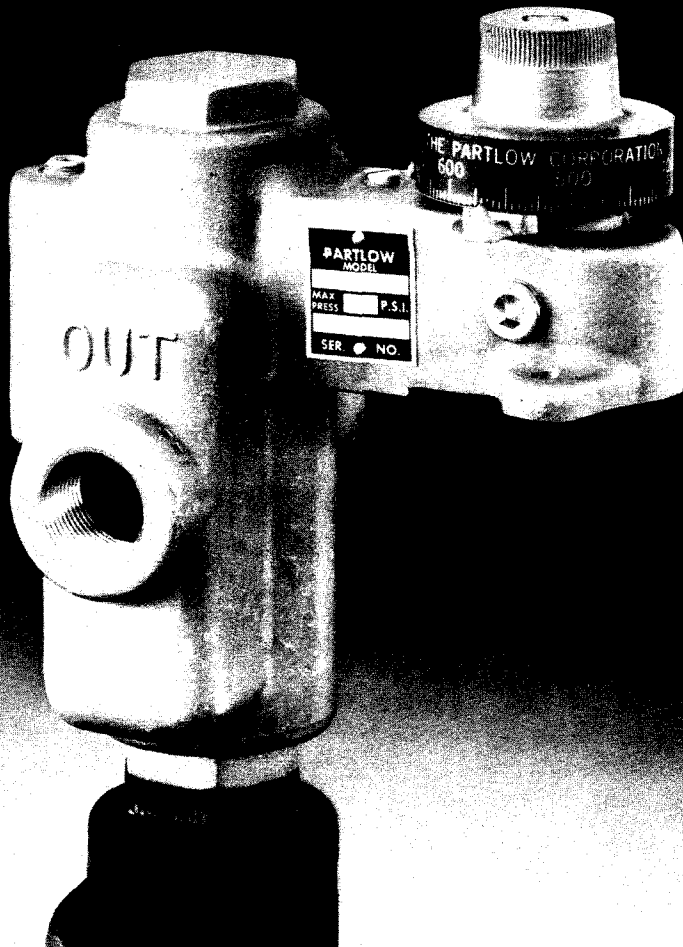


# **THERMALLY-OPERATED, THROTTLING GAS MECHANICAL CONTROLS**

The Model 70 and 713 are thermally-operated, dual-valve, throttling gas controls designed for use in horizontal pipelines.

The 70 and 713 are high pressure controls with the single exception of low pressure model 70-3". They derive their simplicity and efficiency from the Piston-Pak filled system sensing element.



Form Number 3241  
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First Edition

**SPECIFICATIONS  
INSTALLATION  
OPERATION**

# MODEL 70 & 713

**Partlow**

The Partlow Corporation • Two Campion Rd. • New Hartford, NY 13413 USA • 315-797-2222 • FAX 315-797-0403  
**QUALITY INSTRUMENTATION DESIGNED & MANUFACTURED IN THE USA**

## Dynapar, Veeder Root, and Eagle Signal Brands:

Sales, Repair, and Application Support:  
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Gurnee, IL. 60031  
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847-782-5277 Applications Support Fax  
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800-234-8731 Applications Support

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847-782-5277 Applications Support Fax  
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847-782-5277 Applications Support Fax  
800-873-8731 Sales/Order Entry  
800-866-6659 Applications Support

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.

## MODEL 70 & 713 PRODUCT SPECIFICATIONS

• Dimensions	Length	Height	Width	Center of pipe to top of knob
70 - 3/4"	6 1/4"	4"	7 5/8"	4"
70 - 1 1/4"	6 7/8"	5"	9 3/8"	4 1/4"
70 - 2"	6 5/8"	6 1/8"	10 5/16"	4 5/8"
70 - 3"	7 3/8"	6 5/8"	11 7/8"	
713 - 1 1/4"	6 1/2"	5"	9 3/8"	4 1/4"

### 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.**

- Mounting Free standing via piping. Note: piping must be horizontal.
- Thread Size Inlet and output, 3/4" NPT, 1 1/4" NPT, 2" NPT and 3" NPT
- Maximum Pressure Operation 20 PSI maximum (except 70-3", it is limited to 1 PSI max.) Pressure drop across valves not to exceed 9 PSI.
- Maximum Operating Temperature Limited to sensing element operating temperature, Low Temp. 125°F (52°C), Hi Temp. 150°F (66°C)
- Flow Capabilities
  - 70 - 3/4" model - 416 cfh max, 312 cfh @ 75% load permissible, 250 cfh @ 60% load std.
  - 70 - 1 1/4" model - 1053 cfh max, 790 cfh @ 75% load permissible, 635 cfh @ 60% load std.
  - 70 - 2" model - 1915 cfh max, 1436 cfh @ 75% load permissible, 1148 cfh @ 60% load std.
  - 70 - 3" model - 4787 cfh max, 3590 cfh @ 75% load permissible, 2872 cfh @ 60% load std.
  - 713 - 1 1/4" model - 1149 cfh max, 862 cfh @ 75% load permissible, 689 cfh @ 60% load std.

Note: above figures based on 1/2" pressure drop across valve with .60 specific gravity gas.

- Warranty One year, details on the last page.
- Approx. Net Weight\* 70-3/4, 70-1 1/4, 70-2 = 3 lbs., 70-3, 713-1 1/4 = 10 lbs.
- Approx. Ship. Weight\* 70-3/4, 70-1 1/4, 70-2 = 5 lbs., 70-3, 713-1 1/4 = 12 lbs.

\* Weight will vary depending on length of element.

## MODEL 70 & 713 ORDER MATRIX

	Order Number
Model 70 - 3/4"*	GC00101
Model 70 - 1 1/4"*	GC00103
Model 70 - 2"*	GC00105
Model 70 - 3"*	GC00106
Model 713A - 1 1/4"*	GC00104

\*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 70 and 713. 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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## **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 horizontal *pipelines only*. Make sure that valve installation does not exceed a 10° tilt 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.

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## **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 the long leg of the lever are double inverted valves which regulate the amount of gas flow; the short leg of the lever bears on the thermal element plunger.

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 double valves at the opposite end of the lever. The valves are thus positioned either away from or toward its valve seats, increasing or decreasing the flow of fuel to the burners.

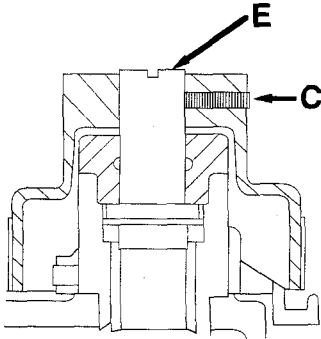
(Continued on next page)

In operation, the control seeks to position its valves 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 valves to establish a minimum flame setting. On all Model 70 controls, a secondary by-pass adjustment permits increased gas flow around the valve when the primary by-pass cannot supply an amount sufficient to maintain minimum flame.

A pressure gauge (to check control's throttling action, etc.) may be installed on the side of the control by removing the 1/4 NPT assembly plug located just above the element flange. **This connection hole is not to be used for pilot light hookup.**

Figure 1 - Control Knob Setting



## MAINTAINING YOUR MODEL 70 & 713

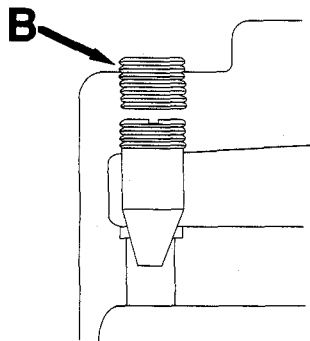
### CHECKING TEMPERATURE

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 stabilize. If instrument dial reading does not agree with test thermometer then dial knob must be reset. See below.

### 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.

Figure 2 - By-Pass Setting



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

This gas control has two minimum flame adjustments. The by-pass screw located beneath plug B is a fine adjustment, i.e. multiple turns for small flame changes. Secondary by-pass screw A is a course adjustment, i.e. large flame changes per small adjustments. Adjust either by-pass screw as necessary. For fine by-pass screw adjustments, see Figure 2. Adjust control dial 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 in (CW) or out (CCW) as required to establish the lowest most stable flame possible for the application.

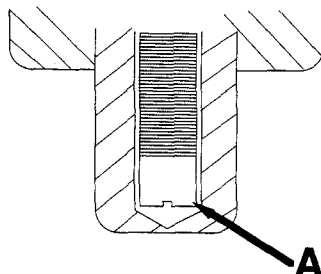
**Note:** Since the by-pass adjustment screw does not seal bubble tight, place thumb over by-pass plug hole when adjusting to be sure that gas leaking around by-pass screw does not affect flame reading.

### SECONDARY BY-PASS SETTING

See Figure 3. Should the primary fuel minimum flame adjustment be insufficient for the requirement of the system, a greater fuel by-pass is provided for via a valve positioning adjustment located under a sealing cap. Loosen the cap to expose slotted screw A. With valve operating and control knob rotated to a point which is lower than the preset system operation, i.e. control knob below set point, the flame size should decrease. Adjusting screw A CW will cause the valve to be cracked open and fuel to pass causing a larger flame at the burner.

**Note:** This adjustment is more course than the primary fuel adjustment. Care should be exercised to avoid either total fuel shut-off or a much larger than needed flame size using this adjustment.

Figure 3 - Secondary By-Pass Setting



An adjustment between primary and secondary adjustments may be necessary to accurately achieve fuel flame size. Re-cap the protective cap over the secondary adjustment screw once the correct adjustment has been achieved.

### 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.

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

The sensing element is ordered separately from the Model 60 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

See Figure 5 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.

**Caution:** The inside valve mechanism(s), particularly the inside of the element housing, should never be oiled.

Figure 4 - Sensing Element ID

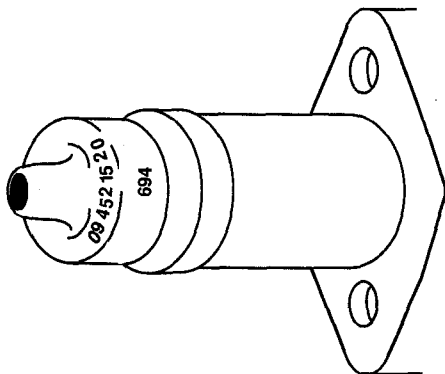
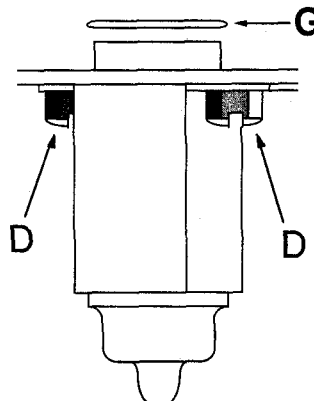


Figure 5 - Replacing Element



## CONTROL CAPACITY

### Normal Control Load

Instrument	Desireable (60%)	Permissible (75%)	†Maximum Control Capacity
70 - 3/4	250 cfh	312 cfh	416 cfh
70 - 1	373	467	622
70 - 1 1/4	632	790	1053
713 - 1 1/4	689	862	1149
70 - 2	1148	1436	1915
70 - 3*	2872	3590	4787

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

\* On model 70 - 3 valves only, gas pressure drop across valve should not exceed one pound.

### Capacity Correction Factors:

For pressure drops other than 1/2" water column, multiply by:

$$\text{FACTOR} = \sqrt{\frac{\text{REQUIRED PRESSURE DROP IN INCHES H}_2\text{O}}{0.5}}$$

For specific gravities other than 0.60, multiply by:

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

### SPECIFIC GRAVITY OF TYPICAL GASES

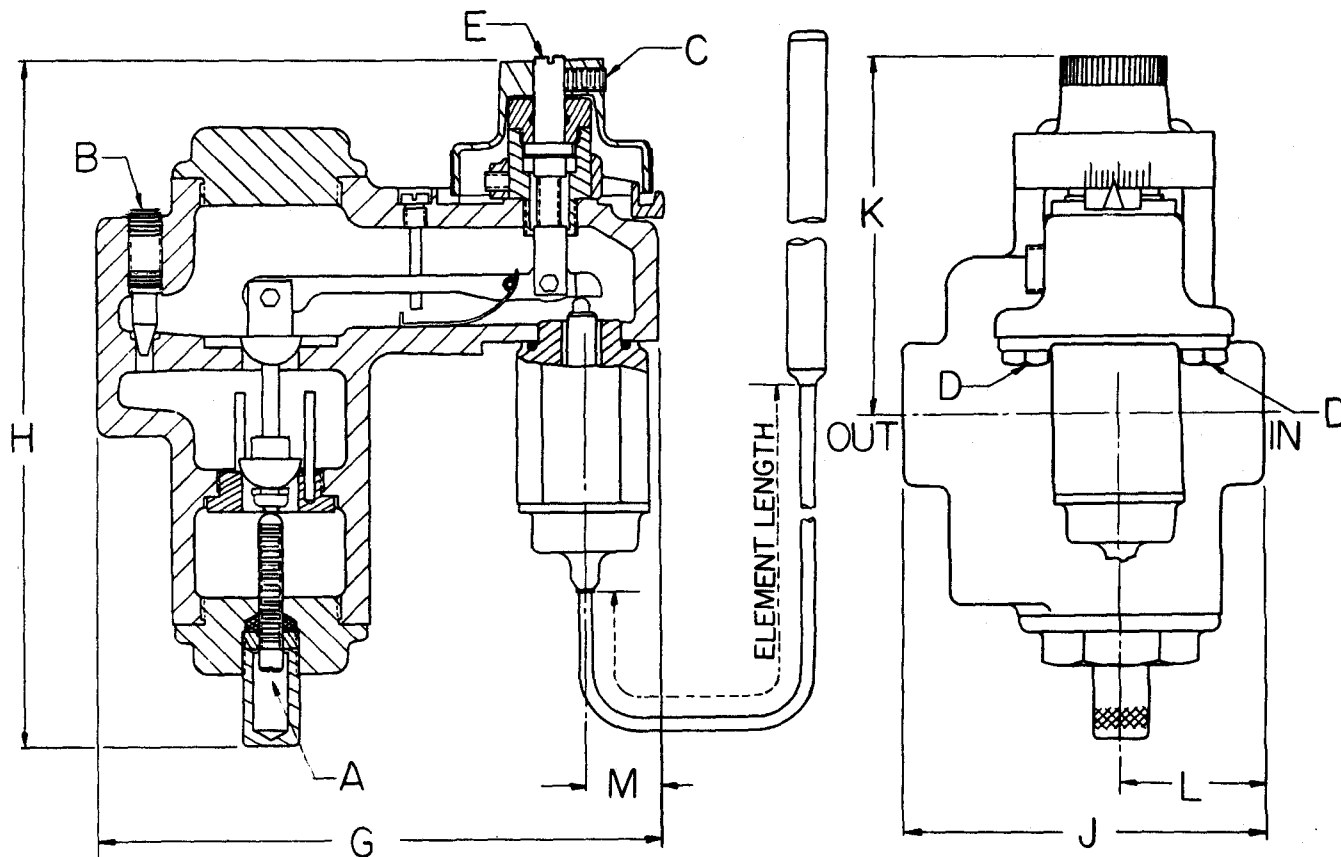
Gas	Straight	100% Premix
Manufactured	.55 to .65	.93
Natural	.60	.97
Propane	1.50	1.03
Butane	2.00	1.03

## 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



Control	G		H		J		K		L		M	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
70-¾"	6.25	158.75	7¾	193.68	4	101.60	4	101.60	1.62	41.15	.81	20.57
70-1"	6.59	167.39	9¾	238.13	5	127	4¼	107.95	1.75	44.45	.81	20.57
70-1¼"	6.59	167.39	9¾	238.13	5	127	4¼	107.95	1.75	44.45	.81	20.57
713-1¼"	6.59	167.39	9¾	238.13	5	127	4¼	107.95	1.75	44.45	.81	20.57
70-2"	6.62	168.15	10¾	261.94	6⅞	155.58	4⅝	117.48	2.37	60.20	.81	20.57
70-3"	7.38	187.45	11¾	301.63	6⅝	168.28			2.75	69.85	1.22	30.99

# EXPLODED VIEW AND PARTS LIST

## 1. Top Cap Kit

70 - 3/4"	<b>64405406</b>
70 - 1 1/4"	<b>64405407</b>
70 - 2"	<b>64405409</b>
70 - 3"	<b>64405410</b>
713 - 1 1/4"	<b>64405407</b>

## 2. Primary By-Pass Kit

Includes: Pipe Plug, Needle Valve, By-Pass Spring **64403601**

## 3. Secondary By-Pass Kit

Includes: Lower Valve Cap, Packing, Gland, Adjustment Screw, Adjustment Screw Cap

70 - 3/4"	<b>64405503</b>
70 - 1 1/4"	<b>64405504</b>
70 - 2"	<b>64405505</b>
70 - 3"	<b>64405506</b>
713 - 1 1/4"	<b>64405504</b>

## 4. Valve Assembly Kit

Includes: Valve Arm Pivot Screw, Lower Valve Assembly, Pivot Screw, Pipe Plug, Valve Seat and Roll Pin Assembly, Guide Screw, Valve Arm Assembly

70 - 3/4"	<b>64404212</b>
70 - 1 1/4"	<b>64404213</b>
70 - 2"	<b>64404214</b>
70 - 3"	<b>64404215</b>
713 - 1 1/4"	<b>64404216</b>

## 5. Dial Assembly

Includes: Knob, Dial Scale, (2) Set Screws

112F	<b>64403801</b>
217F	<b>64403802</b>
217C	<b>64403803</b>
225F	<b>64403804</b>
225C	<b>64403805</b>
335F	<b>64403806</b>
335C	<b>64403807</b>
445C	<b>64403809</b>
555F	<b>64403810</b>
555C	<b>64403811</b>
655F	<b>64403812</b>
665F	<b>64403813</b>
665C	<b>64403814</b>
780F	<b>64403815</b>
780C	<b>64403816</b>
910F	<b>64403817</b>
910C	<b>64403818</b>
1011F	<b>64403819</b>
1011C	<b>64403820</b>
51 Kit	<b>64403821</b>
112F Uncal.	<b>64403822</b>
217F Uncal.	<b>64403823</b>
217C Uncal.	<b>64403824</b>
225F Uncal.	<b>64403825</b>
225C Uncal.	<b>64403826</b>
335F Uncal.	<b>64403827</b>
335C Uncal.	<b>64403828</b>
445F Uncal.	<b>64403829</b>
445C Uncal.	<b>64403830</b>
555F Uncal.	<b>64403831</b>
555C Uncal.	<b>64403832</b>
665F Uncal.	<b>64403833</b>
665C Uncal.	<b>64403834</b>
780F Uncal.	<b>64403835</b>
780C Uncal.	<b>64403836</b>
910F Uncal.	<b>64403837</b>
910C Uncal.	<b>64403838</b>
1011F Uncal.	<b>64403839</b>
1011C Uncal.	<b>64403840</b>

## 6. Dial Pointer Kit

Includes: Dial Pointer and Screws **64405301**

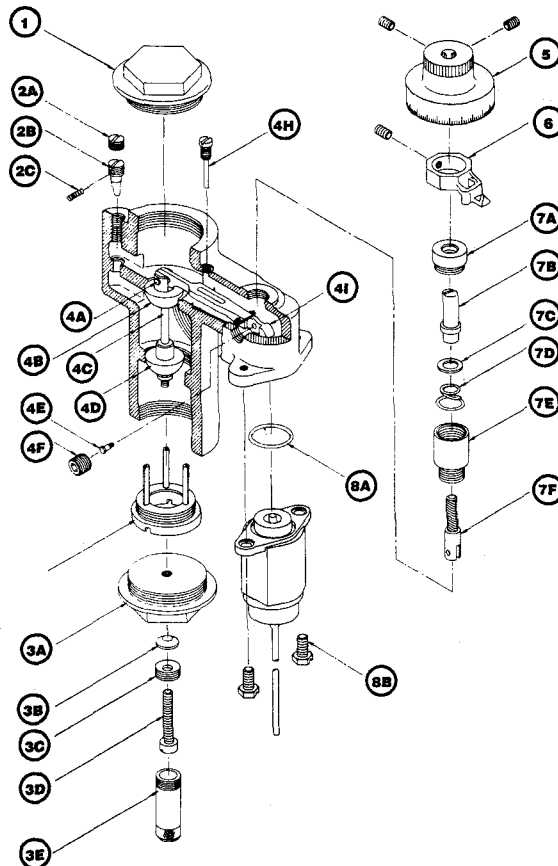
## 7. Stuffing Box Kit

Includes: O-ring Stuffing Box, Adjusting Stem, Adjusting Screw Washer, Stuffing Box Spring, Stuffing Box Body, Adjusting Screw, O-ring

70 - 3/4, 1 1/4, 2	<b>64404002</b>
713 - 1 1/4	
70 - 3	<b>64404001</b>

## 8. O-Ring & Element Screw Kit

Includes: O-ring, (2) element screws **64417901**



# 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.

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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