INDICATING MECHANICAL HIGH TEMPERATURE LIMIT DEVICE

The LFHL is a FM listed indicating high temperature limit device with element failure protection. It derives its simplicity and efficiency from the Piston-Pak filled system sensing element.

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First Edition

SPECIFICATIONS
INSTALLATION
OPERATION

LFHL

Partlow
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QUALITY INSTRUMENTATION DESIGNED & MANUFACTURED IN THE USA

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:

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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.

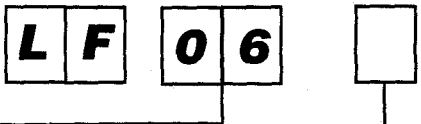
Note:
This document should accompany the instrument to its final installation in order to provide operational and service assistance to the end user.

LFHL PRODUCT SPECIFICATIONS

Dimensions	8 5/8" x 8" x 4 9/32" D
Panel Mount Cutout	7 inches wide by 7 3/4 inches high
Surface Mounting	Mounting brackets included
Switch Type	Three-wire: Single pole double throw High Limit: Partlow #10, manual reset Element Failure: Partlow #15, spring leaf
Switch Sensitivities	Normal 1% of range
Electrical Connection	Terminal block accessible through top cover hatch
Conduit Openings	1/2 inch NPS holes on each side of the case for 1/2 inch conduit fitting; drill guide hole spotted in the rear of the case showing optional rear opening location.
Electrical Rating	15 amps, 250 volts, AC
Agency Approvals	FM and CSA Approved
Warranty	One year, details on the last page
Approx.Net Weight* Approx. Ship. Weight*	5 lbs 8 lbs

* Weight may vary depending on element length.

LFHL ORDER MATRIX



LFHL
(Requires L-Type element plunger).

ACCESSORIES
0 None

PISTON-PAK THERMAL SENSING ELEMENT
A Piston-Pak Thermal Sensing Element must be specified for each LFHL. Use Partlow Form Number 3028 "Mechanical Products Cross Reference and Pricing Guide" to configure the matrix number for the sensing element.

INSTALLATION AND WIRING

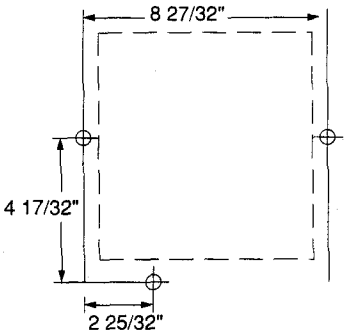
LOCATION

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

MOUNTING

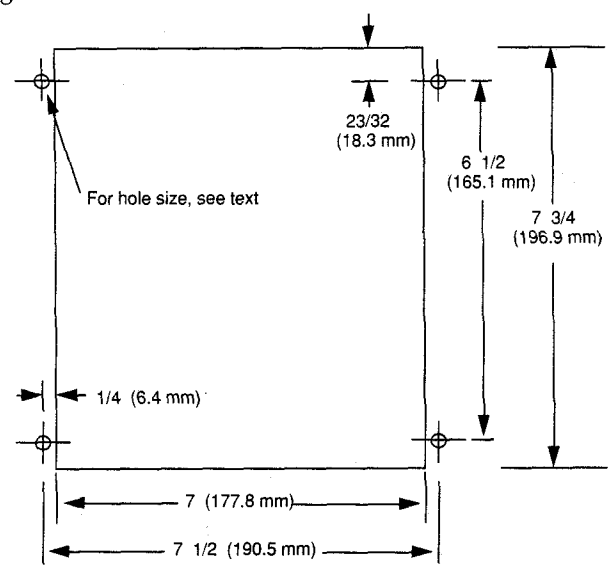
The instrument(s) are shipped to be surface mounted. Figure1 illustrates hole placement for surface mount combinations. Note: Holes in brackets supplied are 9/32 clearance holes for 1/4" bolts. The three holes called out in the drawing may be any size that will accommodate the fastening required, (ie 9/32 for 1/4" thru-bolt with nut fastener) or #7 drill for 1/4" x 20 NC tapped hole fastening or #3 drill for 1/4" x 28 NF tapped hole fastening.

Figure 1 - Surface Mount Dimensions



The instrument may also be flush mounted. This is accomplished by removing the three surface mounting angle brackets from the instrument. Figure 1A illustrates panel cut out dimensions. Cut the panel opening to 7" wide by 7 3/4" high. Drill 9/32 clearance holes in four locations if 1/4" thru-bolt with nut installation is desired. Should a tapped hole be more preferred, drill a #7 hole in four locations for a 1/4" x 20 NC or a #3 drill hole in four locations for a 1/4" x 28 NF. ***Note: All configurations require a flat head screw for proper cover installation. With the instrument in the upright position, insert it and the element into the panel opening and tilt it into place. Depending upon your panel size it may be easier to make electrical connections before finally securing the instrument into the panel.***

Figure 1A - Panel Cutout Illustration (in inches)



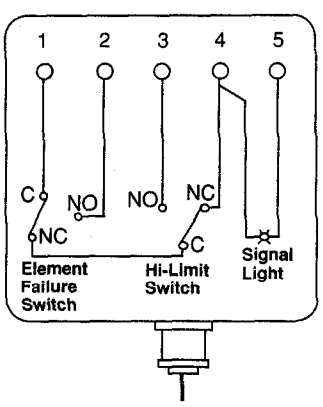
WIRING

Check applicable electrical codes, ordinances and regulations regarding use of conduit, etc. **If acceptable, make connections using short sections of flexible cable or conduit.** It is recommended that the rear conduit hole be used for panel mount installations. If instrument was not ordered with rear conduit hole, a drill guide hole is spotted in the back of the case to accommodate field drilling. If instrument is to be wall-mounted, use one of the threaded conduit openings provided in sides of case. Remove the two screws H at top of instrument case (see Dimensional Drawing) and remove top cover hatch, exposing connection terminal block. Terminals are numbered 1 thru 6. Hookup is accomplished using the first five terminals. Refer to the Wiring Diagram (Figure 2, at right) and make the necessary electrical connections. Replace the top cover hatch.

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 certain that the entire element is immersed in process). 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 many 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. These bulbs may be elevated up to 40 feet above the instrument without affecting calibration.

Figure 2 - Wiring Diagram



STUFFING BOX INSTALLATION (IF APPLICABLE)

Overtightening of 21-T-105 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 130 to 180 inch-pounds for stainless steel and 65 to 100 inch-pounds for steel.

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.

The instrument's high-limit switch should be set at a safe temperature above the primary controller setting. The element failure switch is connected in series with the high-limit switch and is factory-set at some point below normal ambient temperature (normally 50°F).

The high-limit temperature is set by turning the slotted shaft C inside the instrument case with a screwdriver and moving the red set pointer to the desired point on the calibrated scale. This positions the high-limit switch (which moves with the set pointer) in relation to the actuating mechanism.

The black indicating pointer moves up or down-scale in response to the thermal sensing element. When it moves into line with the red pointer, the high-limit switch is actuated, shutting down the equipment, energizing alarms, etc. When the process temperature has returned to a point below the high-limit setting (and any problem corrected), the switch can be reset by pressing the switch reset button on the instrument cover.

The element failure switch will prevent appliance start-up whenever the ambient temperature is lower than the setting of the element failure switch, or the instrument's thermal element has lost some of its fill.

The red signal light on the cover of the instrument is wired in series with both switches and remains **on** during normal operation. The light is de-energized the instant either switch is actuated, alerting personnel to a malfunction of the heating system or thermal element.

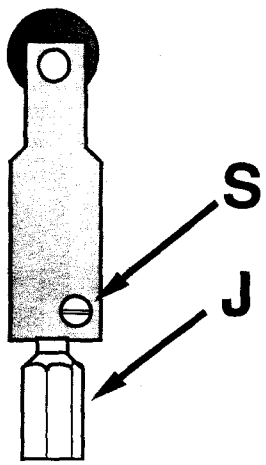
Capstan-type cover screws permit sealing cover for additional tamper-proof protection.

MAINTAINING YOUR LFHL

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 LFHL. Turn the knob on the LFHL to the desired process temperature. Wait for the temperature to stabilize, then compare the test thermometer reading with that of the LFHL. If the two readings do not agree, the LFHL should be re-zeroed.

Figure 3 - Re-Zeroing



RE-ZEROING YOUR LFHL

Be sure that the process temperature is stable. Note the amount of temperature difference between the test thermometer reading and the black indicating pointer reading. Remove the instrument knob and cover. Note hex shaft J and set screw S (Figure 3, at left). Zeroing is accomplished by turning shaft J with the wrench provided. Lengthening shaft J (counterclockwise) raises the black indicating pointer reading; shortening shaft J (clockwise) lowers the reading. Shut off the power to the instrument and turn set pointer (reinstall knob on setting shaft) to high end of scale; then turn shaft J accordingly and correct the reading of the black indicating pointer the same number of degrees as was found to be the error (difference) noted. Re-tighten screw S.

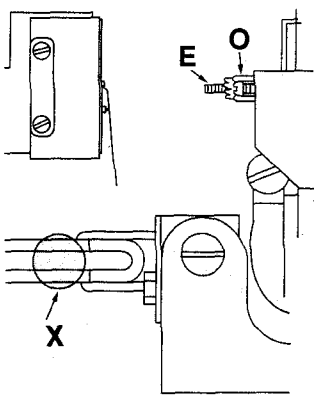
Return set pointer to original setting and restore power to instrument. After temperature stabilization, black indicating pointer reading should agree with test thermometer reading. If necessary, repeat above procedure until properly zeroed. Replace cover and knob.

Note: Power shut down described above prevents process temperature from building while adjustments are being made. If, however, the situation exists where power shutdown is not feasible, follow the same procedures but make shaft J adjustments as quickly as possible. In systems where temperature builds very rapidly, zeroing procedures may have to be repeated several times.

SWITCH REPLACEMENT

The element-failure switch is the stationary spring-leaf switch mounted off left-inside wall of the instrument case. The high-limit switch is the pin-type switch that moves with the red set pointer. When replacing either switch proceed. Turn off power and remove the cover. Remove the two screws holding switch in bracket. Transfer the switch wires from the existing switch to the replacement switch one wire change at a time to avoid wiring confusion. Reattach the replacement switch to the switch bracket with the two mounting screws. ***Note: Switch replacement may slightly alter switch actuation point. Actuation of new switch should be checked (see SWITCH ADJUSTMENTS below).***

Figure 4 - Switch Adjustments



SWITCH ADJUSTMENTS

To set or check switch actuation points turn off power to instrument and remove instrument cover. Remove element screws D (see Figure 7, page 6) and drop element from instrument body (not necessary if checking high limit switch only). Using thumb of right hand, move the black indicating pointer slowly upscale (to check high-limit switch) or downscale (to check element-failure switch) and note when actuation occurs.

High-Limit Switch

Moving the indicating pointer upscale in direction, the limit switch should actuate just as the pointer comes into alignment with the red set pointer. If not, turn rear switch adjustment screw E in or out, as required, and repeat procedure until actuation takes place at the high-limit setting. Note: After each actuation, manually reset switch by pressing reset-point X.

Element-Failure Switch (requires element removal)

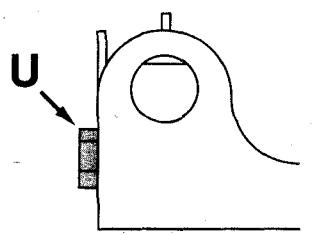
Moving the indicating pointer downscale in direction, the element-failure switch should de-actuate just as the pointer reaches the element-failure setting (normally 50°F). If not, adjust front actuating screw, labeled O in Figure 4 (at right) in or out, accordingly, until switch de-actuates at the proper point. Re-install thermal element and replace instrument cover.

Note: If the thermal element was removed and re-installed, the indicated temperature of the instrument should be checked (see CHECKING TEMPERATURE).

BRAKE TIGHTENING

With use, the setting shaft brake may require tightening. If the brake is too loose, over travel movement of the black indicating pointer will tend to drag the red set pointer upscale from its set position. To tighten the brake, turn the adjusting screw U (Figure 5) clockwise. Check screw U adjustment by positioning the red set pointer to a low scale setting; then, with thumb placed at the base of the black indicating pointer arm, simulate over-travel by moving the black pointer upscale through and beyond the red pointer setting and repeat several times. If the set pointer moves noticeably from its set position screw U is not tight enough. If over-tightened, the set pointer will stay in position, but the setting shaft will be very difficult to turn. Brake adjustment screw U should be tightened so that the red pointer retains its set position when over-traveled by indicating pointer, and setting knob turns with relative ease.

Figure 5 - Brake Tightening



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 6) 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 LFHL and requires its own matrix number. To determine the correct sensing element configuration for your instruments and application see Partlow Form 3028 "Mechanical Products Cross Reference and Pricing Guide."

Note: LFHL ranges are limited to:

107 - 0 to 550 F (-20 to 290 C)
110 - 0 to 700 F (-20 to 375 C)
112 - 0 to 900 F (-25 to 475 C)
113 - 100 to 1000 F (40 to 540 C)
114 - 0 to 1100 F(-20 to 600 C)
115 - 100 to 1100 F (40 to 600 C)

ELEMENT REPLACEMENT

To change a thermal sensing element start by removing screws D (Figure 7) and withdrawing the element from the instrument body. Then remove the element bulb from the medium. Install the new element and tighten screws D. Insert the new element bulb into the medium being measured. Note: After the element has been replaced check the temperature setting as re-zeroing may be necessary. If so see the CHECKING TEMPERATURE section.

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 6 - Sensing Element ID

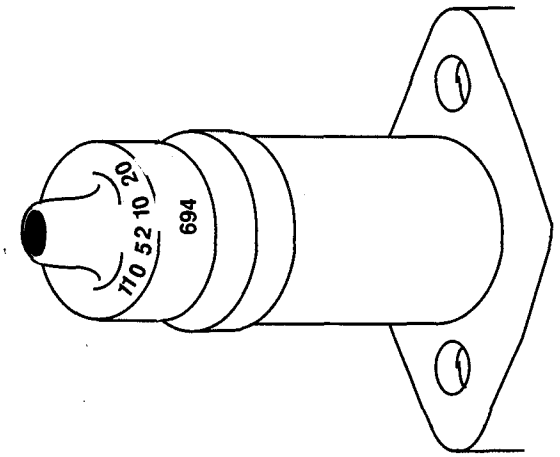
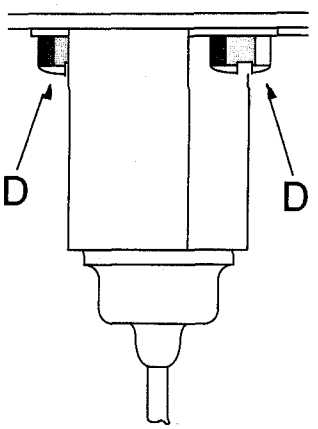


Figure 7 - Replacing Element



DIMENSIONAL DRAWING

Figure 8 - Dimensional Drawing

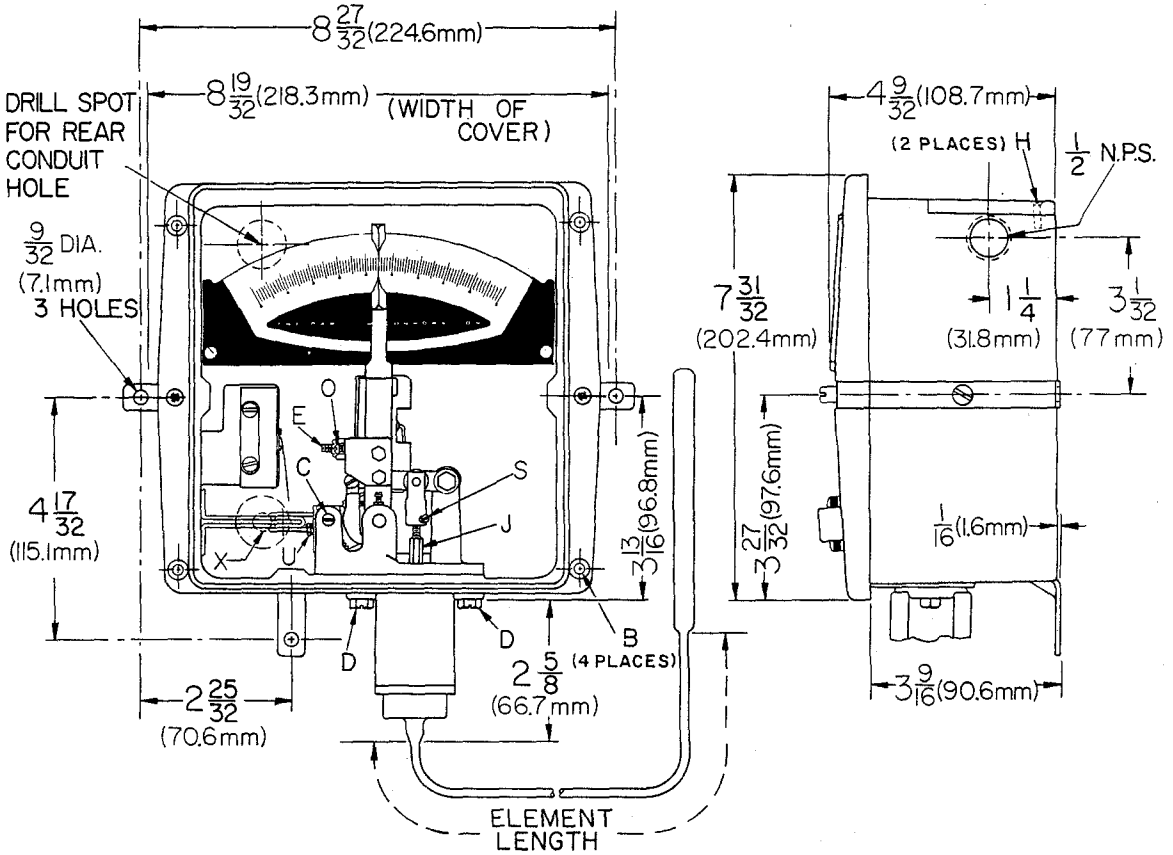
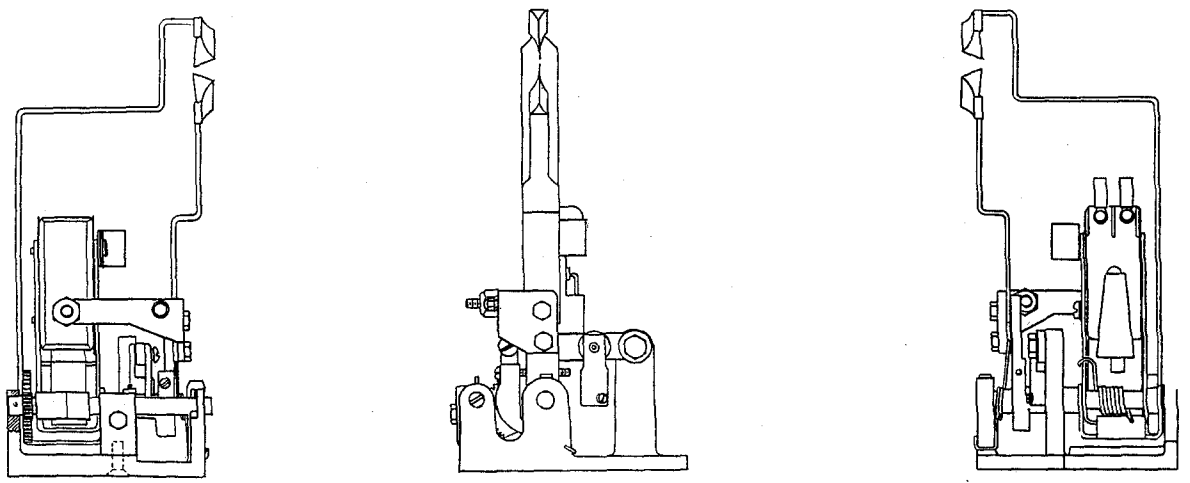


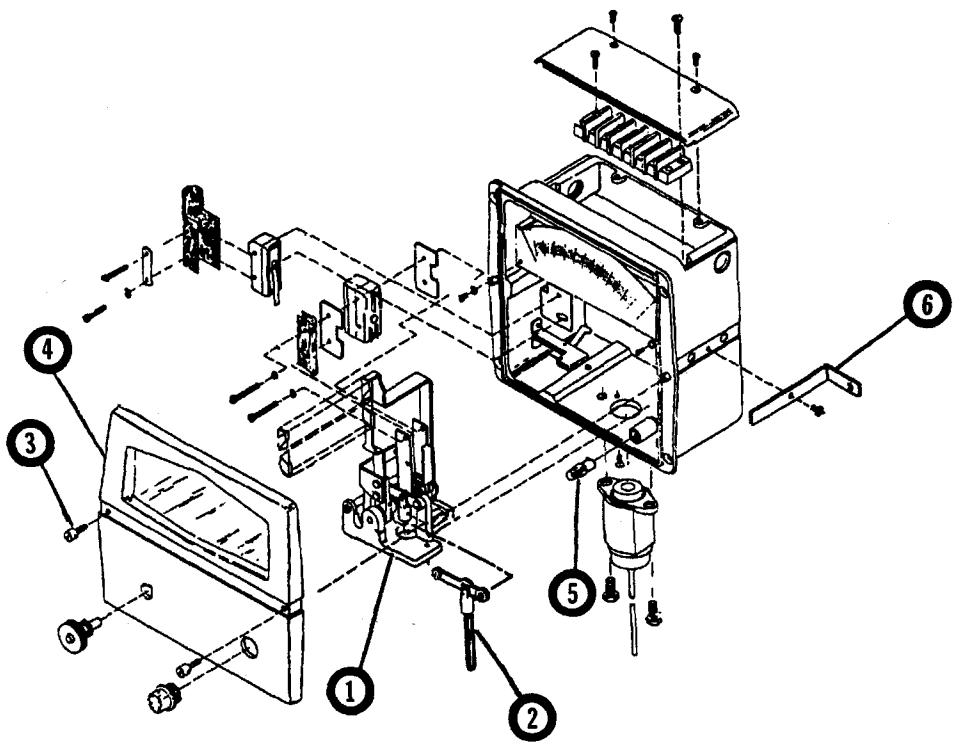
Figure 9 - Mechanism Drawing



Left Side View | Front View | Right Side View

EXPLODED ILLUSTRATION AND PARTS LIST

1. Mechanism Assembly	**10072301**	**5. Signal Light**	**72500801**
2. Main Lever Assembly Includes: Main Lever with Push Rod Cap, Push Rod, Set Screw.	**64412001**	**6. Mounting Brackets**	**64402003**
3. Sealable Cover Screws 2 Required	**LFHL10**	**7. Standard Hardware Kit (not shown)** Includes: Switch Screws, Dial Screws, Terminal Block Mounting Screws, Mechanism Holding Screws, Mounting Bracket Screws, Push Rod Set Screw, Top Plate Screw, Ground Screw	**64412701**
4. Cover Assembly Includes: Cover, Glass, Reset Knob, Light Lens	**SPLFHLS6**		



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 REPLACEMNT AS ABOVE DESCRIBED.

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