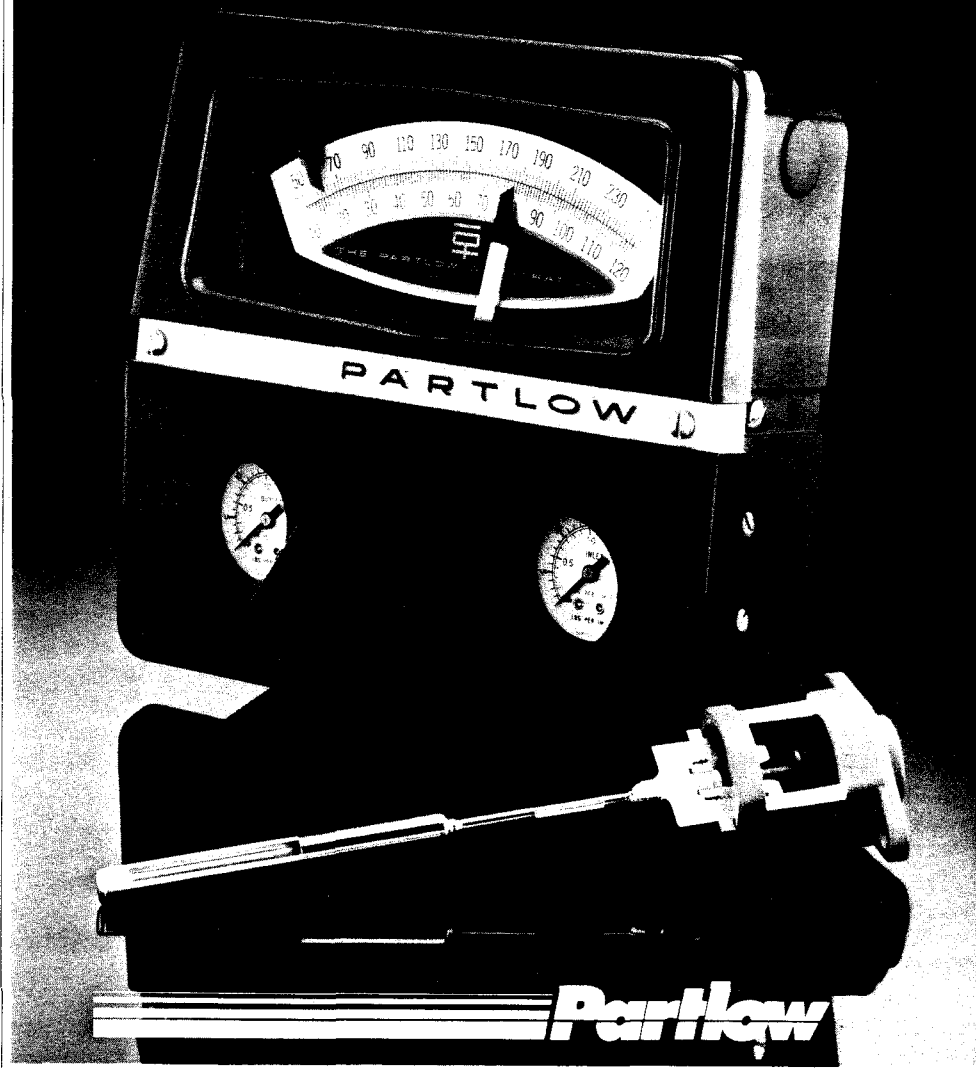


INDICATING PNEUMATIC MECHANICAL TEMPERATURE CONTROLLER

This indicating pneumatic temperature controller operates air-powered throttling valves regulating the flow of steam, water or gas. It is also capable of actuating other pneumatic devices such as pressure switches and relays. The LFA derives its simplicity and efficiency from the Piston-Pak filled systems sensing element.



Form Number 3027
Published Dec. 1989
First Edition

SPECIFICATIONS INSTALLATION OPERATION

LFA

Dynapar, Veeder Root, and Eagle Signal Brands:

Sales, Repair, and Application Support:
1675 Delany Rd.
Gurnee, IL. 60031
847-662-4150 Sales/Order Entry Fax
847-782-5277 Applications Support Fax
800-873-8731 Sales/Order Entry
800-234-8731 Applications Support

NorthStar Brand:

Sales, Repair, and Application Support:
1675 Delany Rd.
Gurnee, IL. 60031
847-782-5288 Sales/Order Entry Fax
847-782-5277 Applications Support Fax
800-326-6216 Sales/Order Entry
800-326-6216 Applications Support

Partlow, West, Rustrak, and LFE Brands:

Sales, Repair, and Application Support:
1675 Delany Rd.
Gurnee, IL. 60031
847-662-4150 Sales/Order Entry Fax
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.

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 temperature 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.

LFA PRODUCT SPECIFICATIONS

Dimensions	8 1/2"W X 8"H X 4 1/4"D
Surface Mounting	Brackets included
Flush Mount Cutout	7" W X 7 3/4"H
Air Hookup	1/4-NPT inlet and outlet openings at top and back of case
Air Input Requirements	Approximately 16 psi
Air Output Pressure	3 to 15 psi
Air Consumption	12 cfh maximum
Throttling Span	Adjustable from 5 to 20% of element range
Load Error Adjustment	Manual reset for load error compensation
Control Action	Reverse or Direct Acting
Air Gauges	Inlet and outlet - both gauges provide for English and Metric scales.
Approx. Net Weight*	4 1/4 lbs
Approx. Shipping Weight*	7 1/4 lbs

* Weight may vary depending on element length.

LFA ORDER MATRIX



LFA*
(Requires L type element plunger)

ACCESSORIES
0 None
1 Weather Resistant (needs inverted dial)

* Specify Dial Scale required.

PISTON-PAK THERMAL SENSING ELEMENT

A Piston-Pak Thermal Sensing Element must be specified for each LFA. Use Partlow Form 3028 "Mechanical Instrumentation Products 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 head assemblies. These temperature limitations must be considered when determining the instrument's location. It should be located in an area as free from vibration as possible.

MOUNTING

The instrument may be surface or flush mounted. For flush mounting, proceed as follows: Cut the panel opening to the size illustrated in Figure 1. Then drill 1/4 inch clearance holes where indicated in Figure 1 and if desired, tap for #10 flat head screws.

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). Be sure to immerse the element 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. These bulbs may be elevated up to 40 feet above the instrument without affecting calibration. For elevations over 40 feet consult with your local Partlow Representative, Distributor or the Factory.

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.

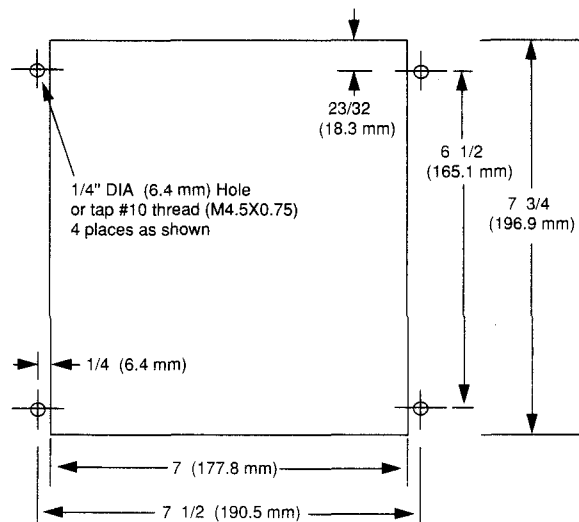
PNEUMATIC HOOKUP

Clean, dry air is essential for trouble-free operation. In most cases, an adequate air filter must be installed in the air line ahead of the control to remove dirt, water, oil, and other foreign matter. Be sure that the filter used will eliminate all oil-mist and moisture, and is easily cleanable. It is recommended that a shut off valve be installed in the air line ahead of the filter to permit the cleaning of accessories without shutting down the entire system. To assure a constant uniform supply of air to the control, an air regulator (with gauge) should be installed in the line ahead of the control. When the control is hooked up to devices requiring large volumes of air (due to their size or long signal lines), a volume booster air relay may be necessary between the control and the device to provide the required valve sensitivity. Be sure that inlet and outlet air lines are connected as designated. The instrument will not function if the air lines are reversed.

Caution: Be sure that the valve used with the Partlow control is adjusted to produce its full travel between 3 and 15 psi.

Note: After pressurizing the system, all fittings should be checked for leakage. This may be accomplished by brushing soap-water solution over the connections and looking for bubbles.

Figure 1 - Panel Cutout Illustration (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, below.

Control temperature is established by turning the knob on the front cover and moving the set pointer along the scale to the desired temperature. The black indicating pointer moves upscale or downscale in response to the Piston-Pak thermal sensing element. When the indicating pointer enters the throttling range and approaches set point temperature, the effective size of the mechanism bleed valve is changed, which, in turn increases or decreases (depending on control action setting, reverse or direct) the pressure signal delivered to the controlled device.

The pressure signal transmitted by the instrument determines the position of the air-operated device which, either directly or indirectly, regulates the flow of heating or cooling medium to the application. When set point temperature is changed, creating a different heating or cooling demand, a new balanced condition between the air signal, valve position and medium flow is established and maintained.

Figure 2 - Re-Zeroing

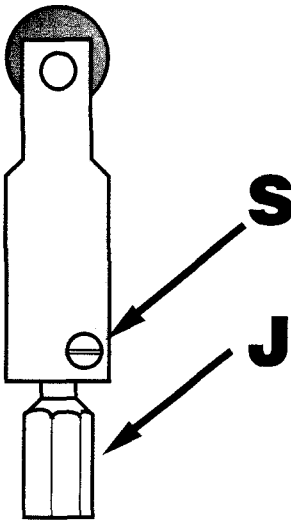
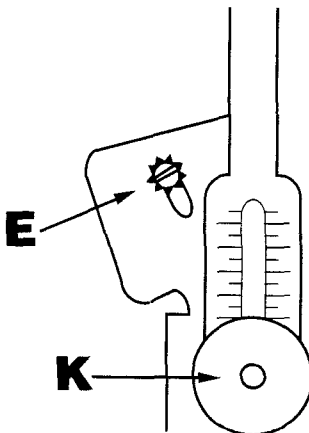


Figure 3 - Reverse or Direct Acting Setting and Throttling Range Adjustment



MAINTENANCE

CHECKING TEMPERATURE

When checking and verifying your temperature be sure to use a test thermometer of known accuracy. Position the test thermometer sensing bulb or probe adjacent to the thermal sensing bulb from the LFA. Turn the knob and position the set pointer to the desired process temperature. Wait for the temperature to stabilize, then compare the reading of the black indicating pointer with the reading of the test thermometer. If the two readings do not agree, the LFA should be re-zeroed.

RE-ZEROING

Be sure that the process temperature is stable. Remove the instrument knob and cover. Loosen the set screw S (Figure 2, above) and using the wrench provided turn shaft J clockwise (lowers black pointer reading) or counterclockwise (raises reading) until the reading of the black indicating pointer agrees with the test thermometer reading. Tighten set screw S. Check the adjustment by allowing the temperature to stabilize and compare the readings. Repeat these steps if necessary.

REVERSE OR DIRECT ACTING SETTING

Instruments are shipped with the mechanisms adjusted for reverse action, to provide a decrease in air pressure with an increase in temperature. If direct acting setting is desired, to provide an increase in air pressure with an increase in temperature, loosen the slotted machine screw on valve assembly E. (Figure 3, at left) Rotate the entire valve until the slotted screw is tight against the opposite end of the adjustment slot in the mechanism bracket. Tighten screw.

Note: After action setting change, it may be necessary to make a manual reset adjustment, see MANUAL RESET ADJUSTMENT section (page 5).

THROTTLING RANGE ADJUSTMENT

Throttling range is adjusted by moving selector knob K (Figure 3, at left) along the mechanism slider scale. The narrowest range is at the top of the scale, widest at the bottom. To set the range, loosen selector knob K (turn counterclockwise), slide the knob upscale or downscale, as required, until proper range (stable indicated temperature) has been established, and re-tighten the knob.

MANUAL RESET ADJUSTMENT

Hex head screw M (Figure 4, at right) is the manual reset adjustment. The control is shipped with the screw adjusted to mid range pressure (9 psi), which means that screw M is set so that the indicating pointer aligns with the set pointer at an output pressure of 9 psi.

Because load error is an inherent characteristic of all throttling type devices, the black indicating pointer may settle out either slightly lower or higher than the set temperature (set pointer). When the indicating pointer settles out above set pointer, using the wrench provided slightly back out (turn counterclockwise) screw M. This will re-position the valve (in relation to the set pointer) and allow the indicating pointer to move into alignment. If the indicating pointer settles out below the set temperature, turn screw M slightly inward (clockwise). After each screw M adjustment allow adequate time for the indicating pointer to settle out. Repeat these steps if necessary.

TO CLEAN FIXED ORIFICE

Fixed orifice screw N (Figure 5, at right) is located in the distribution block inside the case. To access the screw, remove the instrument knob, front cover, dial scale, and back-up plate. Then proceed as follows: Shut off the air supply to the controller. Remove the hex head fixed orifice screw N using a 1/2" wrench. Note the orifice located on side near inner end. Clean the orifice and the interior of the screw with air and solvent. Careful use of the shank end of a new #74 drill or 0.22" dia. wire may be helpful. Do not enlarge orifice. With the orifice screw out of the block, open the air supply briefly to clear the system. Clean any foreign matter that may have exited from the distribution block screw opening before re-installing fixed orifice. Lubricate O rings slightly with a small amount of oil before re-installing. Re-install orifice screw in the distribution block using care to avoid damage to the O ring. Replace back-up plate, dial, cover and knob.

Note: Adjustments to the air valve or air operated device may be necessary. Throttling Range and/or Manual Reset may need to be adjusted or checked after valve has been cleaned. Should adjustments to the air operated device be necessary, see the manufacturers instructions.

TO CLEAN VARIABLE ORIFICE

The variable orifice is located at the rear of the mechanism assembly behind the dial scale. To gain access, remove the setting knob, front cover and dial scale. Remove the element flange screws D (see Figure 8, page 6) and separate the element. Remove the mechanism flat head retaining screw that was exposed when the element was removed, The mechanism assembly may now be lifted out of the case. Then proceed as follows: Remove screw E and its lock washer from the cylindrical valve seat (Figure 3, page 4). Rotate the valve seat counterclockwise (viewed from front of mechanism) until the variable orifice, which was under plastic valve shoe, becomes visible. Do not loosen valve arm set screw. With the air supply to the controller on, air should bleed from variable orifice. The shank end of a new #54 drill or .055 dia. wire may be helpful to clear any obstruction. Do not enlarge orifice or damage the seat surface. When clear, rotate the valve seat clockwise until screw E and its lock washer can be re-assembled to the valve seat in the reverse or direct acting slot. Tighten screw E when it is positioned against the correct end of the adjustment slot, see REVERSE OR DIRECT ACTING SETTING section (page 4). Re-assemble the mechanism and other parts in reverse order.

Note: After re-assembly, the temperature setting should be checked as explained under CHECKING TEMPERATURE section (page 4). Re-zeroing may be necessary.

BRAKE TIGHTENING

Periodically the setting shaft brake may require tightening. If the brake is too loose, the overtravel movement of the black indicating pointer will tend to drag the set pointer upscale from its set position. To tighten the brake, turn the adjustment screw U clockwise (Figure 6, at right). Do not over-tighten.

Figure 4 - Manual Reset Adjustment

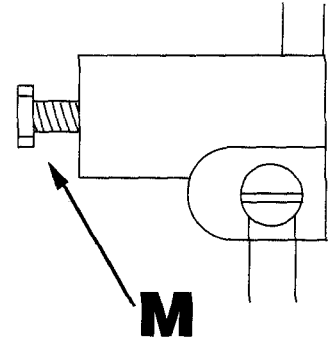


Figure 5 - Cleaning Fixed Orifice

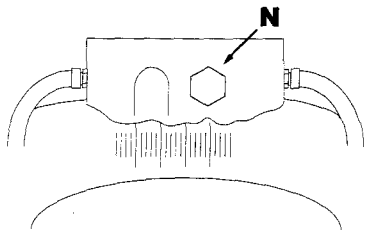
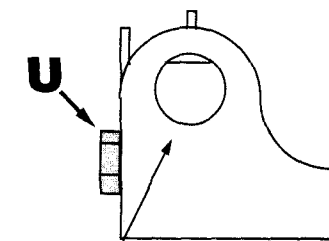


Figure 6 - Brake Tightening



Setting Shaft

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 7, below) 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 LFA and requires its own matrix number. To determine the correct sensing element configuration for your instrument(s) and application, see Partlow Form 3028 "Mechanical Instrumentation Products Cross Reference and Pricing Guide."

ELEMENT REPLACEMENT

To change a thermal sensing element, start by removing screws D (Figure 8, below) and withdrawing the element from the instrument body. Then remove the element bulb from the medium. Install the new element and replace screws D. Insert the new element bulb into the medium being measured.

Note: After the element has been replaced, check the temperature setting, re-zeroing may be necessary. If so, see the CHECKING TEMPERATURE section (page 4).

Caution: The inside mechanism(s), particularly the inside of the element housing, should never be oiled. However, if the instrument is subject to corrosion or gunking conditions, the mechanical linkage should be sprayed periodically with corrosion inhibiting CRC2-26, 3-36, or 5-56. Use only CRC2-26, 3-36, or 5-56 as other lubricants may cause build up and sticking of internal parts. CRC2-26 may be purchased from Partlow in a 15 oz. container (part #63600401). CRC5-56 may be purchased locally from any hardware or automotive store.

Figure 7 - Element ID

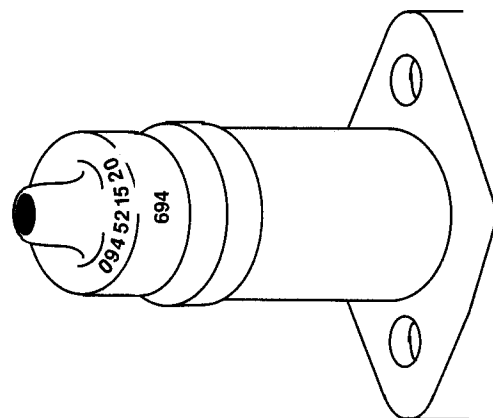
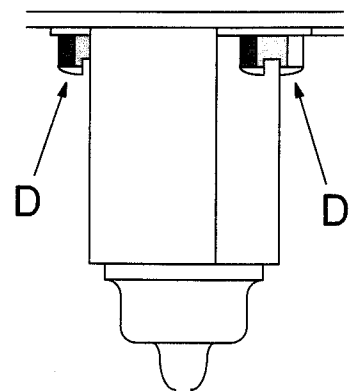


Figure 8 - Element Replacement



DIMENSIONAL DRAWING

Figure 9 - Dimensional Drawing

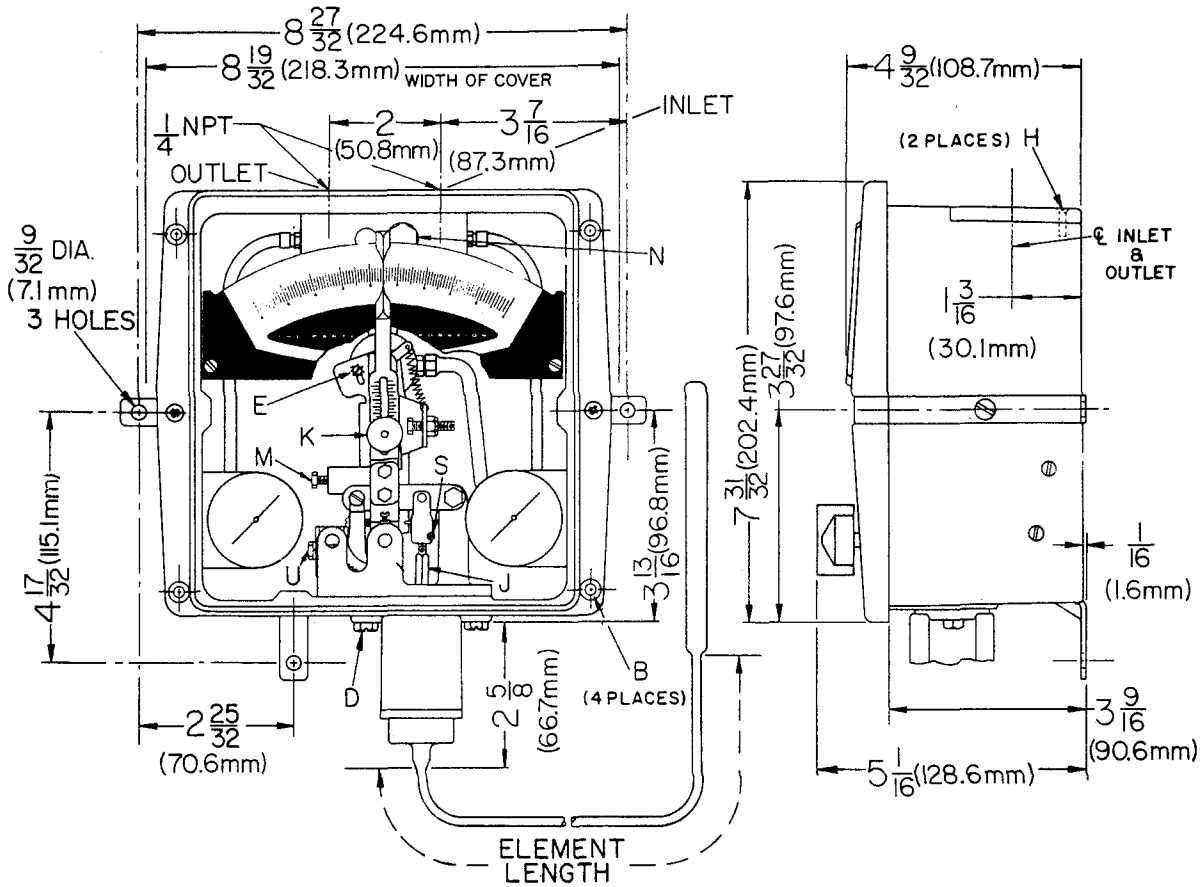
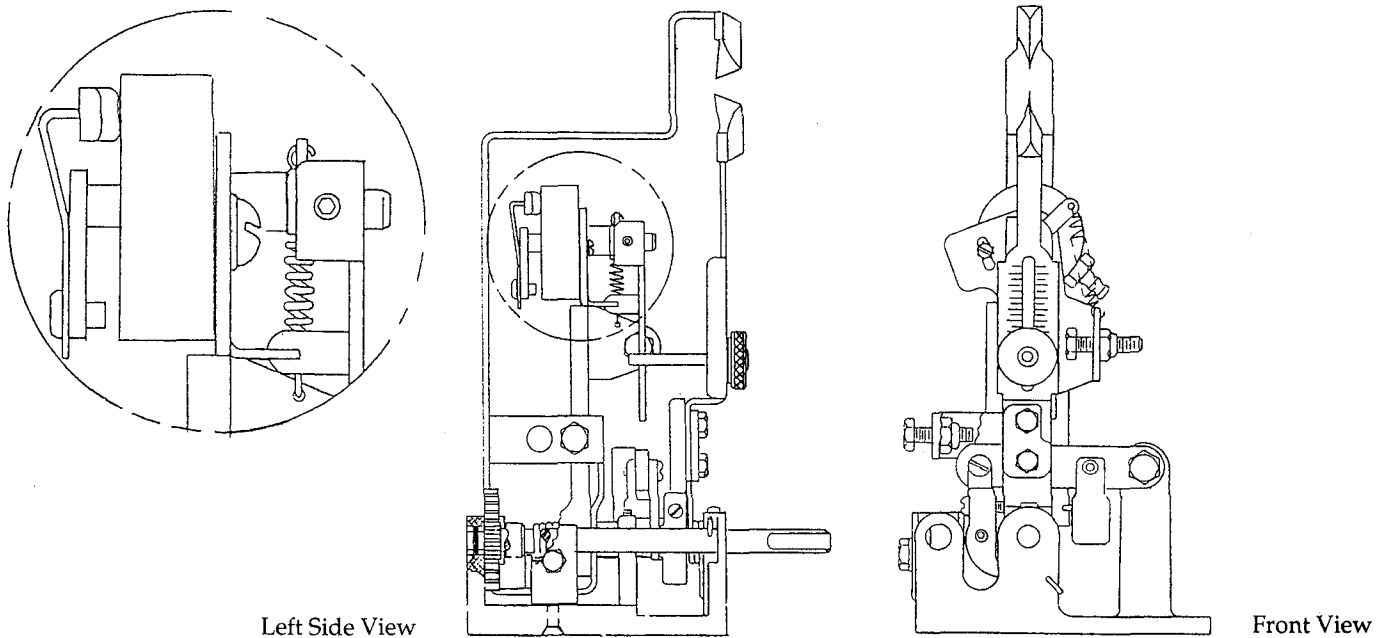
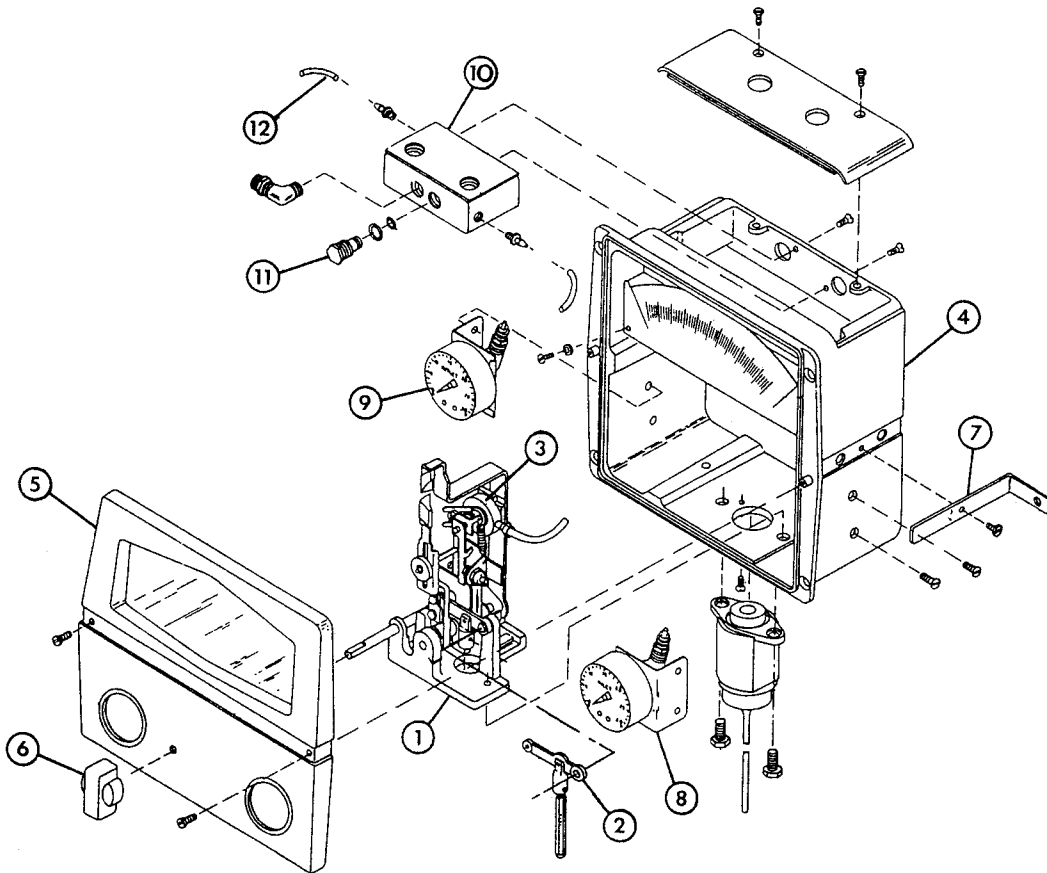


Figure 10 - Mechanism Drawing



EXPLODED ILLUSTRATION AND PARTS LIST

1. Mechanism Assembly	10071904	10. Distribution Block Assembly w/fittings	SPRFAS2B
2. Main Lever Assembly Includes: Main Lever with Push Rod Cap, Push Rod, Set Screw	64412001	11. Fixed Orifice w/ O-rings	64414201
3. Kit Valve Arm Assembly	64411601	12. Plastic Tubing	64414301
4. Case Assembly Includes: Top Plate with Screws, Terminal Block Barrier, Mounting Brackets with Screws.	64412102	13. Fastener Kit (not shown) Includes: Cover Screws, Dial Screws, Terminal Block Mounting Screws, Mechanism Holding Screw, Mounting Bracket Screws, Push Rod Set Screw, Top Plate Screws, Ground Screw, Distribution Block Mounting Screws, and Gauge Mounting Screws	64412701
5. Cover Assembly Includes: Cover, Glass, Cover Screws	64412202		
6. Knob Assembly Includes: Knob with Set Screw	LFA20		
7. Mounting Brackets	64402003		
8. Inlet Gauge Assembly	SPLFAS18		
9. Outlet Gauge Assembly	SPLFAS18A		



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. THERE ARE NO EXPRESSED OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREIN ABOVE SET FORTH. PARTLOW MAKES NO WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCTS.



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