

# **THERMALLY-OPERATED, THROTTLING LIQUID FUEL MECHANICAL CONTROL**

The Model 10 is a high pressure throttling liquid fuel control designed for use in heating systems to regulate the flow of kerosene, fuel oils and the liquid phase of LP gas.

It derives its simplicity and efficiency from the Piston-Pak filled system sensing element.



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First Edition

**SPECIFICATIONS  
INSTALLATION  
OPERATION**

# MODEL 10

# FUEL

# CONTROL

**Partlow**

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**QUALITY INSTRUMENTATION DESIGNED & MANUFACTURED IN THE USA**

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Please disregard all phone numbers and addresses in this manual. The phone numbers and address on this page are the correct phone number and addresses to use for sales, repair, and application support.

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## MODEL 10 PRODUCT SPECIFICATIONS

- Dimensions 2 15/16" W x 4 3/4" H (less element)
- Mounting Threaded flange beneath dial face, 10 x 24 threaded holes in flange
- Thread Size Inlet and outlet 1/2" NPT
- Maximum Pressure Operation 65 P.S.I.
- Maximum Liquid Temperature thru valve 125°F
- Flow Capabilities 15 1/2 scfm @ 30 psi pressure drop (air test medium)  
3 1/4 gpm @ 30 psi pressure drop (water test medium)
- Warranty One year, details on the last page.
- Approx. Net Weight\* 2 lbs
- Approx. Ship. Weight\* 4 lbs
- \* Weight will vary depending on length of element.

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### NOTE:

*It is strongly recommended that Partlow equipped applications incorporate a high or low limit protective device which will shut down the equipment at a preset process condition in order to preclude possible damage to property or product.*

*This document should accompany the instrument to its final installation in order to provide operational and service assistance to the end user.*

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## MODEL 10 ORDER MATRIX

**Model 10\***

**Order Number  
GC00107**

\*M-type plunger is required.

Specify dial required.

### **PISTON-PAK THERMAL SENSING ELEMENT**

A Piston-Pak Thermal Sensing Element must be specified for each Model 10. Use Partlow Form 3028 "Mechanical Product Instrumentation Cross Reference and Pricing Guide" to configure the matrix number for the sensing element.

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**CAUTION:  
THIS CONTROL  
IS NOT TO BE  
USED WITH  
WATER OR  
STEAM.**

## INSTALLATION AND WIRING

### LOCATION

The element head assembly is subject to ambient temperature limitations of -30°F to 125°F (-35°C to 52°C) for low temperature head assemblies and +32°F to +150°F (0°C to 66°C) for high temperature assemblies. These temperature limitations must be considered when determining the instruments location. It should be located in an area as free from vibration as possible.

### MOUNTING

All piping must be clean and free of rust and foreign deposits that may cause valve blockage in operation. If deposits are a problem, a line filter may be required. Install control valve in place using Figure 1 as a guide, if installing in a panel location. If free standing, disregard Figure 1 for mounting requirements. In either instance, install valve in any position in liquid line making certain that flow is in the direction of the arrows stamped on control body. To facilitate valve installation and ease of removal for possible service, it is recommended that unions be installed in both the supply and outlet lines to valve. Be certain to install shut off valve in the supply liquid line for service and also 100% shut off.

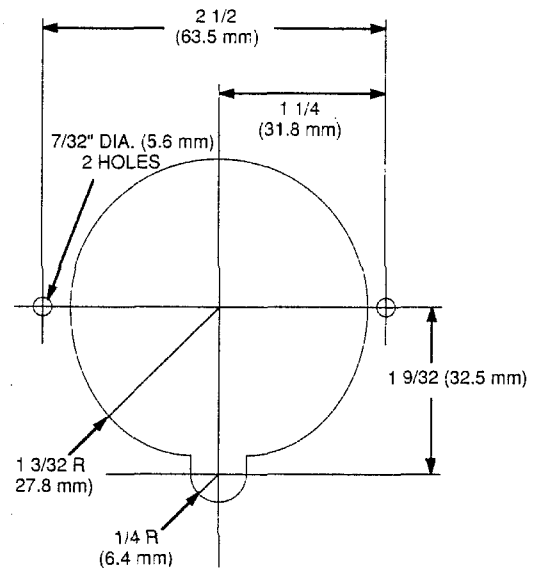
### STUFFING BOX INSTALLATION (IF APPLICABLE)

Overtightening of 21-T-105 steel or stainless steel stuffing boxes can damage the thermal element by restricting the capillary bore. To prevent damage, the stuffing box gland nut should be turned 1/2 to 3/4 of a revolution from a finger-tight position. This is equivalent to a torque of 65 to 100 inch-pounds for steel and 130 to 180 inch-pounds for stainless steel.

### PLACING THE THERMAL SENSING ELEMENT

Locate the thermal sensing bulb in the most agitated part of the medium to be measured and completely immerse it. (When U and Y type bulbs are used note separation coupling between bulb and capillary). The element must be immersed up to the coupling for correct temperature indication. Do not bend capillary to less than 1/2 inch radius and never bend it too close to the element bulb or element head. Pencil type bulbs must never be bent as this will affect instrument accuracy. U and Y type bulbs may be bent, but never to less than a two inch radius. Anchor the excess capillary securely to prevent vibration damage. If the bulb is to be subjected to corrosive or scouring conditions, it should be protected by a thermal well, separable socket or other protected material. The bulb may be elevated up to 40 feet above the instrument without affecting calibration. For elevations over 40 feet consult your local Partlow Representative, Distributor or the Factory.

Figure 1 - Panel Cutout Illustration for flush mounting (In Inches)



## INSTRUMENT OPERATION

Prior to putting the instrument into service, check it against an accurate test thermometer. As with any precision instrument minor adjustments may be necessary after shipment and installation. If you are unfamiliar with how to perform this check refer to the CHECKING TEMPERATURE and RE-ZEROING section of this document.

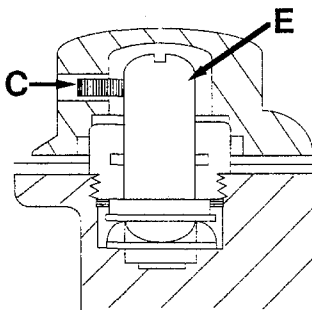
Temperature setpoint is achieved by turning the control's setting knob. This positions a stainless steel valve in relation to its delrin valve seat cage. The thermal element plunger bears directly on the base of the valve seat cage. The Model 10 valve is designed to close on a rise in temperature.

As temperature on the thermal element bulb changes, expanding or contracting the element, the valve cage is positioned either closer to or farther from the valve. This throttling action permits absolute control over the amount of fuel flow to the burners - increasing or decreasing the quantity as bulb temperature changes.

In actual operation, the controls seek to regulate their valve-valve seat relationship so that a fixed flow of fuel arrives at the burner for a particular control setting and load condition. If the load is constant, a balanced situation with constant temperature will exist for that control setting. If the load changes, the temperature must change to affect a different valve seat position and fuel flow, which in turn will produce a new balanced condition at the new temperature.

An adjustable needle-type by-pass is provided which permits fuel flow around the valve to establish a minimum flame setting.

Figure 2 - Control Knob Setting



## MAINTAINING YOUR MODEL 10

### CHECKING TEMPERATURE

When checking and verifying your temperature be sure to use a test thermometer of known accuracy. Locate check test thermometer as close to sensing element as possible. Adjust temperature control knob to the approximate temperature which is to be maintained. Allow time for temperature to stabilize. If the test thermometer reading and the knob setting of the control valve do not agree, the dial knob must be reset. See below.

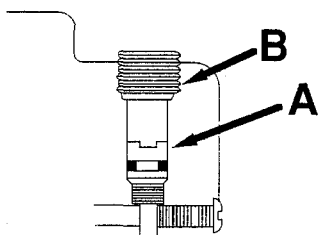
### CONTROL KNOB RESET

See Figure 2. Loosen set screws labeled C. Rotate knob so that pointer is in alignment of check thermometer reading. Tighten set screws C carefully so not to disturb the knob setting.

### BY-PASS SETTING (minimum flame adjustment)

See Figure 3. Adjust control knob to a temperature that will insure full flow to the system. Establish a flame and allow system to rise to temperature. Remove capscrew B and adjust by-pass screw A with a small screwdriver. Slowly back out (CCW) screw until a slight flame increase is observed. Rotate control knob CW to close main control valve. Re-adjust screw A in (CW) or out (CCW) as required to establish the lowest most stable flame possible for the application.

Figure 3 - By-Pass Setting



### PISTON-PAK THERMAL SENSING ELEMENT IDENTIFICATION

An element designation number is stamped on the bottom of the element head. This is a coded description of the element specifications and should be used whenever a replacement element is ordered. The number appearing on the side of the element head (Figure 4) is the element age code, which may be required in establishing warranty.

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### ORDERING/SPECIFYING THE PISTON-PAK SENSING ELEMENT

The sensing element is ordered separately from the Model 10 and requires its own matrix number. To determine the correct sensing element configuration for your instrument(s) and application see, Partlow Form 3028 "Mechanical Product Instrumentation Cross Reference and Pricing Guide."

### ELEMENT REPLACEMENT

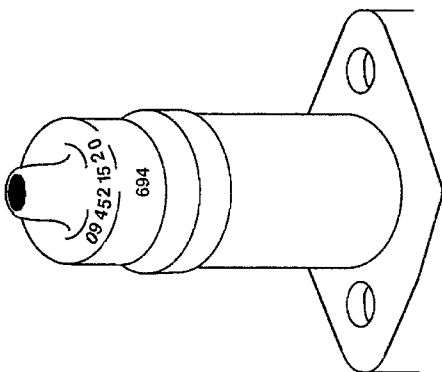
Be certain to shut off fuel to the system being serviced. See Figure 5 for details. Remove screws D and remove element from control body. Be certain that O-ring G is removed as element is removed. Before installing replacement element, clean surface where element bolts on to gas body. Remove protective cap from replacement element and check to be certain O-ring is lubricated before installing. Lubricate with Plastilube or No. 1 Petroleum base grease or equivalent. Install replacement element using care to make certain that O-ring G is properly positioned on element head assembly. Install two screws D. Re-supply fuel, check connections for leaks around surface of gas control to element connection. Do this using a soap solution.

**Note:** Element replacement will cause control knob to need adjustment, see **CONTROL KNOB RESETTING** for adjustment procedure.

**Caution:** The inside valve assembly, particularly the inside of the element housing, should never be oiled.

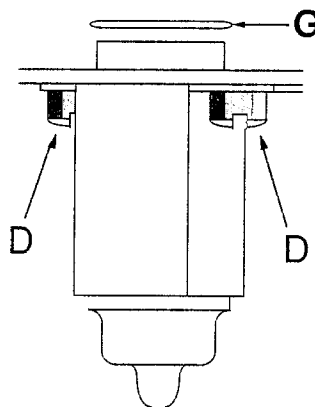
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Figure 4 - Sensing Element ID



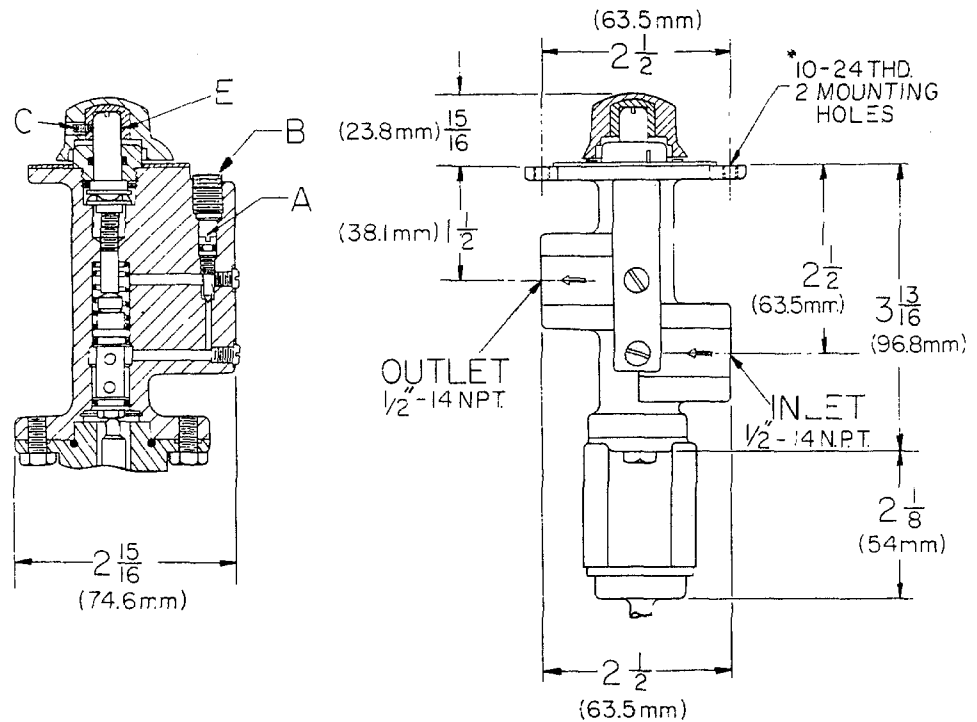

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Figure 5 - Replacing Element



## DIMENSIONAL DRAWING

Figure 6 - Dimensional Drawing



## TROUBLESHOOTING

Symptom	Probable Cause	Remedies
After resetting dial knob, control temperature gradually creeps higher	1. Sensor failure	1. Replace Piston-Pak element
At low dial setting, measured control temperature is consistency higher than dial reading	1. Minimum flame it set too high	1. Adjust by-pass; reset minimum flame
Burner has tendency to go out	1. Minimum flame has not been set or it is set too low	1. Adjust by-pass; reset minimum flame
Measured control temperature is lower than dial setting (conveyor-type oven)	1. Load has increased 2. Dial knob not properly set	1. Set dial knob to higher temperature to offset increased load 2. Reset control dial knob

## PARTS LIST

<b>1. Knob Kit</b>	<b>64404101</b>	<b>6. Dial Kit</b>	
Includes: Knob, setscrew, Instructions		Includes: Dial and Screws	
		112F	<b>64403901</b>
		217F	<b>64403902</b>
		217C	<b>64403903</b>
		225F	<b>64403904</b>
		225C	<b>64403905</b>
		335F	<b>64403906</b>
		335C	<b>64403907</b>
		445F	<b>64403908</b>
		445C	<b>64403909</b>
		555F	<b>64403010</b>
		555C	<b>64403911</b>
		665F	<b>64403912</b>
		665C	<b>64403913</b>
		780F	<b>64403914</b>
		780C	<b>64403915</b>
		910F	<b>64403916</b>
		910C	<b>64403917</b>
		101-F	<b>64403918</b>
		217F Uncal.	<b>64403919</b>
		225F Uncal.	<b>64403920</b>
		335F Uncal.	<b>64403921</b>
		445F Uncal.	<b>64403922</b>
		555F Uncal.	<b>64403923</b>
		665F Uncal.	<b>64403924</b>
		665C Uncal.	<b>64403925</b>
		780F Uncal.	<b>64403926</b>
		910F Uncal.	<b>64403927</b>
		1011F Uncal.	<b>64403928</b>

**Note: Uncalibrated scales to be used with Acc. 194 Indicator.**

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## Warranty

These products are sold by The Partlow Corporation ("Partlow") under the warranties set forth in the following paragraph. Such warranties are extended only with respect to a purchase of these products, as new merchandise, directly from Partlow or from a Partlow distributor, representative or reseller, and are extended only to the first buyer thereof who purchases them other than for the purpose of resale.

These products are warranted to be free from functional defects in materials and workmanship at the time the products leave the Partlow factory, and to conform at that same time to the specifications set forth in the relevant Partlow instrumentation sheet, sheets, manual or manuals for such products.

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