switches are set to OFF, the system will automatically feed 1 gallon.  
 If all HAW switches are set to OFF, HAW delay is zero.  
 If multiple switches are ON for DBF, Excess Feed, FF, or HAW, the lowest setting will be used.

See Fig. 2 for location of the programming switches.

If programming the EWF to operate in Fixed Feed Mode, be sure to follow the procedure "Testing and Setting Fixed Feed Systems" before putting the system into service.

Net IBR Rating MBH*	Recommened Excess Feed Setting (Gals/Month)**
Up to 90	6 Gals.
90-120	8 Gals.
120-150	10 Gals.
150-185	12 Gals.
185 & Higher	15 Gals.

\*MBH is thousands of BTU's per hour  
 \*\*Excess feed settings are based upon normal boiler operation throughout typical heating seasons. These recommended settings do not account for water added due to boiler maintenance. Follow boiler manufacturers' usage recommendations if they differ from the settings shown here.

### Testing LWCO Mode Systems

1. Turn off thermostat and ensure boiler system has power.
2. Verify that the S1 mode switch is in LWCO mode and any DBF and HAW delays are set.
3. Lower the boiler water level until the LWCO indicates a low water condition.
4. Verify that the EWF feeds the boiler. Be sure to verify that any DBF delays occurred prior to the EWF starting a feed cycle.
5. When the LWCO indicates a normal water level, verify the EWF stops feeding the boiler. Be sure that any HAW delays occur before the EWF completes the feed cycle.
6. Return thermostat to its normal setting.

### Testing and Setting Fixed Feed Systems

1. Turn off thermostat and ensure boiler system has power.
2. For boilers with probe style low water cutoffs, lower the boiler water level approximately ½" below the probe. Be sure to verify that any DBF delays occurred prior to the EWF starting a feed cycle.
3. For boilers with float style low water cutoffs, lower the water level in the boiler until approximately ¼" is visible in the gauge glass. Be sure to verify that any DBF delays occurred prior to the EWF starting a feed cycle.
4. While using a stopwatch or a watch with a second hand, press the manual feed button on the EWF and measure the time it takes for the boiler fill to a normal water level. (Use the boiler manufacture's recommended normal operating level – typically the middle of the gauge glass).
5. Determine the number of gallons that were required to fill the boiler to a normal water level: The EWF feeds 1 gallon each minute. Round up to the nearest gallon.
6. Set the S1 mode switch to FF (Fixed Feed).
7. Set the S3 (Fixed Feed Settings) mode switch to the number of gallons determined in step 5.
8. Return thermostat to its normal setting.



- Fixed feed settings will always feed the amount of water set on switch S3, even if the LWCO indicates a normal water level before the feed cycle completes.
- Improper fixed feed settings could result in flooding and property damage could result.

## Troubleshooting

If the EWF enters the Flood Protection Lockout, the system should be examined to determine the reason for the lockout condition.

The EWF contains sophisticated electronics to detect circuit failures. In the unlikely event that the EWF detects a circuit failure, the Status LED blinks red, the feed valve closes, and the control enters a failsafe state. The user must remove and re-apply power from the EWF. If the failure is correctable, the EWF will restart normally. If the Status LED continues to blink red, the control must be replaced.

Condition at Flood Protection Lockout	Possible Cause	Details / Remedy
<b>Overfilled Boiler</b>	Low Water Cutoff not functioning properly	If the LWCO does not signal the EWF when water is at a normal level, the EWF will feed too much water to the boiler. Refer to manufacturer's instructions for the LWCO that is installed on the boiler for testing the LWCO.
	Improper setting of Fixed Feed amounts	Re-test boiler system to determine proper fixed amount of water to feed when a low water condition occurs. Adjust Fixed Feed amount to a lower setting.
	Improper setting of Low Water Cutoff Delay On Break (DOB)	If condensate is slow to return to the boiler, a longer DOB may be required to allow the water level to stabilize before the LWCO signals low water and feeding starts. If the LWCO has a DOM feature, be sure it is enabled and set correctly. (Refer to manufacturer's instructions for the LWCO that is installed on the boiler).
	Improper setting of Delay Before Feeding (DBF)	If condensate is slow to return to the boiler, a longer DBF may be required to allow the water level to stabilize before feeding starts.
	Improper setting of Hold After Water OK (HAW)	In LWCO mode, setting the HAW delay too long can cause overfilling. Re-test boiler system to determine the correct amount of additional feed water that is needed after the LWCO detects a safe water level.
<b>Low Water Condition</b>	Leaks in boiler or piping	Repair or replace boiler or piping as needed.
	Feed valve obstructed	Close isolation valves and open the strainer on EWF's feed valve. Clean out any deposits and debris in strainer. Replace and tighten strainer. Open isolation valves fully.
	Isolation valves not fully open.	If the isolation valves are not fully open, they can restrict the amount of water being fed to the boiler by the EWF. Open both isolation valves fully.
	Improper setting of Fixed Feed amounts	Re-test boiler system to determine proper fixed amount of water to feed when a low water condition occurs. Adjust Fixed Feed amount to a higher setting.



•Wiring 120VAC to 24VAC models of the Electric Water Feeder could result in electrical shock or damage to equipment. Carefully follow the recommended wiring methods in this bulletin.

## Maintenance

Disassemble and clean the feed valve's strainer screen at least twice annually.



## Limited Warranty Statement

Taco, Inc. will repair or replace without charge (at the company's option) any product or part which is proven defective under normal use within one (1) year from the date of start-up or one (1) year and six (6) months from date of shipment (whichever occurs first).

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