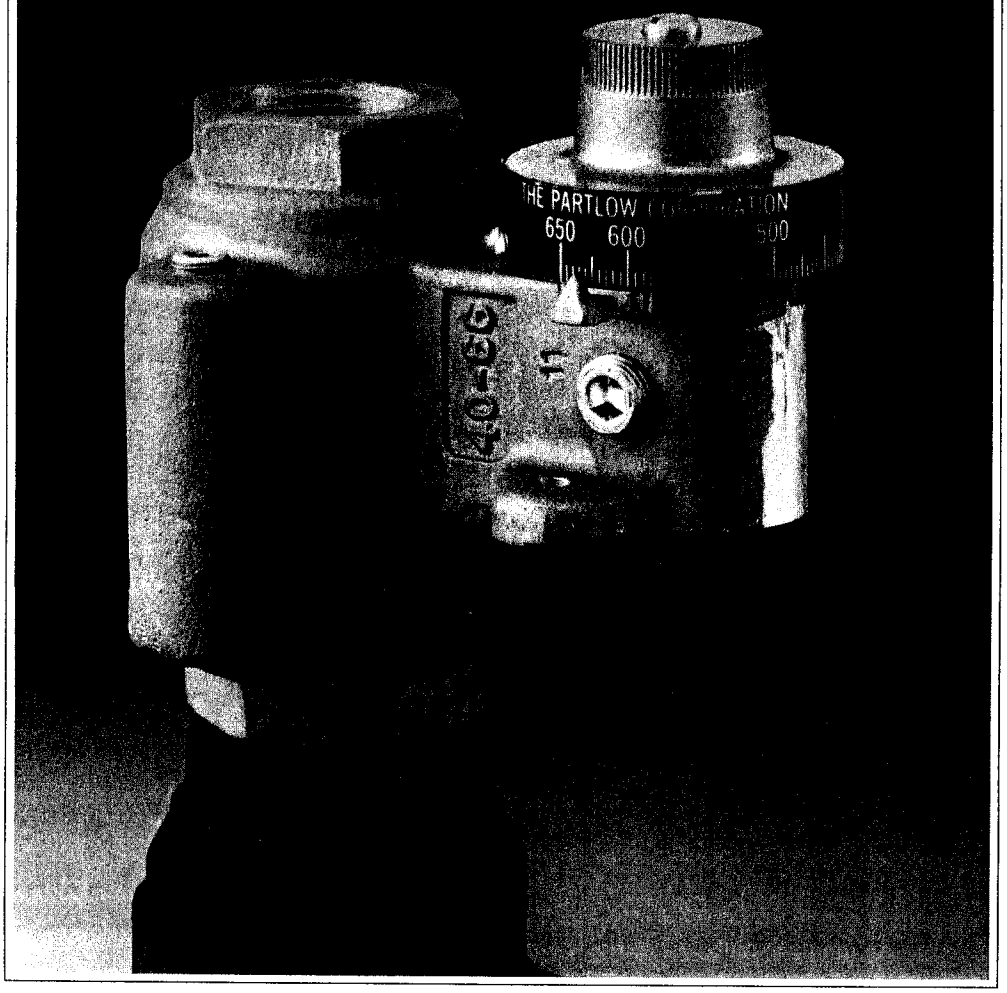
THERMALLY-OPERATED, THROTTLING GAS MECHANICAL CONTROLS

The Model 40 is a low pressure throttling gas control designed for use in vertical pipelines. The Model 48 is a medium pressure throttling gas control designed for use as a pilot operator for large diaphragm valves. It must also be vertically mounted. They derive their simplicity and efficiency from the Piston-Pak filled system sensing element.



Form Number 3239
Published Sept. 1991
First Edition

SPECIFICATIONS
INSTALLATION
OPERATION

MODEL 40 & 48

Partlow
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QUALITY INSTRUMENTATION DESIGNED & MANUFACTURED IN THE USA

MODEL 40 & 48 PRODUCT SPECIFICATIONS

• Dimensions	3 3/16" W x 5 1/2" H (top of knob to lower portion of element head assembly)
• Mounting	Free standing via piping. Note: piping must be vertical.
• Thread Size	Model 40 - inlet and outlet - 1" NPT Model 48 - inlet and outlet - 1/2" NPT
• Maximum Pressure Operation	Model 40 - 1 PSI Model 48 - 5 PSI
• Maximum Operating Temperature	Limited to sensing element operating temperature, Low Temp. 125°F (52°C), Hi Temp. 150°F (66°C)
• Flow Capabilities	40 - 1" model - 589 cfh max, 441 cfh @ 75% load permissable, 303 cfh @ 60% load std. 48 - 1/2" model - 139 cfh max, 105 cfh @ 75% load permissable, 86 cfh @ 60% load std.
• Warranty	One year, details on the last page.
• Approx. Net Weight*	5 lbs
• Approx. Ship. Weight*	7 lbs

* Weight will vary depending on length of element.

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.

MODEL 40 & 48 ORDER MATRIX

	Order Number
Model 40 - 1"*	**GC00088**
Model 48 - 1/2"*	**GC00090**

*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 40 and 48. Use Partlow Form 3028 " Mechanical Product Instrumentation Cross Reference and Pricing Guide" to configure the matrix number for the sensing element.

INSTALLATION

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 in *vertical pipelines only*. Make sure that valve installation does not exceed a 10° from vertical position. Failure to follow this guide line could result in improper valve operation. To facilitate valve installation and ease of removal for possible service, it is recommended that unions be installed in both supply and outlet lines to valve. Be certain to install shut off valve in the supply line for service and 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.

INSTRUMENT OPERATION

The control is shipped with the by-pass and main valve in closed position and the calibrated indicating dial positioned beyond the low end of the element scale range against the dial stop. Variables such as load error, type of application, size of burner, etc., make it impossible for control valves to be pre-set at the factory.

Before being put into service, therefore, the control must be check against a test thermometer, and the by-pass and dial knob reset to your particular requirements and equipment. For checking and adjusting procedure, see MAINTENANCE section of this document.

Temperature setpoint is achieved by turning the control's calibrated setting dial. Movement of the dial positions a fixed lever fulcrum in the control. Suspended from one end of the lever is a hemispheric valve which regulates the amount of gas flow; near the other end, the thermal element plunger contacts the lever adjacent to the fixed fulcrum.

As temperature on the thermal element bulb changes, expansion or contraction of the thermal sensing element, positions the plunger either up or down. This movement of the plunger against the lever fulcrum, in turn, produces a counter movement in the heispheric valve at the opposite end of the lever. The valve is thus positioned either away from or toward its valve seat, increasing or decreasing the flow of fuel to the burners.

(Continued on next page)

In operation, the control seeks to position its main valve so that a fixed flow of fuel arrives at the burner for that particular load condition and control setting. 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 effect a different valve position and fuel flow, which, in turn, will produce a new balanced condition as a new temperature.

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

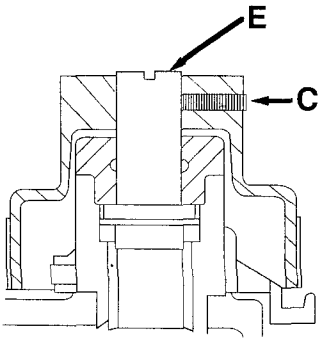
A pilot burner supply line may be conencted directly to the side of the control by removing the 1/4 NPT assembly plug just above the element flange.

MAINTAINING YOUR MODEL 40 & 48

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. Rotate control dial knob to an approximate temperature that is to be maintained. Allow adequate time for temperature to stabalize. If instrument dial reading does not agree with test thermometer then dial knob must be reset. See below.

Figure 1 - Control Knob Setting



CONTROL KNOB RESET

See Figure 1. Loosen set screws labeled C. Rotate knob so that pointer is in alignment of test thermometer reading. Tighten set screws C carefully so not to disturb adjusting screw E.

BY-PASS SETTING (minimum flame adjustment)

See Figure 2. Adjust control knob to a temperature that will insure the application temperature will remain above ambient condition while adjustment is made. Establish a flame and allow system to rise to temperature. Remove by-pass plug labeled B. This will expose a slotted needle valve. Using a 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.

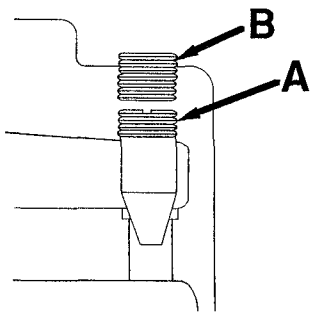
Note: Since the by-pass adjustment screw does not seal bubble tight, place thumb over by-pass plug hole when adjusting to be sure that gas leaking around by-pass screw does not affect flame reading.

Be certain to reinstall by-pass plug labeled B and rotate control knob to desired temperature 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 3) is the element age code, which may be required in establishing warranty.

Figure 2 - By-Pass Setting



ORDERING/SPECIFYING THE PISTON PAK SENSING ELEMENT

The sensing element is ordered separately from the Model 40 & 48 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 Priding Guide."

ELEMENT REPLACEMENT

See Figure 4 for details. Be certain to shut off fuel to the system being serviced. Remove screws D and remove element from control body. Be certain that O-ring G is retained as element is removed. 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 gas, 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.

Figure 3 - Sensing Element ID

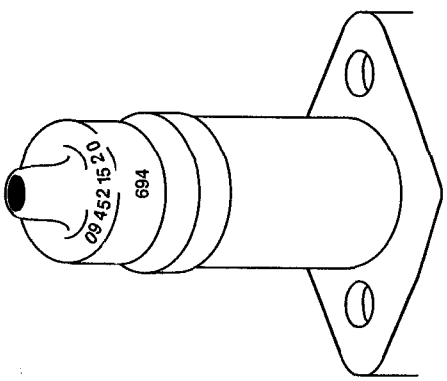
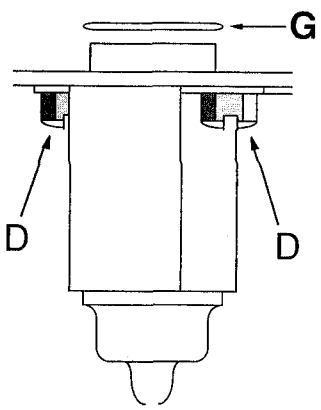


Figure 4 - Replacing Element



CONTROL CAPACITY

Normal Control Load

Instrument	Desirable (60%)	Permissible (75%)	*Maximum Control Capacity
40 - 3/8	103 cfh	129 cfh	172 cfh
40 - 1/2	155	194	258
40 - 3/4	287	359	407
40 - 1	353	441	589
48 - 3/8	62	81	105
48 - 1/2	86	105	139

*Maximum control capacity based on 1/2 inch pressure drop in control with .60 specific gravity gas.

Capacity Correction Factors:

For pressure drops other than ½" water column, multiply by:

$$\text{FACTOR} = \sqrt[2]{\frac{\text{REQUIRED PRESSURE DROP IN INCHES } H_2O}{0.5}}$$

For specific gravities other than 0.60, multiply by:

$$\text{FACTOR} = \sqrt[2]{\frac{0.60 \text{ SPECIFIC GRAVITY}}{\text{REQUIRED SPECIFIC GRAVITY}}}$$

SPECIFIC GRAVITY OF TYPICAL GASES

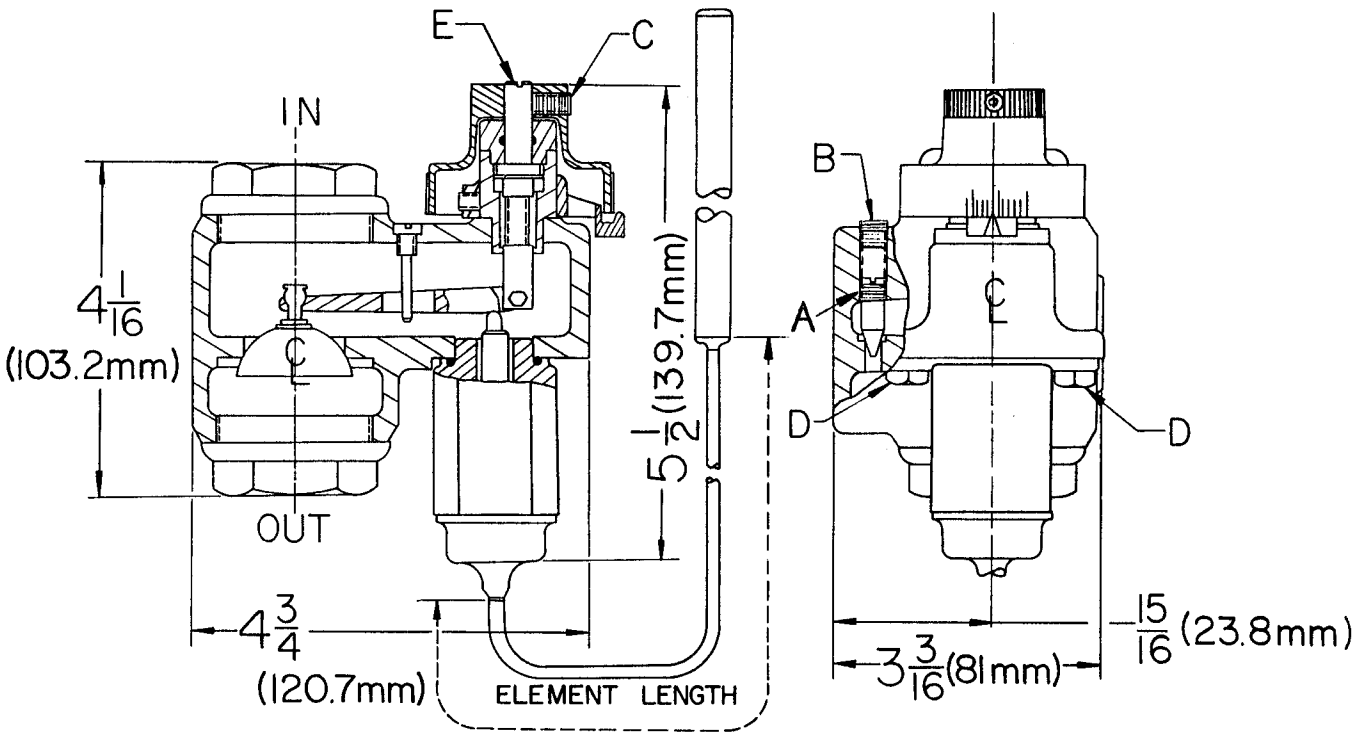
Gas	*Straight*	*100% Premix*
Manufactured	**.55 to .65**	**.93**
Natural	**.60**	**.97**
Propane	**1.50**	**1.03**
Butane	**2.00**	**1.03**

TROUBLESHOOTING

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

DIMENSIONAL DRAWING

Figure 6 - Dimensional Drawing



EXPLODED VIEW AND PARTS LIST

1. Valve Arm **64418101**
Includes: Valve arm, Valve Arm Guide Screw, Pivot Screw, Pipe Plug.

2. Valve Assembly
Includes: Valve, Valve Arm, Valve Arm Guide Screw, Valve Stem, Stem Nut, Pivot Screw, Pipe Plug.
Model 40 **64404205**
Model 48 **64404206**

3. Stuffing Box Kit **64404001**
Includes: O-Ring and Stuffing Box, Adjusting Stem, Adjusting Stem Washer, Stuffing Box Spring, Stuffing Box Body, Adjusting Screw

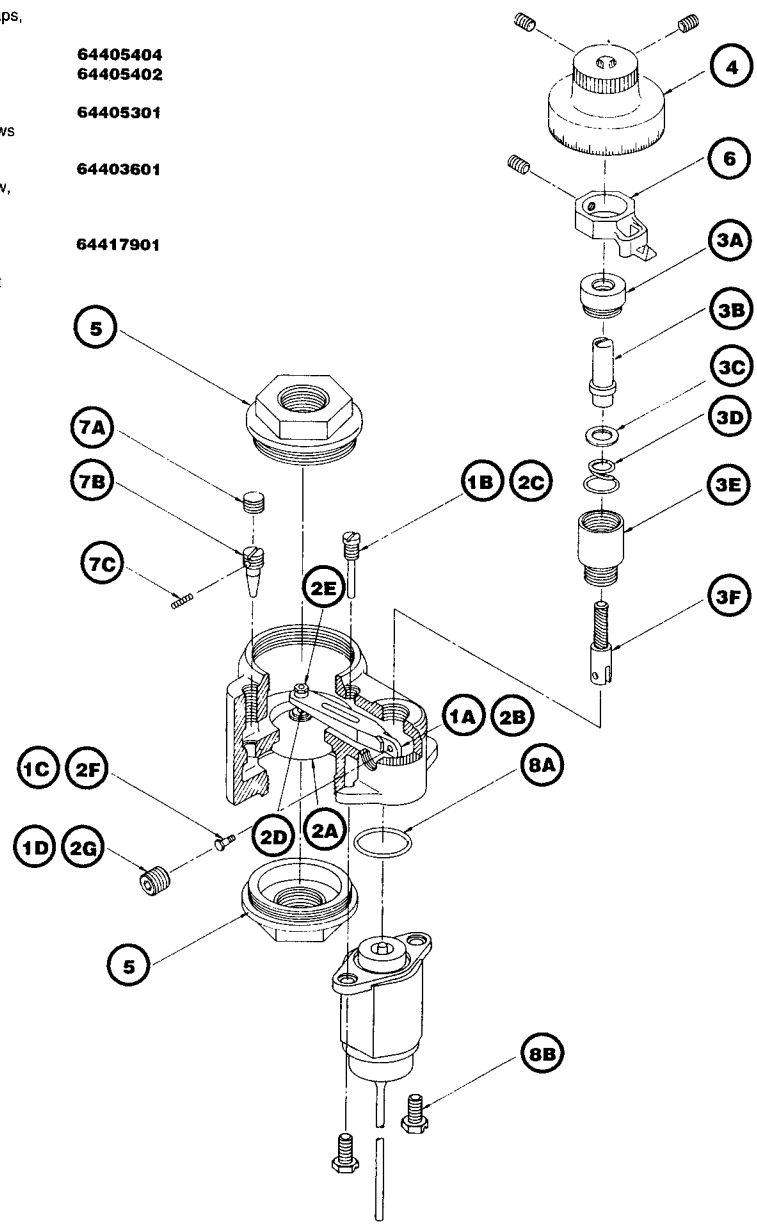
4. Dial Kit **64403701 to**
Includes: Dial and Screws, all ranges **64403742**

5. Cap Kit
Includes: Top and Bottom Caps, Threaded for 1" NPT.
Model 40 **64405404**
Model 48 **64405402**

6. Dial Stop Kit **64405301**
Includes: Dial Stop and Screws

7. By-Pass Kit **64403601**
Includes: Plug, By-Pass Screw, Spring

8. Element Screws and and O-Ring Kit **64417901**
Includes: O-Ring and Element Screws



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 there of 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.

Partlow's sole and exclusive obligation and buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, at Partlow's option free of charge, the products which are reported in writing to Partlow at its main office - The Partlow Corporation, 2 Campion Road, New Hartford, New York 13413 or FAX MAIL 1-315-797-0403 and which if so advised by Partlow, are returned with a statement of the observed deficiency to the designated facility during normal business hours, transportation charges prepaid and which upon examination by Partlow are found not to comply with the above warranties. PARTLOW SHALL NOT BE LIABLE FOR ANY INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, SPECIAL DAMAGES, OR ANY OTHER DAMAGES, COSTS OR EXPENSES, EXCEPTING ONLY THE COST OR EXPENSE OF REPAIR OR REPLACEMENT AS ABOVE DESCRIBED.

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