BOILER CONTROLS RETROFIT

AND

SERVO INSTALLATION GUIDE

FOR USE ON CLEAVER-BROOKS™ BOILERS

BREAK FREE OF CB PARTS, PRICING, AND CONTROL
While Cleaver Brooks makes a good low emissions boiler, adding a BurnerMate Universal retrofit control package makes it a great low emissions boiler. BurnerMate Universal offers a self-contained boiler control package that includes advanced flame safeguard control, parallel positioning fuel/air ratio control, oxygen trim draft control and drum level control. Up to ten high precision digital servos can be utilized for a variety of applications or in some cases you can reuse existing analog control devices.

The BMU continually monitors the flue gas oxygen and will use previously entered curve data to trim or fine tune the fuel/air ratio, maintaining peak operating efficiency. The safety of the boiler operation is also improved by monitoring the flue gas oxygen. This provides low excess air alarm and trip functions and has proven to be essential whenever Flue Gas Recirculation (FGR) is utilized to reduce emissions.

A Variable Speed Drive (VSD) controlled forced draft fan provides significant electrical savings compared to fixed speed fans with a damper. In many cases, the annual electrical cost savings due to the VSD are approximately the same as the annual fuel cost savings due to the Oxygen Trim. A BurnerMate Universal retrofit control package provides twice the annual savings, achievable with application of only a O2 Trim or only a VSD.

With energy savings as the main concern in today’s world, a single point jackshaft control system does not allow for energy saving possibilities on a Cleaver Brooks boiler. By converting to the BurnerMate Universal with an independent servo parallel positioning system, O2 trim and a VSD, annual energy costs will quickly plummet. Payback periods are frequently less than one and a half years.

Preferred Utilities, located in Danbury, Connecticut, manufactures microprocessor based controllers, instruments and electric actuators for combustion and process applications. A major component of the Instrument group sales is from control systems integration including personal computer based Supervisory Control and Data Acquisition systems.
Burner control upgrades and/or burner upgrades can provide significant fuel and electricity cost savings. How can an engineer, installer, or facility estimate realistic cost savings in order to evaluate the payback from an upgrade investment? Preferred has the answer. We built the Preferred Utilities EnergySaver Payback Analysis Web App to estimate savings based on site specific data.
Overview of Parts Required for Installation

**BurnerMate Universal Control System**

The following pictures and descriptions are based on a typical BurnerMate Universal retrofit package on a 250 HP Cleaver Brooks Boiler with CB Hawk controls.

**Retrofit control package includes:**

- BurnerMate Universal 1ZN0 cabinet:
  - BMU expanded chassis for draft control and O2 trim
  - OIT Touchscreen
- ZP Oxygen Analyzer
- FD Fan Variable Speed Drive
- Limit switches including:
  - Low Gas Pressure Switch
  - High Gas Pressure Switch
  - Low Oil Pressure Switch
  - High Oil Pressure Switch
  - Low Oil Temperature Switch
  - Combustion Air Pressure Switch
- Draft Pressure Transmitter and High Draft Cutout Switch
- Steam Drum Pressure Transmitter
- Flue Gas Temperature Thermocouple
- Parallel Positioning Combustion Control Servos:
  - Gas Valve Servo
  - Oil Valve Servo
  - Forced Draft Damper Servo
  - Flue Gas Recirculation (FGR) Damper Servo
  - One additional servo for draft control
  - (If there is an existing outlet damper)

**Reused original equipment to BMU system:**

- Cleaver Brooks’ Oil Atomizing Air Pressure Switch
- Gas and Oil Safety Shutoff Valves
- Both High Steam Pressure Operating Limit Switches
- Existing Low Water and Auxiliary Low Water Cutoffs
- Boiler Water Temperature Aquastat Switch

All of the required brackets, couplings to adapt the new servos to the existing fuel and damper control devices.
Recommended Steps for Installation

Installation of the BurnerMate Universal control panel

Remove all field wiring to the original panel and unbolt it from the two angle supports on the boiler door. Build a uni-strut frame that will dimensionally fit the new panel and bolt it to the two angle supports as shown.

Original panel mounted to the angle supports.

New BurnerMate Universal panel bolted to the uni-strut frame.

New BurnerMate Universal panel powered up.

New uni-strut frame bolted to the angle supports.

FD Motor wires routed behind the panel.
Mounting of the Field Devices

A Preferred ZP Zirconium-Oxide Oxygen Detector Probe (ZP-O2) is included as part of the new system. This gets wired in its own dedicated conduit directly back to the BMU panel. Calibration gas flow rate rotometers are supplied for installation at floor level and is connected to the Oxygen Detectors with ¼ inch copper. Reference Section 7 of the BurnerMate Universal Instruction Manual for details on installing the ZP-O2 probe and detector.

ZP-O2 Detector and Probe mounted in the stack.

Flow meter tubed to the O2 Detector

Shown are:
- Low and High Oil Pressure
- Low Oil Temperature
- Low Combustion Air Flow
- Low Atomizing Air Pressure Switches

ZP-O2 Detector and Probe mounted in the stack.                    Flow meter tubed to the O2 Detector

Shown are:
- Low and High Oil Pressure
- Low Oil Temperature
- Low Combustion Air Flow
- Low Atomizing Air Pressure Switches
Two new Oil Safety Shut Off Valves with Proof of Closure Switches were installed to replace the Original oil solenoid valves. The new oil valves were not part of the original retrofit package.

The original oil solenoid valve may be required to be replaced with new oil safety shut off valves with proof of closure switches.
Wiring Field Devices

Wire the field devices as shown on the BurnerMate Universal electrical print and prove they are properly connected using the Touch Screen I/O reference view. All of the low voltage and high voltage circuits can be checked by viewing the touch screen.
**FD Damper BMU Servo Installation**

**Parts Required for Mounting the FD Damper Servo:**

- One (1) BMU-SM-37-QD Servo
- One (1) Set servo bolts and washers
- One (1) 107371 Bracket
- One (1) 107366 Lever Arm
- Two (2) ¼-20 X 1 inch bolts, flat washers, lock washers

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1. Remove the existing drive rod from the damper arm. Remove all the swivel hardware from the drive rod and the ball pin from the jackshaft drive arm for reuse. Discard the rod.

2. Remove the drive arm connecting the firing rate actuator to the jackshaft drive arm and remove the swivel hardware. Keep the drive rod for reuse and discard the swivel hardware.

3. Bolt the BMU-SM-37-QD Servo to the bracket supplied (107371) and loosely install the lever arm (107366) to the servo shaft as shown in the picture below.

4. With the FD damper in the fully closed position, hold the servo and bracket up to the boiler as shown in the picture below. Holding the servo so that the drive arm is approximately ¾ of an inch to the left of the last hole (outer most) in the FD drive arm, mark on the boiler the location of the bolt holes for the servo bracket. **Hint:** Use a level to plumb a line from the last hole in the FD drive arm and make a pencil mark on the boiler adjacent to where the FD servo will be mounted. This will help facilitate the location of the servo bracket.

5. Drill and tap two ¼-20 holes and mount the servo bracket as shown above.
6. Using the drive arm from the firing rate actuator and the swivel fittings removed from the FD drive arm; assemble the drive arm as shown in the below pictures. The quick disconnect fitting should be on the servo drive arm.

7. At 4 inches from the FD damper end of the drive arm, use a bench vise to bend the rod approximately 15 to 20 degrees as shown below. As a starting point, install the drive rod in the outer most hole on the damper drive arm and the 4th hole on the servo drive arm.

8. Remove the jumper J11 from the servo and stroke the servo manually to insure that the FD damper goes through a full stroke without binding. Adjust the drive rod position on the drive arms and the servo drive arm hub until a full damper stroke is achieved.
Alternate FD Damper Servo Installation for Larger Shells

On larger diameter shells there is more room so that an alternate FD Servo bracket can be used as shown above and below. The bracket reuses the bolt holes that held the support bracket for the jackshaft. Reuse the bolts that held the jackshaft support bracket to the boiler front door.

Parts Required for Mounting the FD Damper Servo in the Alternate Location:

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) Set servo bolts and washers</td>
</tr>
<tr>
<td>One (1) 20174 Bracket</td>
</tr>
<tr>
<td>One (1) 10736 Lever Arm</td>
</tr>
</tbody>
</table>
FGR Damper Servo Installation

Suggested Installation Instructions:

1. Remove the drive rod assembly and discard. Remove the outer portion of the FGR damper drive arm and over travel spring assembly but leave the inner portion fastened to the shaft. Also leave the bracket with the high and low fire stop screws.

2. Assemble the servo, coupling and bracket together and place it into position on the FGR damper shaft. Mark the center of the (4) holes for bolting the bracket to the front door.

The following parts are required:

- One (1) BMU-SM-37-QD Servo
- One (1) Set servo bolts and washers
- One (1) 26177 Bracket
- One (1) A-26173-2A Coupling
- Four (4) ¼ 20 X 1 inch bolts
- Four (4) ¼ inch lock washers
3 Remove the servo assembly and drill and tap the (4) ¼ 20 holes as required. Mount the servo assembly back onto the FGR damper shaft and install the (4) ¼ 20 bolts using the lock washers.

4 Do not tighten the set screws on the coupling to the shaft until the servo is powered up. The remove the J11 jumper and adjust the stroke of the servo to the required stroke of the FGR damper.

5 Move the servo and the damper to the closed position. Tighten the coupling set screws to the FGR damper shaft. Re-stroke the servo to insure smooth movement and that there is no binding.
CB-LE Gas Valve Servo Installation

As found:

Suggested Installation Instructions:

1. Before removing any of the linkage, use a file to mark the shaft to show the valve in the fully closed position. Remove the drive rod assembly. Remove the gas valve drive arm, over travel spring assembly and the bracket with the high and low fire stop screws. Save the bolts that held the stop screw bracket to the gas valve for reuse.

2. Bolt the bracket to the bottom of the gas valve as shown.

The following parts are required depending on gas valve:

HoneyWell LVL
- One (1) BMU-SM-37-QD Servo
- One (1) Set servo bolts and washers
- One (1) 26189 Bracket
- One (1) A-216173-2A Coupling

Or

Other
- One (1) BMU-SM-37-QD Servo
- One (1) Set servo bolts and washers
- One (1) C-30009 Bracket
- One (1) B-20154 Coupling
3 Install the servo and coupling as shown below. Do not tighten the coupling set screws to the valve shaft yet.

4 Once the servo is powered up, remove the J11 jumper and adjust the stroke of the servo to the required stroke of the gas valve.

5 Move the servo and the gas valve to the closed position (use the reference mark from #1 above). Tighten the coupling set screws to the gas valve shaft. Carefully stroke the servo to insure smooth movement and that there is no binding.
Cleaver Brooks Oil Cam Servo Installation

As found:

Suggested Installation Instructions:

1. Remove any linkage connected to the shaft in the vicinity of the oil valve assembly. Clean the shaft with emery cloth for 2 inches near the shaft bearing support. Cut the shaft at 1.375 inches from the bearing support bracket as shown below.

The following parts are required depending on gas valve:

- One (1) BMU-SM-37-QD Servo
- One (1) Set servo bolts and washers
- One (1) 20173 Bracket
- One (1) A-26180-1 Coupling
- Three (3) \( \frac{1}{4} \)-20 x 1.25 inch bolts and lock washers
Mount the servo and coupling to the bracket and place it on the shaft as shown. When the coupling appears to be properly aligned, mark the front door for the bracket location.

The following parts are required:

- One (1) BMU-SM-37-QD Servo
- One (1) Set servo bolts and washers
- One (1) 20173 Bracket
- One (1) 26180-1 Coupling
- Three (3) ¼-20 x 1.25 inch bolts and lock washers
3 Re-install the servo and coupling to the mounted bracket. Tighten the servo end of the coupling but do not tighten the coupling set screws to the shaft yet.

4 Once the servo is powered up, remove the J11 jumper and adjust the stroke of the servo to the required stroke of the oil valve cam.

5 Move the servo and the oil valve cam to the closed position. Tighten the coupling set screws to the shaft. Carefully stroke the servo to insure smooth movement of the cam and that there is no binding.
Outlet Damper Servo Installation

Introduction:

It is quite common to find a Cleaver Brooks Package Firetube Boiler without an outlet damper or any type of draft control installed. A stub stack arrangement usually doesn’t produce draft issues that will affect the Cleaver Brooks Boiler. On the other hand there are many cases where the Cleaver Brooks Boiler was part of a retrofit package in an existing older boiler room. This older boiler room probably has an existing chimney and common breaching design that was reused for venting the new boilers. In this case it is very common to find draft dampers and control systems that are in use.

The Cleaver Brooks Package Firetube Boiler is normally very tolerant of variations in the outlet draft because the level of the draft (or pressure) is very small compared to the resistance of the Boiler and Burner and the resulting FD Fan discharge static pressure. The allowable draft range variation is normally specified by Cleaver Brooks to be -0.5 to +0.5" in. wc.

However, with the introduction of the “LE” (Low Emissions) model the outlet draft has becomes a significantly more important condition because it has a direct influence on the quantity of flue gas directed to recirculate and blend with the combustion air. Variations in the amount of recirculated flue gas (FGR) not only impacts on the level of NOx emissions but also will affect the burner’s overall operation. For this reason Cleaver Brooks has specified an outlet draft range for “LE” Boiler applications be limited to -.25 to +.25 in. wc.

Preferred Utilities has supplied hundreds of draft control systems for use on the Cleaver Brooks Boilers. The mechanical feed-forward RapidLink System was originally designed for operation with the CB-LE Boilers. The RapidLink was later updated with our current ELink Draft Control System. In both cases the same damper design was utilized.

The following drawings illustrate the RapidLink design and the newer ELink design. The conversion of the ELink to a new BMU servo is quite easy and only requires a servo change out and set up. The RapidLink however is more involved.

The following instructions are based on the retrofit of a RapidLink system with a new BMU servo
Outlet Damper Servo Installation

The following parts are required:
- One (1) BMU-SM-37-QD Servo
- One (1) A-26180-1 Coupling
- One (1) Set servo bolts and washers
- One (1) 90377 Bracket
- Two (2) 90378 Spacers
- Two (2) ¼-20 x 2.5 inch bolts, washers, flat washers and nuts (supplied by others)
- One (1) 107371 Bracket

As found:

Suggested Installation Instructions:

1. Remove the RapidLink linkage assembly, draft actuator, main support bracket (save the mounting bolts, nuts and washers) and the flex cable that connects to the firing rate jackshaft. Reference the next two photos.
Secure the damper drive arm thumbscrew so that the damper cannot be accidentally locked in place.

Loosely mount the 107371 bracket to the 90377 bracket using the two 90378 spacers. Then slide the coupling onto the servo and mount the servo to the 107371 bracket as shown in the following pictures. Note that the 90377 bracket will mount to the damper assembly in the same location and faction as the RapidLink mounting bracket.
3. With all bolts hand tight and the servo and damper shaft lined up, mark the location of the two required bolts holes on the damper bracket. Remove the 90377 bracket and drill the holes large enough so that the original mounting bolts, nuts and washers can be reused.

4. Reassemble the parts noted in step 2 and tighten the nuts and bolts as required. Tighten the coupling on the servo shaft only and leave the damper shaft end loose. Move the damper using the damper drive arm and insure that the damper moves freely.

5. Once the servo is powered up, remove the J11 jumper and adjust the stroke of the servo to the required stroke of the damper.

6. Move both the servo and the damper to the closed position. Tighten the coupling set screws to the damper shaft. Carefully stroke the servo to insure smooth movement and that there is no binding.

7. As shown in some of the above pictures, the top of the 90377 serves as a convenient location for the new JC-22XMTR-HPCO Draft Transmitter and High Pressure Cutout Switch.
Wiring the BurnerMate Universal Servos

The wiring of the BurnerMate Servos is relatively easy if the following instructions have been read and are understood by the installing electrician.

There are two methods of connecting the required power and communication wires to the servos. The first is to directly wire to the internal circuit boards of the servos and the second is to use the factory supplied and pre-wired quick connect cables made specifically for these servos. The following covers both of these methods in detail.

Direct Wiring Method

The servos are always wired in a series, daisy chain arrangement where the wires will run from the BurnerMate Universal chassis to the first servo (address 0) and then from the first servo to the next servo (address 1) and then to the next (address 2) and then to the next and the next until all the servos have been connected. The address of the servo is always in the same sequence as they are wired; first servo is address 0, the second is address 1, etc. As each servo can be assigned to any of the available tasks it makes no difference what sequence you use to connect the servos. Take the easiest route.

To wire the servos directly you will need three #16 gauge THHN wires and the green BMU-CABLE. These wires can be run in the same conduit because the 120 VAC power is isolated for powering the servos only. No other devices can be powered from this circuit.

Prepare the shielded cable ends before pulling the cables into the servo.
1 Pull the BMU-CABLE along with (3) 16 ga. THHN wires through a ½" flex conduit with enough slack for servicing.

2 Install (2) conduits for daisy chain wiring, one BMU-CABLE & three 16 ga. wires in each conduit. Reference the terminal wiring diagrams on page 25.

**Caution:** Do not attempt to pull two of the green shielded cables through one servo conduit connection! It will never fit and damage to the shielded cable will result.

3 

4 Push back the braided shield and cut it off.

5 **Caution:** Do not cut off the bare ‘drain’ wire.

Remove the foil shield.

6 Keep the wire pairs twisted together.

Separate the bare ‘drain’ wire.

7 Use the 1/16" shrink tubing to insulate the drain. For Daisy chaining servos, mark the in & out grey/pink wires on the respective wire sides. If the servo is the last in the chain there is no need for this step.

8 Slide the 3/8 inch shrink tubing over the twisted pairs and drain wire and heat shrink it.

**Attention:** All following steps must be completed before moving forward.

**Caution:** All shielded cable braid, foil, and bare drain wire must be insulated. If any of these touch the conduit, servo metal, ground, or any other exposed wires; electrical noise will be increased!

9 After preparing the shielded cable ends, pull the shielded cables and the 120 VAC wires through the conduit connections and into the servo, and connect the flex conduit to the servo.
Use wire ties to route the wires as shown. Keep the wires on the back side of the stand-off to provide clearance for the cover.

Keep the wires away from the white limit switch cam adjustment wheels.

Wire servo via Terminal Wiring.

### Terminal Wiring

**Horizontal AC Terminal Strip:**
- Left two terminals: Neutral
- Right two terminals: 120 VAC Hot
  (Terminal pairs are connected internally)

**Vertical DC shielded cable terminal strip:**

<table>
<thead>
<tr>
<th>V+</th>
<th>Brown</th>
<th>(+ 24 VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-</td>
<td>White</td>
<td>(24 VDC Common)</td>
</tr>
<tr>
<td>C+</td>
<td>Yellow</td>
<td>(Communications +)</td>
</tr>
<tr>
<td>C-</td>
<td>Green</td>
<td>(Communications -)</td>
</tr>
<tr>
<td>Blank</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Shield drain wire</td>
<td>(Heat shrink covered)</td>
</tr>
<tr>
<td>IN</td>
<td>Pink/gray pair</td>
<td>(from the BMU or the previous servo)</td>
</tr>
<tr>
<td>OUT</td>
<td>Pink/gray pair</td>
<td>(to the next servo in the ‘daisy chain’)</td>
</tr>
</tbody>
</table>

Wire nut the field wiring ground wires to the green/yellow servo ground wire.

Very firmly tighten all terminal block screws.

Tug on each individual wire in each terminal to ensure that there is a good connection.
Quick Connect Cable Method

Preferred Instruments has developed an easier and more efficient method of wiring the servos. Quick connect sockets are pre-installed in the servos at the Danbury factory. Each servo has a socket for the power cable and a second socket for the communication cable. A central cable junction box (BMU-JBOX) receives the three #16 gauge power wires and the green BMU-CABLE. Up to four servos can be connected to each J-box. Should there be more than four servos, a second J-box can be installed in series with the first box.

This doesn’t confine the installer too using only one or the other wiring method. For example, if there are three servos on the burner front and an outlet damper servo at the back of the boiler, the servo in the back of the boiler can be direct wires from the J-box.

The following shows a typical installation where the servos are wired with the quick connect cables.

Like most electronic circuit boards, the J-box has a maximum temperature rating of approximately 125 deg. F. In picture A, the door of this boiler will reach temperatures up to 150 deg. F. In this case you must mount the J-box off the door with spacers to allow air to circulate behind the box. Reference picture B.

Reference to Part Numbers

| BurnerMate Universal cable junction box | BMU-JBOX |
| Servo communication wire | BMU-Cable |
| Servo communication quick connect cable | COMM-CABLE-ASSEMBLY-XX |
| Servo power quick connect cable | PWR-CABLE-ASSEMBLY-XX |

Note: XX denotes the cable length- 2 ft., 6 ft., & 12 ft.

**Two very important things to remember when using the Quick Connect cables and the BMU-JBOX:**

1. The cables always are connected from the left side to the right side of the JBOX.
2. Insure that you set the J7 jumper to the number of servos connected to that box.
<table>
<thead>
<tr>
<th><strong>Quick Reference for Parts Required for Installation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FD Damper:</strong></td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) Set servo bolts and washers</td>
</tr>
<tr>
<td>One (1) 107371 Bracket</td>
</tr>
<tr>
<td>One (1) 107366 Lever Arm</td>
</tr>
<tr>
<td>Two (2) ¼-20 X 1 inch bolts, flat washers and lock washers</td>
</tr>
<tr>
<td><strong>FGR Damper:</strong></td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) Set servo bolts and washers</td>
</tr>
<tr>
<td>One (1) 26177 Bracket</td>
</tr>
<tr>
<td>One (1) A-26173-2A Coupling</td>
</tr>
<tr>
<td>Four (4) ¼ 20 X 1 inch bolts</td>
</tr>
<tr>
<td>Four (4) ¼ inch lock washers</td>
</tr>
<tr>
<td><strong>Gas Valve:</strong></td>
</tr>
<tr>
<td>HoneyWell LVL</td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
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</tr>
<tr>
<td>One (1) C-30009 Bracket</td>
</tr>
<tr>
<td>One (1) B-20154 Coupling</td>
</tr>
<tr>
<td><strong>Oil Valve:</strong></td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
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<td>One (1) A-26180-1 Coupling</td>
</tr>
<tr>
<td>Three (3) ¼-20 x 1.25 inch bolts and lock washers</td>
</tr>
<tr>
<td><strong>Outlet Damper - Converted from a RapidLink:</strong></td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
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<td>One (1) A-26180-1 Coupling</td>
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<tr>
<td>One (1) 90377 Bracket</td>
</tr>
<tr>
<td>Two (2) 90378 Spacers</td>
</tr>
<tr>
<td>Two (2) ¼-20 x 2.5 inch bolts, washers, flat washers and nuts (supplied by others)</td>
</tr>
<tr>
<td><strong>FD Damper Servo (Alternate Location):</strong></td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
<td>One (1) Set servo bolts and washers</td>
</tr>
<tr>
<td>One (1) 20174 Bracket</td>
</tr>
<tr>
<td>One (1) 10736 Lever Arm</td>
</tr>
<tr>
<td><strong>Other</strong></td>
</tr>
<tr>
<td>One (1) BMU-SM-37-QD Servo</td>
</tr>
<tr>
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<td>One (1) Set servo bolts and washers</td>
</tr>
<tr>
<td>One (1) 26189 Bracket</td>
</tr>
<tr>
<td>One (1) A-26173-2A Coupling</td>
</tr>
</tbody>
</table>
Commissioning the BurnerMate Universal

The following are the basic steps recommended for a complete and successful start-up of the BurnerMate Universal, including the tuning and final commissioning functions. A detailed step by step procedure is outlined in Section 5 of the Instruction Manual.

Caution: The commissioning engineer must read the Instruction Manual carefully and be certain that they fully understand the requirements of the BurnerMate Universal and its application as it applies to the specific fired equipment being retrofitted. Failure to follow the instructions in the manual could result in damage to the product and/or a hazardous condition. Check the ratings given in the manual to insure that this product is suitable for the intended application. After installation and commissioning is complete, check that the actual operation of this product is as it is described in the manual.

Steps to commission a BurnerMate Universal

1. Obtain a Temporary Password.

2. Review the application and configure the appropriate Parameters as they apply to this installation. See Section 3 in the Instruction Manual.

3. Set up and calibrate all of the BurnerMate Universal servos.

4. Place the BurnerMate Universal in the “Commission Mode”.

5. Pre-program the Standby, Purge and Ignition positions.

6. Start the burner sequence and confirm the operation of all safety non-recycle and operating recycle limits.

7. Verify the Purge and Ignition positions and fire the burner.

8. Enter the curve points. Repeat for all fuels.

9. Verify all curve points.

10. Operate in automatic and perform the final PID tuning.

11. Document all the Parameter settings, limit switch settings and combustion and servo data.
Commissioning the BurnerMate Universal

1 To get started you must obtain a temporary password for the BurnerMate Universal. On the LCD screen, access the Utilities menu from the Main menu. Record the current Date, Time and Serial Number. Contact Preferred Instruments in Danbury, CT during normal working hours and ask for Technical Support. A temporary password, good for 6 hours, will be issued to you.

2 Application setup pages in the OIT Touch Screen are designed to make the initial parameter setting a snap. By answering a few questions upfront about your installation, you will customize the Main Screen view and basically eliminating all unused options and parameters leaving behind only the parameters that pertain to this application.

![OIT Application Screen](image_url)
Parameters are divided into six basic groups.

From the Application screen, proceed to the Parameter Setup screens.
Each Parameter group is further divided into sub-groups so it's easy to stay organized.
Configure and calibrate the servos. Follow the simple step by step instructions in section 6 of the BMU instruction manual.
4. From the LCD keypad, enable the “Commission Mode”.

5. Pre-program the Standby, Purge and Ignition positions and curve points.

6. Start the burner sequence and verify that all safety and operating limits are functioning properly.

7. Verify the Purge and Ignition positions and fire the burner.

8. Set up the fuel/air ratio curves for each fuel. The curve set up screen will provide access to all locations to enter setting up data and verification of points.
Typical fuel curve
All curve points can be graphically viewed for fine tuning.

10 Perform the final tuning of the control loops.

PID loop tuning is made easy with tuning parameters and a trending graph.
New Quick-Disconnect Servo Cables

A Simpler Way to Retrofit

Part No.
QD1-CABLE-3.3

New QD1 style

One cable per servo (all 120V, Communications, and 24Vdc wires into are in a single cable)

A QD1-JB Junction Box is NOT required (more cost savings), but can be used if desired.

Cables are rated ITC-ER (Instrument Tray Cable – Exposed Run), which means these cables do NOT have to be run in conduits per the National Electric Code.

QD1 cables and -QD1xx servos are UL Recognized for Exposed Run installation on Burners and Boilers.

QD1 cabling costs less than the existing QD cables and is more rugged.

Cable length can be extended by connecting two cables together, see attached instructions for lengths in stock.

The -QD1MF (Male & Female) servos can be used for: Daisy Chain, QD1-JB, or mixed Daisy Chain/QD1-JB systems.

The QD1-CABLE-F-xx replaces the “Green Cable” (that used to run to the BMU-JBOX), see attached instructions.

The QD1-JB can connect to up to 6 servos (the old BMU-JBOX could only connect to 4 servos)

Old QD style

Two cables were required per servo (a 120V cable plus a communications cable)

Requires a BMU-JBOX

Is NOT UL Listed

Is more expensive than -QD1 cabling

Is not as rugged as -QD1 cabling