

EXPLOSION PROOF INDICATING TEMPERATURE CONTROLLER

The LFV4 is an explosion proof switch actuating indicating temperature controller designed to operate valves or relays which control heating or cooling systems. It derives its simplicity and efficiency from the Piston-Pak filled systems sensing element.



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**SPECIFICATIONS
INSTALLATION
OPERATION**

LFV4

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
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1675 Delany Rd.
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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.

LFV4 PRODUCT SPECIFICATIONS

Dimensions	8 5/8" W x 10 3/16" H x 4 9/32" D
Surface Mounting	Brackets provided
Flush Mount Cutout	7" W x 7 3/4" H
Switch Type	<u>S.P.S.T.</u> Partlow #4 explosion proof switch
Electrical Rating	<i>Change to S.P.D.T.</i> 50 VA inductive, 500 VA non-inductive
Electrical Hookup	Front of switch enclosure, removable for terminal access
Conduit Openings	Threaded 1/2" NPS hole in right side of switch enclosure
Agency Approvals	UL
Approx. Net Weight*	8 lbs
Approx. Ship. Weight*	11 lbs

* Weight may vary depending on element length

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.

LFV4 ORDER MATRIX

	L	F	0	5	
LFV4 * (Requires L-type element plunger, specify dial scale required)					
ACCESSORIES 0 None					

* UL listed, agency recognition void if instrument is modified from factory standard.

PISTON-PAK THERMAL SENSING ELEMENT

A Piston-Pak Thermal Sensing Element must be specified for each LFV4. Use Partlow Form 3028 "Mechanical Instrumentation 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 -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 location. It should be located in an area as free from vibration as possible.

MOUNTING

The instrument(s) are shipped to be surface mounted. Figure 1 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.

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, in four locations for a 1/4" x 20 NC or #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.

WIRING

The threaded side conduit hole in switch enclosure is used for electrical connections. Rigid conduit is normally required with explosion proof controls. Make necessary electrical connections according to applicable electrical codes. Remove the switch enclosure cover by withdrawing screws "A", see dimensional drawing on page 6. Make electrical connections according to wiring diagram (Figure 2, below). Replace enclosure cover.

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 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. The bulb 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.

Figure 1 - Surface Mount Dimensions

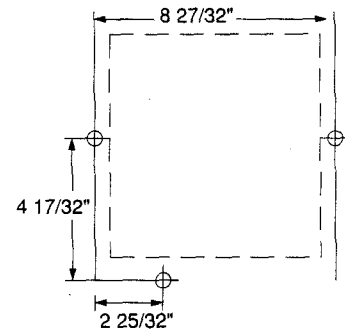


Figure 1A - Panel Cutout illustration (in inches)

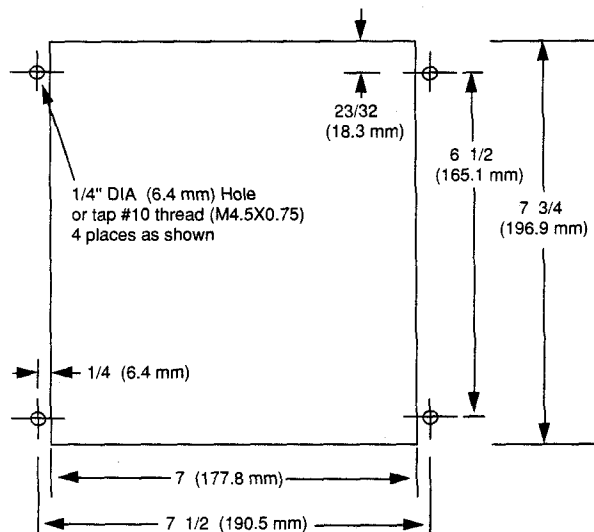
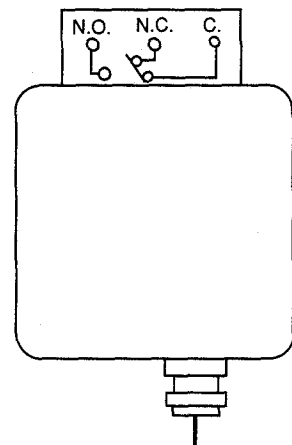


Figure 2 - Control Switch



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 (below) and RE-ZEROING (below) section of this document.

Temperature is set by turning the knob on the front of the control and positioning the red set pointer to the desired point on the dial.

The snap-acting switch, located atop the instrument in a separate explosion-proof enclosure, is actuated by the black indicating pointer which moves in response to the thermal sensing element. When the indicating pointer moves into line with the red set pointer, the snap-acting switch opens or closes the circuit (depending on electrical hookup) controlling heating or cooling input to the appliance.

MAINTAINING YOUR Lfv4

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 Lfv4. Turn the knob and position the set pointer to the desired process temperature. Wait for the temperature to stabilize, then compare the test thermometer reading with that of the Lfv4 (Black indicating pointer). If the two readings do not agree, the Lfv4 should be re-zeroed.

SWITCH REPLACEMENT

Be sure all electrical power to the instrument is removed. Remove the set point knob and front cover from instrument. Remove the four switch enclosure cover screws from the top switch housing (Screws A, see dimensional drawing on Page 6). Note switch and switch housing are replaced as an assembly. Remove wires from the terminals of the switch, note their exact location to aid in re-wiring replacement switch. Disconnect conduit from switch housing. Remove four mounting screws from the top plate that retain the housing on to the instrument. Remove the switch housing and plate assembly. Remove the two screws that fasten the mounting plate to the switch housing. Exchange the switch housing with the new switch housing. Re-attach the plate and switch assembly into the instrument, using the four screws removed previously. Re-attach the conduit pipe to the switch housing and connect up the wiring to the switch as removed originally. Install the cover on to the switch housing. Before re-connecting up the instrument front cover, check to see that the switch is adjusted properly. See switch adjustment below.

RE-ZEROING YOUR Lfv4

Be sure that the process temperature is stable. Remove the instrument knob and cover. Loosen the set screw S (Figure 3, at left) and using the wrench provided turn shaft J until the black indicating pointer reading agrees with the test thermometer reading. Lengthening shaft J (counterclockwise) raises the black indicating pointer reading, shortening shaft J (clockwise) lowers the reading. Tighten the set screw S. Check the adjustment by allowing the temperature to stabilize and compare the readings. Repeat these steps if necessary.

SWITCH ADJUSTMENT

After replacing switch, it may be necessary to adjust actuation rod inside mechanism to cause proper temperature control at setpoint. Remove knob and cover from instrument front. Switch actuation rod is located on back of instrument case behind mechanism. Rod extends downwards towards mechanism. Top of switch rod has an adjustable cap that pushes up on the switch actuating rod from below. Loosen the 10-32 lock nut from beneath the adjustable cap. Adjust top cap to actuate switch at set point. Adjusting the cap CW (left to right) causes switch to switch before setpoint. CCW (right to left to actuate after setpoint). **Note: Be sure to set stop nut after adjustments.** Install cover and knob on instrument.

Figure 3 - Re-Zeroing

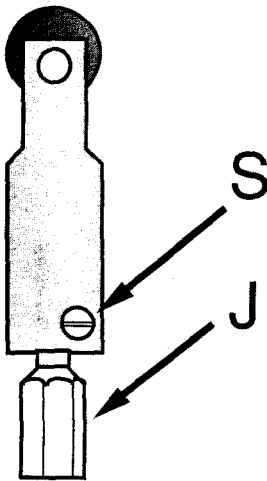
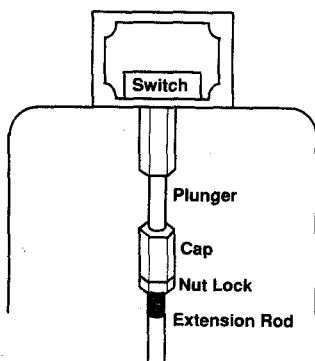


Figure 4 - Switch Adjustment



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 red set pointer upscale from its set position. To tighten the brake, turn the adjustment screw U clockwise (Figure 5, below). Do not over-tighten.

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, page 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 LFV4 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 7) 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.

Caution: The mechanism inside the instrument and particularly the inside of the thermal element housing, should never be oiled. However, if the instrument interior is subject to corrosion or gunking conditions, the 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 buildup and internal parts to stick. CRC2-26 may be purchased from Partlow in a 15 oz. container (part #63600401). CRC5-56 can be purchased at most any hardware or automotive store.

Figure 5 - Brake Tightening

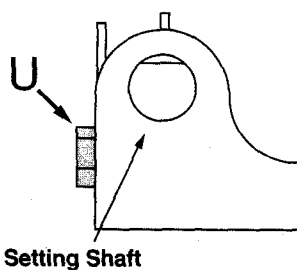


Figure 6 - Sensing Element ID

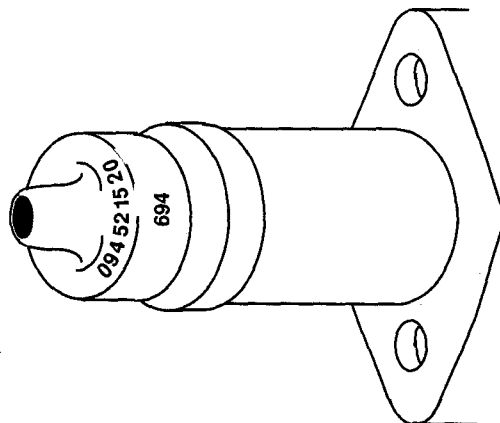
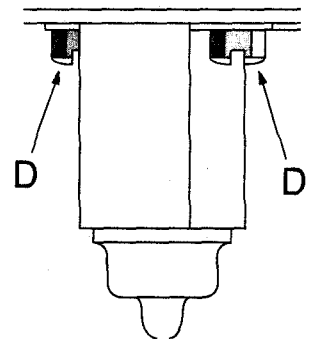


Figure 7 - Replacing Element



DIMENSIONAL DRAWING

Figure 9 - Dimensional Drawing

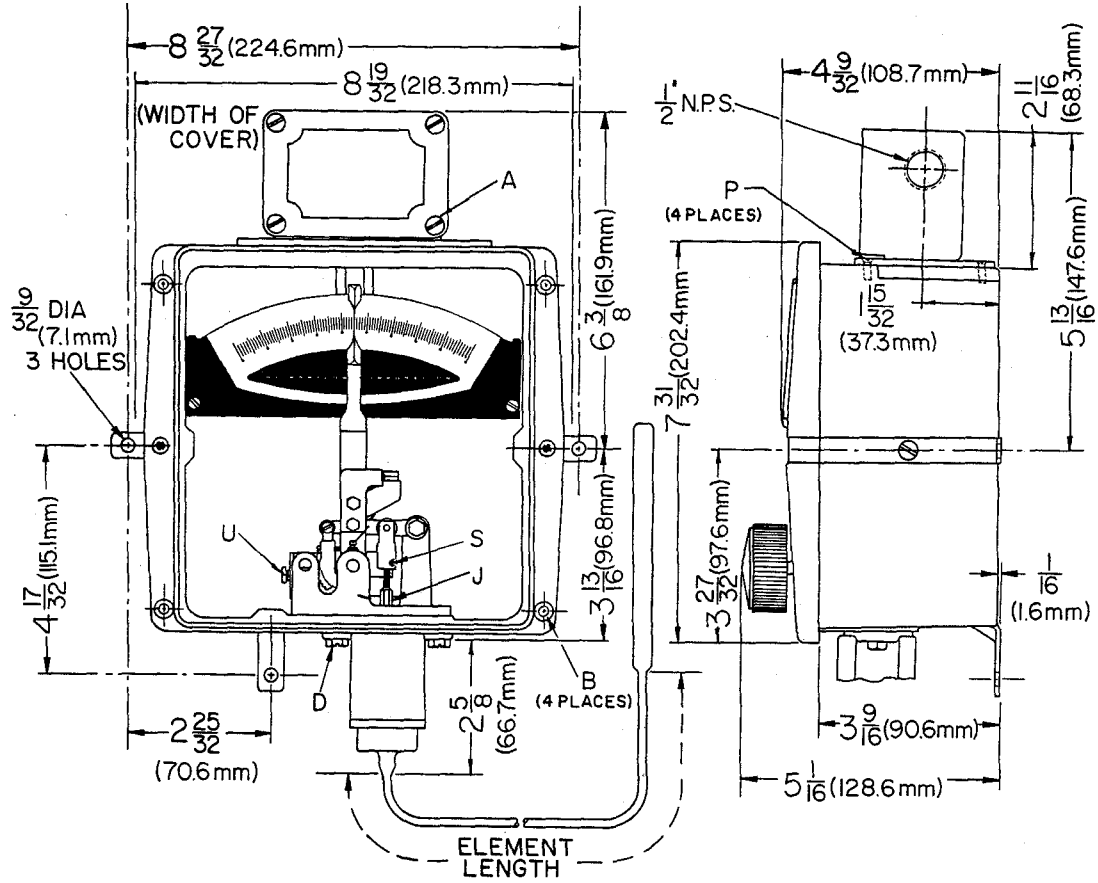
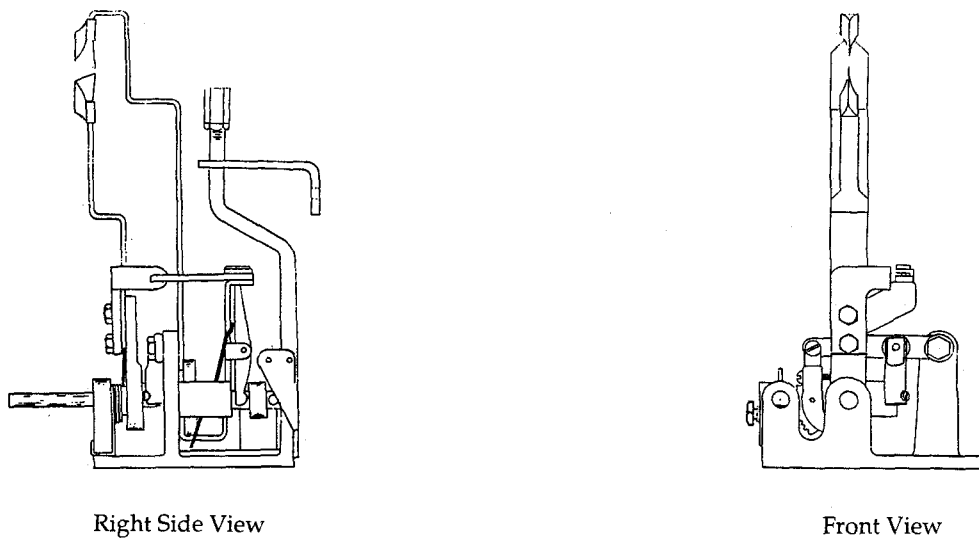
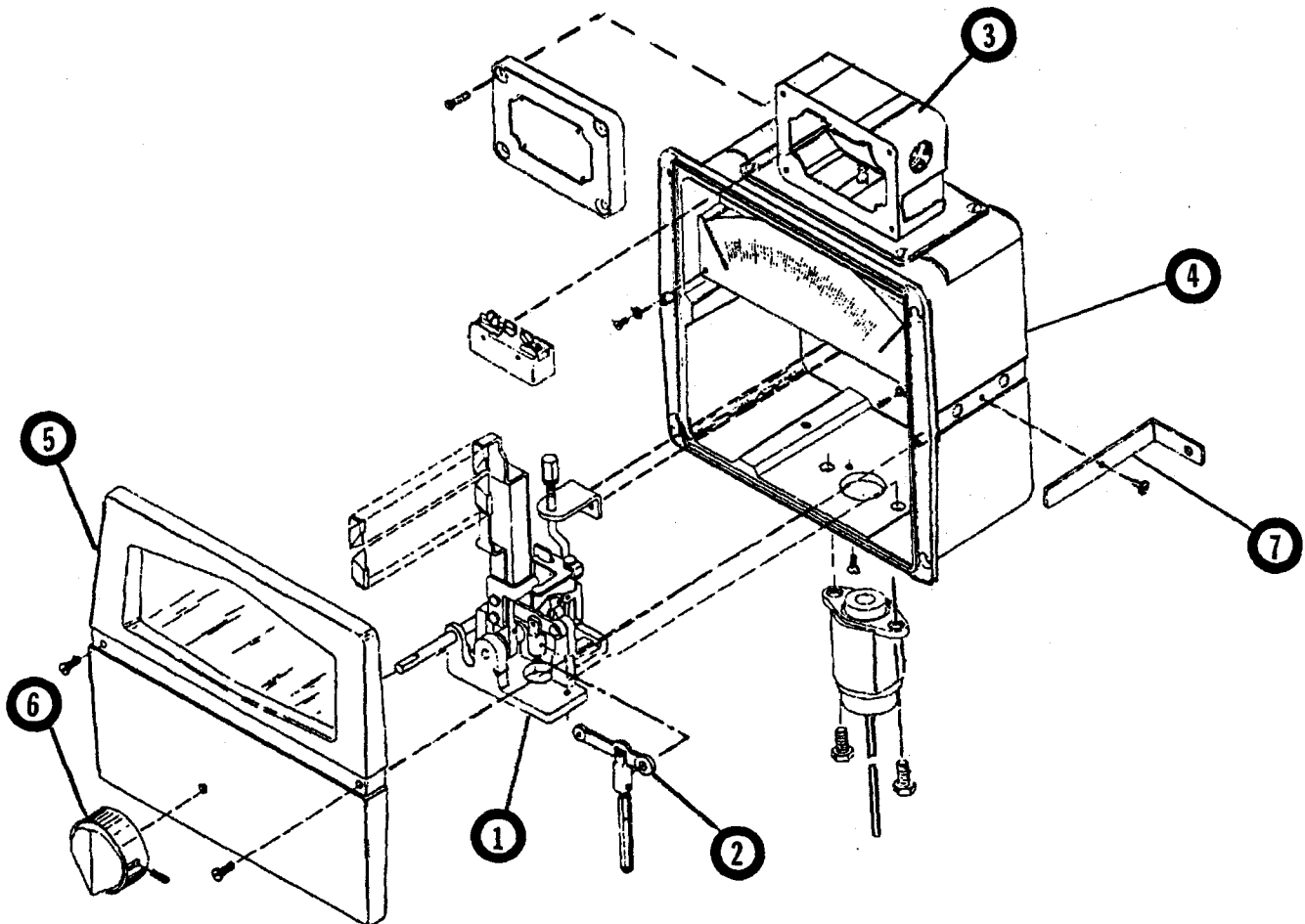


Figure 10 - Mechanism Drawing



EXPLODED ILLUSTRATION AND PARTS LIST

1. Mechanism Assembly Includes: Actuating Arm, Push Rod, Mounting Screws	10072702	6. Knob Assembly Includes: Knob with Set Screw	10041301
2. Main Lever Assembly Includes: Main lever with Push Rod Cap, Push Rod, Set Screw	64412001	7. Mounting Brackets	64402003
3. Switch Assembly Includes: Switch, housing and cover	10081202	8. Standard Hardware Kit (not shown) Includes: Cover Screws (2) Dial Screws (2) Terminal Block Mounting Screws (3) Mechanism Holding Screw (1) Mounting Bracket Screws (3) Push Rod Set Screw (1) Top Plate Screws (2) Ground Screw (1)	64412701
4. Case Assembly Includes: Top Plate	LFVSS5		
5. Cover Assembly Includes: Cover, Glass, Cover Screws	64412201		



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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