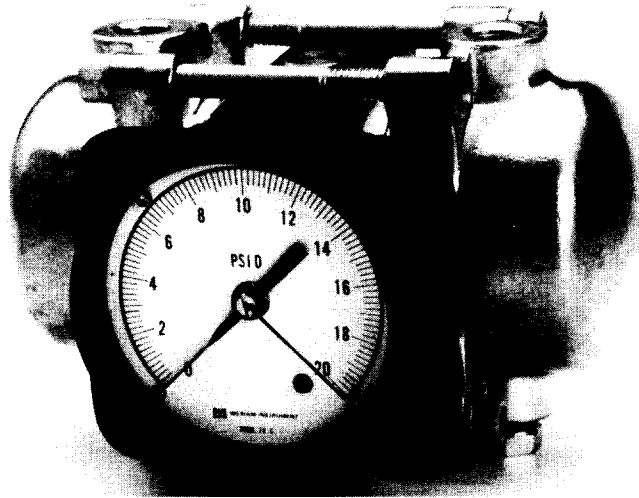


## INSTALLATION & OPERATING INSTRUCTIONS



### MERIAM SERIES 1120 BELLOWS D/P INDICATORS AND SERIES 1220 BELLOWS D/P INDICATING SWITCHES

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## ***Fragile* – UNPACK WITH CARE**

Thank you for buying Meriam products. We appreciate your business. We have packed this shipment with care to be certain you receive what you ordered in good condition. Carefully remove all packing material and thoroughly inspect contents to be positive all items shown on the packing list are included and not damaged. Check contents for:

- Differential Pressure Indicator or Indicating Switch
- Service Manual
- Accessories supplied per customer purchase order

### **Precautions:**

If the instrument was ordered for service in a critical medium requiring special cleaning (e.g. oxygen) remove the plastic bag only under controlled cleanliness conditions.

Your Meriam instrument was inspected during manufacture and prior to shipping. However, an inspection should be performed at the time of unpacking to detect any damage that may have occurred during shipment. If any irregularities are found:

1. Report damage to carrier.
2. Claims to trucking, express, or air carriers are to be filed by the customer.
3. Claims to United Parcel Service must be filed by Meriam.
4. Advise Meriam of damage and obtain authorization to return for repair or replacement. Do this promptly to assure coverage and avoid delay.

Thank you again for your order. If applied to designed specifications, these products will provide you with many years of service. We look forward to serving you again.

## PRINCIPLE OF OPERATION

The Meriam Model 1020 Differential Pressure Unit is a proven and reliable sensing element. Available in ranges from as low as 0-30" H<sub>2</sub>O to 0-500 PSI. It is especially adaptable where size and weight are critical factors. The light weight and compact differential pressure unit incorporates a rupture-proof and leak-proof bellows plus other construction features that make it second to none. This unit is suitable for activating indicators, recorders, transmitters, switches, and controllers and is available as a separate assembly for that purpose.

The basic D/P unit consists of a high and a low pressure bellows, both liquid filled and connected to a center plate. The bellows are enclosed in the high and low pressure end housings which in turn are bolted to the center plate. When differential pressures are applied to the high and low pressure connections, the high pressure bellows contracts forcing the fill fluid through the center plate into the low pressure bellows causing it to expand.

The resulting linear motion of the low pressure bellows is converted to a 6° rotary motion of the output shaft

through a temperature compensated linkage. Overrange protection is provided by two opposed valves located on this linkage allowing the unit to withstand overranging up to the full static pressure rating of the housing without damage. The interior of the bellows and center plate are completely filled with a clean, non-corrosive, low freezing point liquid. This output shaft is part of a low friction, "O" ring sealed shaft and bearing assembly which carries the rotary motion to the external area of the bellows unit and into the instrument case.

In the Meriam bellows unit all of the fill fluid must pass through the Meriam Pulsation Dampening valve in the center plate. This valve is field adjustable so that the desired dampening effect can be obtained. Because of this Meriam design, other types of external dampening devices are not required on services involving measurement of fluctuating differential pressures. The Meriam bellows D/P unit incorporates a special design which completely isolates the process fluid from the center plate.

## CONSTRUCTION SPECIFICATIONS

MODEL	1123	1124	1126	1224-1	1224-2	1226-1	1226-2	1124-P-3	* 1124-P-4	1126-P-2	SERIES 1020																																																			
DIAL SIZE	3"	4½"	6"	4½"	4½"	6"	6"	4½"	4½"	6"	Basic D/P Unit For All Models																																																			
HOUSING MATERIAL & PRESSURE RATING	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2"></th> <th colspan="4">ALL MODELS</th> <th colspan="2"></th> <th colspan="3">PROCESS CONNECTIONS</th> </tr> <tr> <th colspan="2"></th> <th>ENDHOUSINGS</th> <th colspan="2">CENTERPLATE</th> <th colspan="2">S.W.P.</th> <th colspan="3"></th> </tr> </thead> <tbody> <tr> <td colspan="2"></td> <td>Brass</td> <td colspan="2">Brass</td> <td colspan="2">500 or 1000 p.s.i.</td> <td colspan="3">1/4" &amp; 1/4" NPT</td> </tr> <tr> <td colspan="2"></td> <td>Steel</td> <td colspan="2">Steel or Brass (1000 SWP only)</td> <td colspan="2">1000, 1500, 3000 or 6000 p.s.i.</td> <td colspan="3">1/4" &amp; 1/2" NPT</td> </tr> <tr> <td colspan="2"></td> <td>316 Stainless Steel</td> <td colspan="2">316 SS, Steel or Brass (1000 SWP only)</td> <td colspan="2">1000, 1500, 3000 or 6000 p.s.i.</td> <td colspan="3">1/4" &amp; 1/2" NPT</td> </tr> </tbody> </table>													ALL MODELS						PROCESS CONNECTIONS					ENDHOUSINGS	CENTERPLATE		S.W.P.							Brass	Brass		500 or 1000 p.s.i.		1/4" & 1/4" NPT					Steel	Steel or Brass (1000 SWP only)		1000, 1500, 3000 or 6000 p.s.i.		1/4" & 1/2" NPT					316 Stainless Steel	316 SS, Steel or Brass (1000 SWP only)		1000, 1500, 3000 or 6000 p.s.i.		1/4" & 1/2" NPT		
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BELLOWS MATERIAL	ALL MODELS Beryllium Copper (30" W.C. to 65 PSID), 316L Stainless Steel (50" W.C. to 500 PSID) or MONEL 400 (50" W.C. to 65 PSID)																																																													
MOUNTING STYLES	ALL MODELS (except 1124P & 1126P) FLUSH PANEL using indicator case for mounting — WALL or ¾" NPT using universal mounting bracket PIPE SADDLE or WALL using "H" mounting bracket and 2" U-Bolts — 2" Ell Pipe Stand																																																													
SPECIAL FEATURES	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="6">ALL MODELS</th> </tr> </thead> <tbody> <tr> <td colspan="6">Range Variations 270° Pointer Travel, 6° Shaft Rotation Temperature Compensation for Varying Ambients Built-In Pulsation Dampening (Field Adjustable)</td> </tr> <tr> <td colspan="6">Lo-Torque Instrument Shaft &amp; Bearing Break-Resistant Acrylic Viewing Window Die-Cast Aluminum Case With Gasketed Cover Simple Zero, Span and Linearity Adjustment</td> </tr> </tbody> </table>											ALL MODELS						Range Variations 270° Pointer Travel, 6° Shaft Rotation Temperature Compensation for Varying Ambients Built-In Pulsation Dampening (Field Adjustable)						Lo-Torque Instrument Shaft & Bearing Break-Resistant Acrylic Viewing Window Die-Cast Aluminum Case With Gasketed Cover Simple Zero, Span and Linearity Adjustment																																						
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\* Available in Brass Construction Only

## PERFORMANCE SPECIFICATIONS

### INDICATORS

Accuracy:  
 0 to 30" W.C. range ..... 1.50% FS  
 0 to 50" thru 0 to 500 PSID range ..... 0.75% FS  
 Optional ±0.50% FS for ranges 100" W.C. to 50 PSID ....  
 Consult Factory  
 Linearity ..... Within above stated accuracy

Zero Elevation:  
 Maximum 100% of range

Suppression:  
 Maximum 100% of range, 150 PSID Max.

Operating Temperature Limits ..... -60° to +200° F

Full Scale Displacement:  
 0 to 30" thru 0 to 130" W.C. range ..... .19 Cu. In.  
 0 to 135" W.C. thru 0 to 60 PSID range ..... .12 Cu. In.  
 0 to 75 PSID thru 0 to 500 PSID range ..... .06 Cu. In.

### INDICATING SWITCHES

Accuracy  
 Before activation, ±¼% of full diff.  
 At activation point, ±2% of full diff.  
 After activation point, switch activated, ±1½% of full diff.

Linearity,  
 Suppression &  
 Displacement  
 Refer to "Indicators"

Switch Dead Band  
 10% of full diff. Maximum (7% nominal).

Switch Setting  
 Increasing 10 to 100% of differential or 10" of water whichever is greater.  
 Decreasing: 5% or 5" of water whichever is greater.  
 15% of F.S. minimum between set points.

Switch Type  
 Snap action SPDT.  
 Switch Rating  
 5 amperes at 125 or 250 V.A.C.  
 3 amperes inductive or 5 amperes resistive at 30 V.D.C.

# INSTALLATION

## OPERATING LIMITATIONS

The One-Year Warranty of the Differential Pressure Unit will not apply if the following limitations are exceeded:

### Useful Temperature:

- 60° F. to +200° F.
- (-35° F. with oil fill)
- (+35° F. to 150° F. with distilled water)

**Pressure:** Units are capable of line pressures up to the SWP stamped on the I.D. Tag (located on the bottom of the centerplate) without damage. Zero reset or recalibration may be required.

**Pulsation:** If the meter body is to be subjected to pulsation, make sure the externally adjustable pulsation dampener is adjusted correctly to prevent damage to the instrument. All instruments are shipped with the dampener valve 1/4 turn open. Use a screwdriver to adjust the dampener valve until the proper dampening effect is obtained. Approximately 1-1/2 turns is fully open. Severe pulsations will affect the accuracy of the instrument; when pulsation is severe, the installation of a pulsation damping device upstream of the meter run is recommended.

**Vibration and Shock:** Do not subject instrument to severe mechanical vibration or hydraulic shock, unless the unit has been specially ordered for such severe operating conditions.

**Corrosion:** The bellows of the Differential Pressure Unit are made of either beryllium copper, Type 316L stainless steel or of MONEL 400.

## LOCATION

1. Locate the indicator's meter body so it will be easily accessible from ground level.
2. Select a reasonably vibration-free location where ambient temperature does not exceed operating temperature limits. Do not locate the instrument near vents or bleed holes discharging corrosive vapors or gases.
3. In Liquid Measurement (Figs. 7-9) locate the meter body below the primary element to permit entrapped air or gas to be vented into the flow line.

For Steam and Gas Measurement (Figs. 2-7) place the meter body above the flow line to facilitate condensate draining.

4. The distance between the primary device and the DPU shall be as short as possible. For distances up to 50 feet use 1/4 inch or 3/8 inch pipe or tubing. For runs 50 to 100 feet use 1/2 inch pipe or tubing. Distances exceeding 100 feet are not recommended. The recommended distance limitation does not apply if an air-purge system is used.

**MOUNTING:** Refer to Pgs. 4 & 5 for dimensions.

The instrument must be approximately level for proper operation.

**Wall Mtg.** — Universal Bracket or 2" Pipe Saddle.

Drill four mounting holes on wall to match the "H" mounting bracket.

Secure instrument with bolts and nuts.

### Pipe Mtg.

1. Universal Bracket: Place a suitable length of 3/4 inch threaded pipe into a well-secured floor or wall flange. Thread instrument onto pipe and properly orient meter with wrench or bar on meter body bracket.

**CAUTION:** Do not orient by turning or grasping the indicator case.

2. Pipe Saddle or Stand: Attach to existing 2" piping, or to a 2" pipe secured in a manner similar to (1.) above by means of the "U" bolts or Ell supplied.

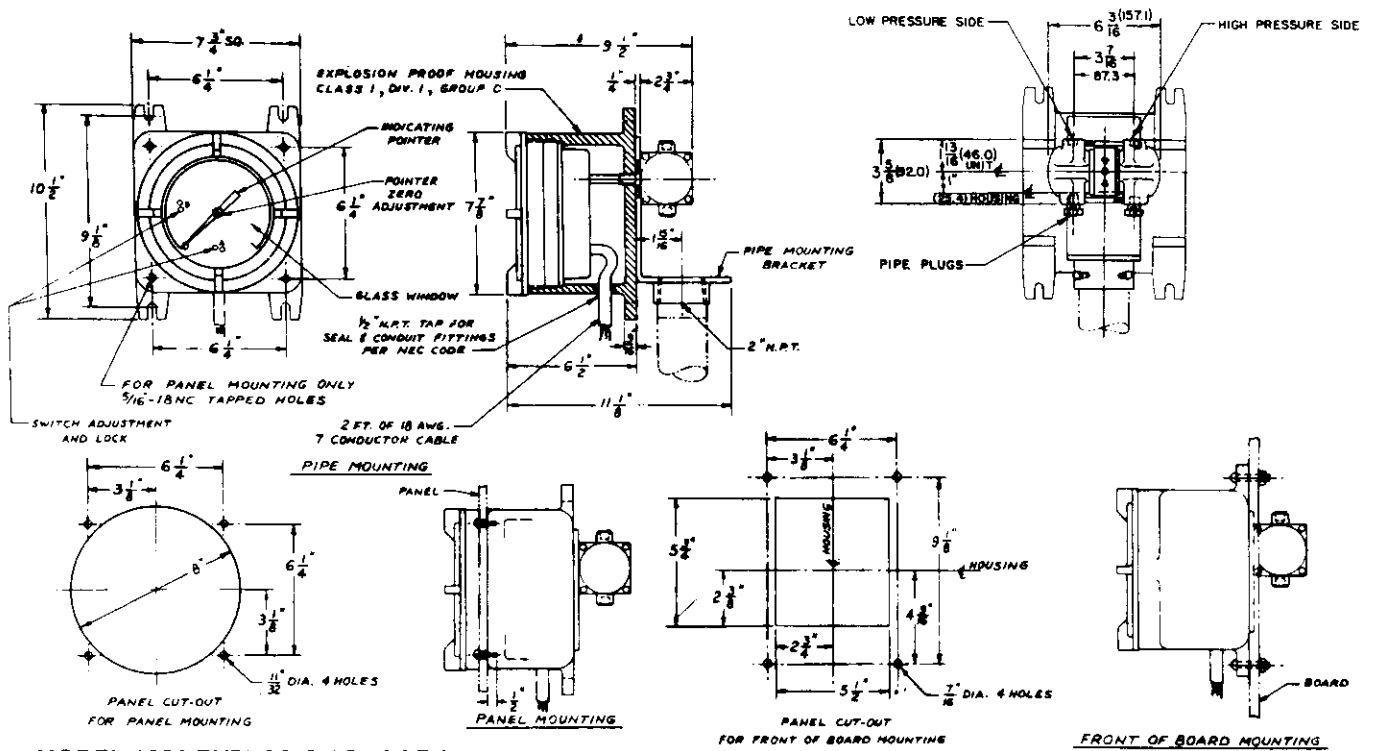
### Flush or Panel Mtg.

1. Remove the gauge cover and provide a hole in the panel per the mounting dimensions. Insert the gauge and install washers and retaining nuts on the four mounting bolts.
2. Orient the axes of the dial for readability and appearance and wrench tighten the retaining nuts. Replace the gauge cover to complete the installation.

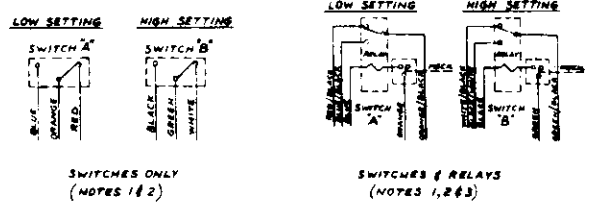
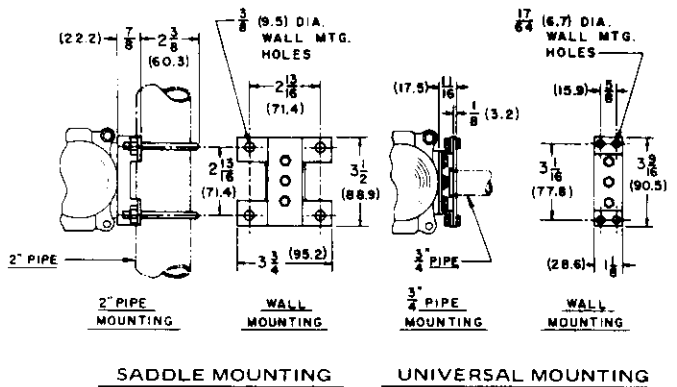
On Models 1124 and 1224, the washers will overhang onto the panel, retaining and locking the gauge in place. If holes are felt necessary for the retaining bolts of Models 1124 and 1224, a more complex cutout may be used in the panel (refer to the drawing). This cutout will also pass the DPU.



# MOUNTING DIMENSIONS (Cont.)



MODEL 1226 EXPLOSION PROOF SWITCH



NOTES:

1. SWITCH RATING: 5AMP AT 125 OR 250 V.A.C. UL RATED, 3AMPS AT 30 V.D.C.
2. DELETE SWITCH "B" FOR SINGLE SWITCH MODEL 1226-1
3. RELAY CONTACT RATING: 10 AMP AT 115 VAC OR 28VDC RESISTIVE LOAD  
NOMINAL COIL POWER: 3VA, COIL VOLTAGE: 115 VAC

ALL MODELS

## PIPING

Refer to Figs. 2 through 15 for typical piping arrangements.

Certain practices should be followed on all flow and liquid level DPU piping:

1. Locate piping per pg. 3 "location" para. 4.
2. Make up all joints using a suitable pipe joint compound to reduce measurement errors caused by leaks in the pipe joints.
3. Slope all piping at least 1 inch per linear foot to avoid liquid or gas entrapment.
4. If process media exceeding 200° F (93° C) is to be measured, provide 2 feet of uninsulated

piping between the primary device and the DPU for each 100° F (37.8° C) in excess of 200° F.

5. Install a valve manifold connecting the DPU and the differential pressure source to facilitate operation and checking of the DPU. Locate shutoff and bypass valves to be readily accessible to the operator from the front of the instrument. The shutoff valve should be the first valve from the process line or vessel.
6. Steel and Stainless Steel DPU's have two pressure connections in each housing, one 1/4" and one 1/2" NPT. If necessary, rotate the housings 180 degrees to place the connections in the desired position.

# INSTRUMENT STARTUP

**IMPORTANT:** PRIOR TO PLACING THE INSTRUMENT IN SERVICE, PERFORM THE FOLLOWING OPERATIONS:

1. Since the bellows may have taken a slight "set" due to possible extended periods of storage prior to installation, it is advised that the first time the DPU is used and prior to actual operation, the unit be exercised to ensure correct indications. To exercise the unit, sequentially apply maximum and minimum differential pressure to the high pressure side for at least ten cycles.
2. Check manifold and piping for leakage by opening the block valves, one shutoff valve, and the bypass valve to pressurize the instrument. Then close the shutoff valve and bypass valve. If pointer travels upscale, leak in low pressure piping; pointer travels downscale, leak in high pressure piping.
3. Zero check the instrument. To do this, close the block valves and open the bypass valve(s). This equalizes the pressure on both sides of the instrument. If the instrument does not indicate zero, set pointer by holding pointer hub with the screwdriver and turning pointer to zero reference.
4. Check Calibration: First zero the instrument at atmospheric pressure and connect a calibration instrument such as a Meriam 35JA10 Portable Manometer to the high pressure connection of the meter. The low pressure connection is vented to atmosphere. Turn meter valves to use flowing gas pressure, or use pressure source such as Meriam 961AB2 aspirator bulb, to apply increasing pressures of 20, 50, 80 and 100 percent of full-scale differential to the HP housing. Exercise care to always approach the desired scale reading from the low D/P side; if you overshoot and drop back to the reading, your calibration will be incorrect. Reverse the procedure, bleeding pressure and stopping at the same scale readings, now taking care to always

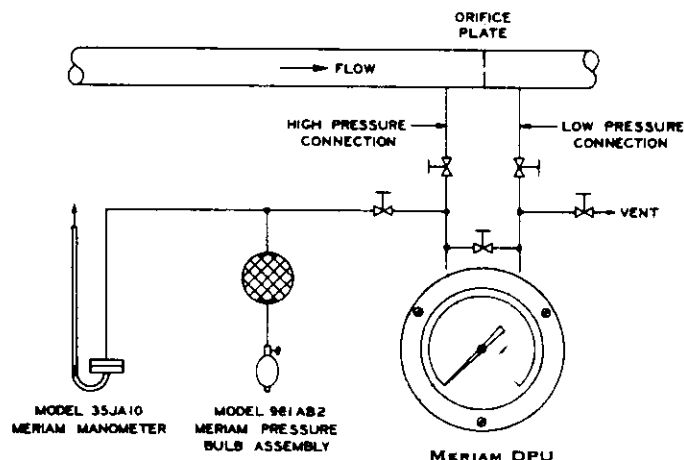
approach readings from the high D/P side. Compare DPU readings with the calibration instrument.

Inconsistent readings may be the result of the pointer dragging against the scale plate. To inspect for this condition, remove the lens as described under "Complete Calibration." The end of the pointer should be no closer to the scale plate than 1/32 inch throughout its arc of travel. If necessary, bend the pointer away from the scale by gently pulling on the outer end.

If indications are within specified tolerances, no further calibration is required.

If instrument readings are outside specified tolerances, refer to "Complete Calibration".

After instrument has been checked to read correctly, replace lid and/or glass assembly.



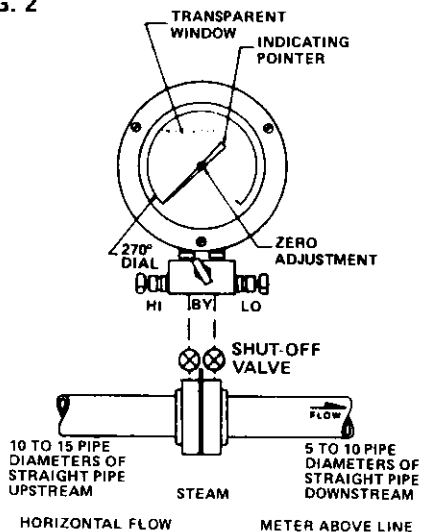
**FIG.1 Typical Schematic Arrangement For Calibration Of Bellows D/P Meter**

**CAUTION:** Although the Meriam DPU is a seamless rupture-proof bellows type instrument, care should be taken not to subject the DPU to unnecessary shock or over-range pressure during startup.

Make sure block and bypass valves are closed when beginning start-up procedures.

# METER PIPING DIAGRAMS

FIG. 2



Diagrams for typical and special installations are presented in Figures 2 through 15. The start-up procedure for each installation is presented with the respective piping diagram. Use the diagram most applicable to your specific requirement as a guide.

## STEAM



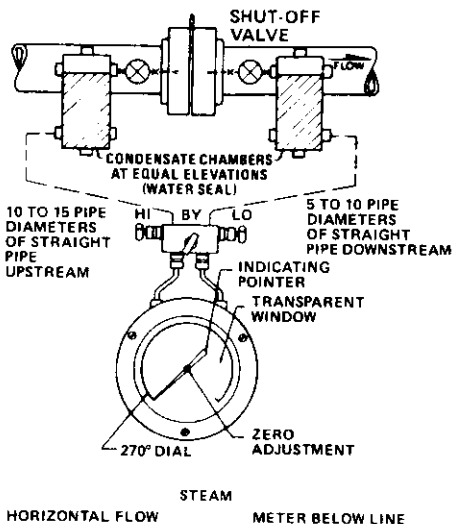
### START-UP

Recommended for use whenever possible to realize self-draining of DPU. If DPU must be located below the primary element, see Fig. 3.

**CAUTION:** Maximum DPU operating temperature is 200°F. For higher temperatures, see Fig. 4.

1. Whatever the location of the meter body, make all primary element taps at or near top of pipe.
2. Close block valves and vent valves (if used). Open bypass valve and shut-off valves.
3. Slowly and simultaneously open block valves, then close shut-off valves. Check for leaks (see #2 pg. 6).
4. Slowly and simultaneously open shut-off valves.
5. Close bypass valve for D/P reading.

FIG. 3



## STEAM



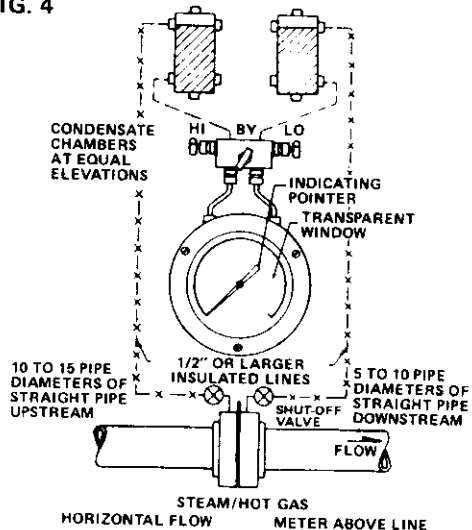
### START-UP

Used if DPU must be located below primary element.

**NOTE:** To prevent overheating during instrument blow-down, monitor the temperature by placing your hand on the pipe between the DPU and the vent valves.

1. Close shut-off valves and vent valves (if used). Open bypass valve and block valves.
2. Remove side and fill plugs from condensate chambers.
3. Fill piping and meter body chambers with water by pouring into fill port in both condensate chambers to the level of the side plugs. Meter chambers and piping must be free of bubbles. When instrument and piping are completely full, pointer will rest at zero.
4. Install plugs in ports of condensate chambers.
5. Slowly and simultaneously open shut-off valves then close. Check for leaks (see #2 pg. 6).
6. Slowly and simultaneously open shut-off valves.
7. Close bypass valve for D/P reading.

FIG. 4



## STEAM or HOT GASES

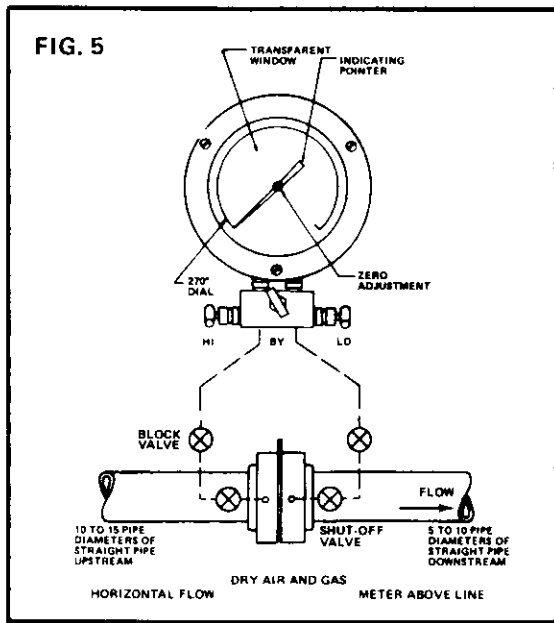


### START-UP

Recommended for use when process temperature exceeds 200°F.

See "Piping" #3 pg. 5; then follow steps in Fig. 3.

# METER PIPING DIAGRAMS (Cont.)



## GASES

### START-UP

Used if hydrates or heavy solids are present. Piping diameter not less than 1/2". Drain valves are required.

1. through 5. Follow steps in Fig. 5.
6. Drain condensate chambers of hydrates at regular intervals.

## CORROSIVE FLUIDS

### START-UP

When the flowing medium is highly corrosive, contains solids in suspension, is highly volatile, or for some other reason would damage the meter body, install liquid or chemical seals to prevent its entering the meter body.

In selecting a location for seals:

Place as close as possible to the primary element to reduce the length of piping filled with process fluid.

On high temperature applications, locate the seal at least 36" from the primary element shutoff valves to prevent overheating.

**NOTE:** When measuring liquids, locate pressure taps at or near BOTTOM of pipe. Diaphragm type seals can be used in place of condensate chambers (eliminate Steps 2 through 6).

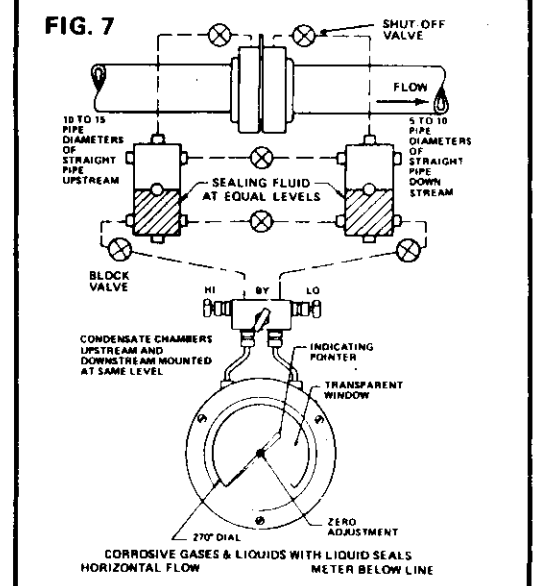
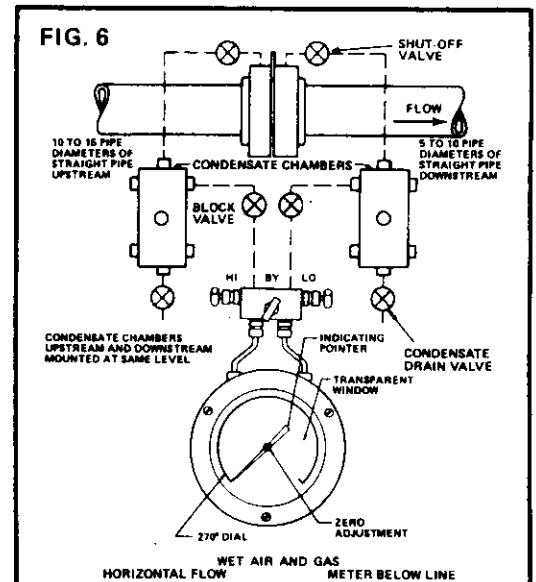
1. Close shutoff valves; open manifold valves and block valves.
2. Remove fill and side plugs from seal pots.
3. Fill seal pots, piping and meter housings with the immiscible seal fluid by pouring into upper fill ports. Meter housings, tubing and seal pots must be filled to seal pot side ports with bubble-free liquid. Pointer will indicate zero when both high and low pressure chambers are filled equally.
4. Install side plugs and close all valves.
5. Slowly open each shutoff valve alternately until bubble-free process liquid spills from upper fill port (skip this step in gas applications).
6. Replace fill plugs.
7. Check piping for leaks (see #2 pg. 6).
8. Open manifold valves and block valves, then SLOWLY open both shutoff valves simultaneously.
9. Close bypass valve for D/P reading.

## GASES

### START-UP

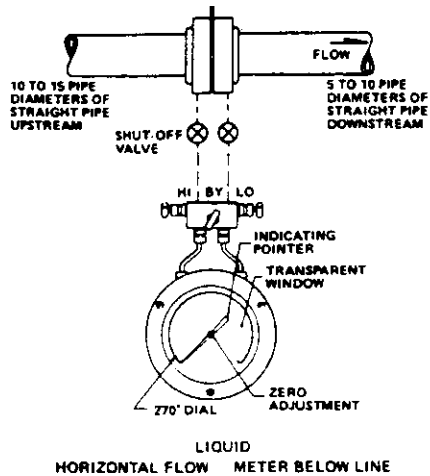
Recommended for use whenever possible, as DPU is self-draining. NOT recommended when hydrates are present. If hydrates are present, or the meter body must be located below the primary element, See Fig. 6.

1. Whatever the location of the meter body, make all primary element taps at or near the top of the pipe.
2. Open manifold valves and bypass valve, open one block valve and one shutoff valve to pressurize meter.
3. Then close block valve and bypass valve and check for leaks (see "Instrument Start-up" # 2, pg. 6).
4. Open bypass valve, open block valves and slowly open both shutoff valves simultaneously.
5. Close bypass valve for D/P reading.



## METER PIPING DIAGRAMS (Cont.)

FIG. 8



### LIQUIDS

#### START-UP

Recommended for use in all liquid flow applications, especially volatile or gassy liquids. Make all primary element taps at or near bottom of pipe.

**CAUTION:** Maximum meter operating temperature is 200°F (93°C). For higher temperature media, first see "Piping" #3, page 5. With hot or gassy fluids, disconnect meter and fill both housings and piping through manifold with process fluid cooled to below 200°F, then reconnect.

1. Open block valves, bypass valve, and one shutoff valve.
2. Alternately crack drain valves (connected to lower meter body ports) until liquid, free of bubbles, spills out both ports.
3. Close both drain valves and shutoff valve.
4. Pointer should indicate zero. If not, and no leaks are detected, the housings and/or piping are not completely full of bubble-free liquid. Repeat steps 1 through 4 until pointer remains stationary at zero.
5. Open both block valves and shutoff valves; close bypass valve for D/P reading.

### LIQUIDS

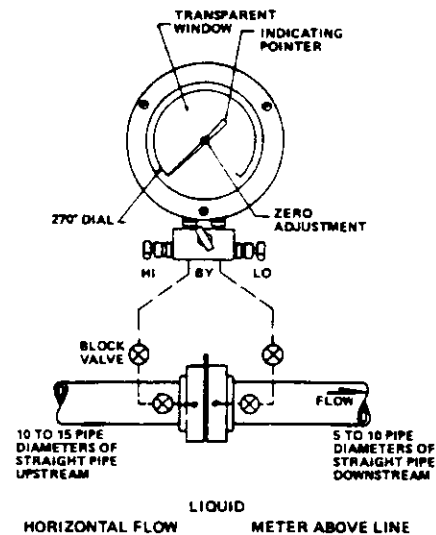
#### START-UP

Recommended for use when sediments are present or when meter cannot be mounted below line. Where sediments are NOT present, make primary element taps at or near bottom of pipe. Periodically inspect and clean instrument lines.

**NOTE:** Where process fluid is gassy or system is subject to numerous no-flow conditions and meter cannot be mounted below line, install automatic air bleed fittings in top meter body ports or at high point of instrument lines.

1. Open both block valves, bypass valve, and one shutoff valve.
2. Alternately crack vent valves or loosen plugs from top ports of meter body housings until liquid, free of bubbles, spills out of both upper meter body ports.
3. Close vent valves or replace plugs and close shutoff valve.
4. Pointer should indicate zero. If not, and no leaks are detected, the housings and/or piping are not completely full of bubble-free liquid. Repeat steps 1 through 4 until pointer remains stationary at zero.
5. Open both shutoff valves, close bypass valve for D/P reading.

FIG. 9



### PORTABLE METER

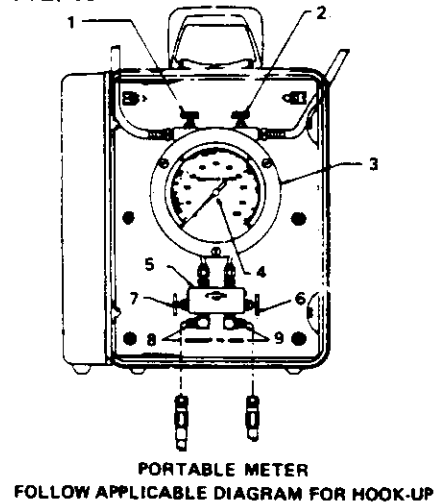
#### START-UP

**NOTE:** Hose pressure and temperature limits: Brass units — 500 psi at 160°F; Steel and SS — 3000 psi at 200°F.

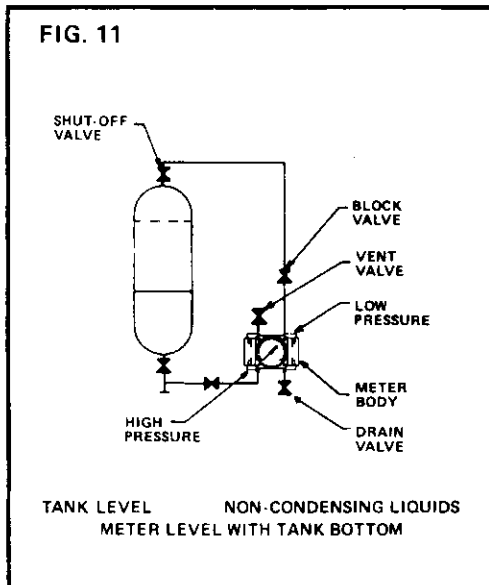
**CAUTION:** Maximum temperature of meter body is 200°F; for higher temperatures, see "Piping" #3, page 5.

1. Place instrument with dial face vertical (or horizontal in case of 1124P-4 only). Open vent valves (1 and 2). Zero pointer as necessary; remove cover and glass (3); turn screw (4) until pointer reads zero; replace glass and cover.
2. Close vent valves (1 and 2). Open bypass valve (5). Close block valves (6 and 7).
3. Connect high pressure fitting (8) to upstream primary device tap and connect low pressure fitting (9) to downstream primary device tap using hoses provided.
4. Open valves at primary device. For gas or steam measurement, go to step 7.
5. For liquid measurement, open block valves (6 and 7) and partially open vent valves (1 and 2) until all air has been expelled from instrument and hoses.
6. Close vent and block valves, keeping bypass valve open; pointer should indicate zero; if not, air is trapped in the system. Repeat step (5), opening block valves alternately until all air is removed.
7. Open block valves, close bypass valve; read pressure differential.
8. When through with test, open bypass valve, close valves at primary device, and remove hoses.
9. Open vent valves and drain instrument hoses.

FIG. 10



## METER PIPING DIAGRAMS (Cont.)



### COOL LIQUIDS

#### START-UP

Recommended for use with water, oil, or other media which will not condense in low pressure piping. For hot (volatile) liquids, see Fig. 12.

Mount meter body centerline level with lower tank reading point. If meter is mounted below lower tank reading point, install a reference leg per Fig. 9, a bubbler system per Fig. 13, a Meriam 961C4 hand pump, or order special D/P and dial range from factory.

**NOTE:** Do not share fill or vapor return lines with meter piping.

1. Close all valves; open high pressure block valve and crack high pressure vent valve.
2. Slowly open bottom (high pressure) shut-off valve. When bubble-free liquid spills from high pressure vent valve, close vent valve.
3. Open low pressure block valve; slowly open top (low pressure) shutoff valve.
4. Crack low pressure drain valve to drain any condensation and reclose.

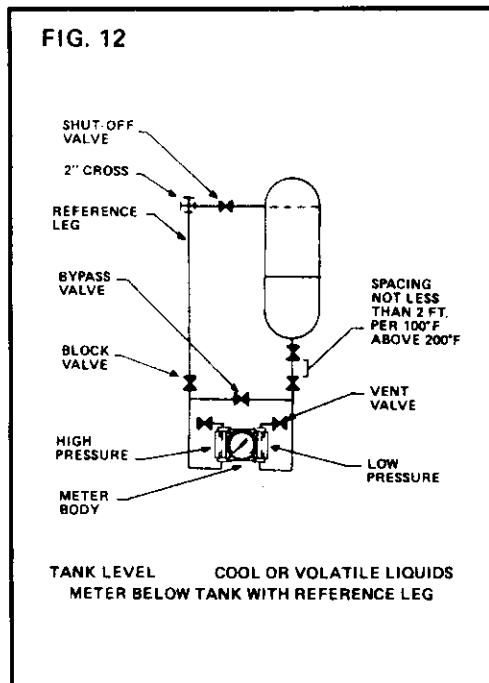
### COOL or HOT LIQUIDS

#### START-UP

Recommended for use to cancel out the "dead leg" (piping from tank bottom to centerline of meter body) when meter is mounted below tank. Process medium can be used as reference leg seal fluid if it will condense in the leg under all conditions. Otherwise, a non-miscible seal fluid must be used.

**CAUTION:** If bypass valve is opened at any time when the tank liquid level is below maximum, the reference leg must again be filled.

**NOTE:** Do not share fill or vapor return lines with meter piping.



### COOL LIQUIDS

1. Partially fill reference leg by opening bottom shutoff valve, both block valves and bypass valve.
2. Crack vent valves on meter body housings; close when clear, bubble-free liquid flows out.
3. Close bypass and block valve on reference leg.
4. Remove plug from side port in 2 inch pipe cross connection used for reference level reservoir, and fill the leg by opening block valve and cracking the bypass valve until bubble-free liquid spills out.
5. Close bypass valve. Replace plug in cross.
6. Slowly open upper shutoff valve.

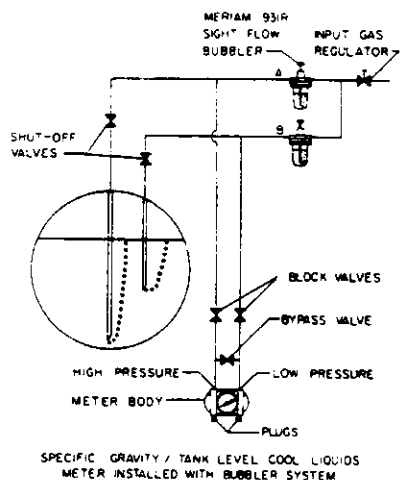
### HOT (VOLATILE) LIQUIDS

**CAUTION:** Maximum meter operating temperature is 200°F. See "Piping" #3, page 5, before proceeding.

1. Close shutoff valves; open both block valves, vent valves, and bypass valve.
2. Remove plug from top port in 2" pipe cross. Use process liquid (cooled to below 200°F) or other suitable seal fluid, and fill both high and low pressure meter housings through cross until it runs out vent valves bubble-free.
3. Close HP vent valve and bypass valve. Fill reference leg and replace plug.
4. Crack LP (bottom) shutoff valve until fluid flows bubble-free from LP vent, and reclose. AVOID danger of scalding from hot liquid.
5. Slowly open both shutoff valves.

# METER PIPING DIAGRAMS (Cont.)

FIG. 13



## COOL (NON-VOLATILE) LIQUIDS

### START-UP

**NOTE:** Do not share fill or vapor return lines with meter piping

### SPECIFIC GRAVITY

For use to determine specific gravity changes in a process medium.

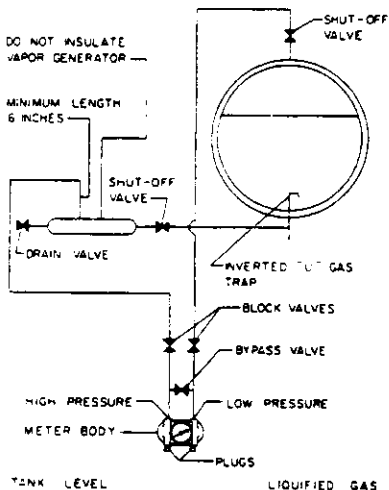
1. Set bubbler input gas regulator at a pressure slightly higher than process vessel pressure.
2. Open shutoff valves and block valves. Close bypass valve.
3. Adjust sight bubblers for equal gas flow to each tube, approximately one bubble per second. Continuous bubbling is necessary.

### LIQUID LEVEL

Recommended for use whenever solids or sludge are present, or when meter must be mounted above tank bottom.

1. Delete LP sight flow bubbler (B).
2. On a pressurized tank, pipe the LP meter housing directly to upper tank connection. On a vented tank, vent the LP meter housing to atmosphere.
3. Follow steps 1 through 3 under "Specific Gravity" above.

FIG. 14



## LIQUIFIED GASES

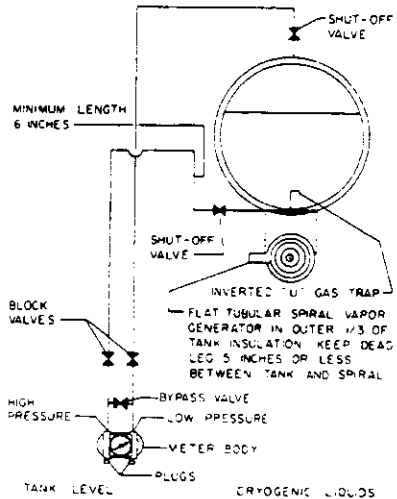
### START-UP

Recommended for use with CO<sub>2</sub>, Butane, Propane, Freon, and other liquified gases warmer than -150° F (-101° C). Meter may be mounted above or below tank.

Vapor generator is a 12-inch length of 1" to 1-1/2" diameter pipe; avoid traps or pockets between vapor generator and tank. Install inverted "U" gas trap inside tank. Do not insulate piping below lower shutoff valve. Do not share fill or vapor return lines with meter piping.

1. Close tank shutoff valves.
2. Open bypass valve, then open meter block valves.
3. Open drain valve and loosen meter housing plugs to remove all liquid from system. Replace plugs.
4. Close meter block valves.
5. Close drain valve and slowly open tank bottom shutoff valve to allow liquid to enter vapor generator.
6. Open tank upper shutoff valve.
7. Open meter block valves. Check meter zero. Close bypass valve and read tank level.

FIG. 15



## CRYOGENIC LIQUIDS

### START-UP

Recommended for use with Oxygen, Nitrogen and Argon. Meter may be mounted above or below tank. Vapor generator is a spiral of 3/8" tubing. Install an inverted "U" gas trap inside tank. Do not share fill and vapor return lines with meter piping.

**CAUTION:** Meters designed for use with Oxygen are specially cleaned and packaged, and MUST be kept clean. No organic compounds, oil, grease, dirt or scale of any kind can be tolerated in an oxygen installation.

1. Close tank shutoff valves.
2. Open bypass valve, then open meter block valves.
3. Loosen meter housing plugs to remove all liquid from system. Replace plugs.
4. Close meter block valves.
5. Slowly open tank bottom shutoff valve to allow liquid to enter vapor generator.
6. Open tank upper shutoff valve.
7. Open meter block valves. Check meter zero. Close bypass valve and read tank level.

## FINAL ADJUSTMENT

It is advisable to recheck instrument zero and to test the operation of the bypass valve after the DPU has been placed in service and fully subjected to differential pressure, line pressure, and process/ambient temperature.

**CAUTION:** Never zero check when only one block valve is shut.

Where seal pots are used, it is possible to lose or displace some of the sealing fluid. In gas flow service, a standing wave effect in the process line can displace the indicator; the displacement could be assumed to be an erroneous reading.

1. With the meter body subjected to differential pressure and in service, observe the position of the pointer on the scale and use this reading as a reference for checking the effectiveness of the bypass valve on the meter body piping manifold.

Close the H.P. meter body block valve. (Note that when checking instrument zero where seal pots are involved, the primary element shutoff valve is used instead of the meter body valve on the piping manifold). If the pointer moves from the reference position towards zero, the bypass valve on the piping

manifold is leaking and must be replaced. If the pointer remains in the reference position, the bypass valve is functioning properly.

2. Open the bypass valve on the meter body piping manifold. The pointer should go to zero on the scale. If the instrument does not indicate zero, check for gas or liquid entrapment in the lines or in the DPU (depending on the orientation of the piping layout and service). If necessary, adjust the pointer by holding the pointer hub with a screwdriver and turning the pointer to zero reference.

### 3. Adjustment of the Pulsation Dampener

**CAUTION:** Never try to remove the pulsation dampener adjusting screw. Meter body fill fluid will be lost. Serious injury can result if adjustment screw is removed with the meter under pressure.

When an increase in dampening is required, as indicated by a quivering movement of the instrument pointer, turn the damping screw clockwise until the pointer just stops its oscillation. Do not over-adjust. (See "Operating Limitations – Pulsation" pg. 3) Further damping will decrease the speed of response and introduce unnecessary time lag into the measuring system. Recheck instrument zero.

# TROUBLESHOOTING

If trouble occurs, it is recommended that the routine shown below in tabular form be followed:

TROUBLE	POSSIBLE SOURCES	MALFUNCTION	REMEDY
LOW OR NO INDICATION	<p>Primary element or differential pressure source</p> <p>Piping from primary element to meter</p> <p>Bellows unit</p> <p>Movement mechanism</p>	<p>Orifice installed backwards, or oversize.</p> <p>Flow blocked upstream from run.</p> <p>Loss of liquid in reference leg (liquid level).</p> <p>Density changes in process medium or reference leg.</p> <p>Pressure tap holes plugged.</p> <p>Piping plugged</p> <p>Bypass valve open or leaking.</p> <p>Liquids or gases trapped in piping.</p> <p>Block or shutoff valves closed.</p> <p>Piping leaks, high pressure side.</p> <p>End housings filled up with solids restricting bellows movement.</p> <p>Gas trapped in housing in liquid service or liquid trapped in housing in gas service.</p> <p>High pressure housing gasket leaks.</p> <p>Meter body tampered with.</p> <p>Loose linkage arms or movement.</p> <p>Out of calibration.</p> <p>Corrosion or dirt in mechanism.</p> <p>Pointer loose.</p>	<p>Replace orifice, or install properly.</p> <p>Clean out run or open valve.</p> <p>Refill reference leg.</p> <p>Refill reference leg with liquid of same density as process medium.</p> <p>Clean out piping.</p> <p>Clean out piping.</p> <p>Close bypass valve(s) or replace.</p> <p>Vent piping.</p> <p>Open block or shutoff valves.</p> <p>Repair leaks.</p> <p>Clean out housing.</p> <p>Vent or drain housing.</p> <p>Replace gasket.</p> <p>Return bellows unit assembly for repairs.</p> <p>Tighten or replace.</p> <p>Recalibrate.</p> <p>Clean or replace.</p> <p>Tighten or replace.</p>
HIGH INDICATION	<p>Primary element</p> <p>Piping from primary element to meter</p> <p>Bellows unit</p> <p>Movement mechanism</p>	<p>Orifice partially restricted or too small.</p> <p>Leak in low pressure piping.</p> <p>Incorrect hook-up for tank level indication.</p> <p>Gas trapped in low pressure housing in liquid service or liquid trapped in high pressure housing in gas service.</p> <p>Low-pressure housing gasket leaks.</p> <p>Range spring broken.</p> <p>Meter body tampered with.</p> <p>Loose linkage arms or movement.</p> <p>Out of calibration.</p>	<p>Clean out or replace.</p> <p>Repair.</p> <p>See "Meter Piping Diagrams" and "Final Adjustment".</p> <p>Vent or drain housing.</p> <p>Replace gasket.</p> <p>Replace range spring.</p> <p>Return bellows unit assembly for repair.</p> <p>Repair or replace.</p> <p>Recalibrate.</p>
ERRATIC INDICATION	<p>Primary element</p> <p>Piping from primary element to meter</p> <p>Bellows unit</p> <p>Mechanism</p>	<p>Flow pulsating.</p> <p>Liquid trapped in gas piping or gas bubble in liquid piping.</p> <p>Vapor generator incorrectly installed.</p> <p>Reference leg gassy or liquid vaporizing.</p> <p>Obstructed bellows travel.</p> <p>Gas trapped in high-pressure or low-pressure housing.</p> <p>Loose range spring.</p> <p>Movement dragging or dirty.</p> <p>Pointer dragging on scale plate.</p>	<p>Adjust pulsation dampener.</p> <p>Remove (See startup instructions).</p> <p>Repipe.</p> <p>See piping instructions and diagrams.</p> <p>See "Meter Body Inspection and Cleaning".</p> <p>Remove (See "Meter Piping Diagrams").</p> <p>Tighten and adjust (See "Range Changes").</p> <p>Adjust and clean.</p> <p>Adjust.</p>

If you have any questions not answered in this chart, contact your local Meriam Representative, or the factory direct.

# MAINTENANCE

Periodic inspection and cleaning of the DPU is standard recommended practice. Recalibration, unless required because of a defective component or workmanship, is also considered a normal maintenance function.

## REMOVING THE METER BODY FROM SERVICE

1. Close the H.P. primary element shutoff valve.
2. Open bypass valve in the line between the seals (where applicable).
3. Close the low pressure primary element shutoff valve.
4. Close the high pressure meter body shutoff valve on the piping manifold.
5. Open the bypass valve on the piping manifold.
6. Close the low pressure meter body shutoff valve on the piping manifold.

## METER BODY INSPECTION AND CLEANING TOOLS

Tool	Purpose
1. Allen wrench, 1/8 in	To remove mounting bracket
2. Small screwdriver	Calibration adjustment
3. Medium screwdriver	Bezel (case lid)
4. Allen wrench, 5/64 in.	For Model 1123 (case lid and dial)
5. Allen wrench, 3/32 in.	Calibration adjustment
6. Allen wrench, 1/4 in.	Housing bolts
7. Soft bristle brush	To clean bellows
8. A 3-, 4-1/2-, or 6-in. dial, as applicable with the center cut out, showing only the numbers and graduations	Calibration
9. Manometer or sensitive test gauge	Calibration

## METER BODY INSPECTION AND CLEANING

When instruments are used in services where solids or semi-solids can accumulate, the meter body housing and bellows will require periodic inspection and cleaning. This can be performed as follows:

1. Remove meter from service and remove housing bolts.
2. Carefully and slowly remove end housings. If accumulation of material is extensive, removing the housings too rapidly can damage bellows convolutions.
3. Use a solvent, if possible, to remove accumulations from between bellows convolutions and end housings. A soft bristle brush can also be used.

**CAUTION:** Do not use a sharp instrument between the convolutions.

4. After cleaning, check condition of range springs and bellows.
5. Replace end housings (new gaskets are recommended). Lubricate housings bolt threads, and secure housings. Torque end housing bolts as follows:
  - 10 ft.-lbs. for 5/16" bolt (3000 PSIG & below SWP)
  - 50 ft.-lbs. for 1/2" bolt (above 3000 PSIG SWP)

## RANGE CHANGES

1. There is ample adjustment in the indicator linkage and movement for a range change of  $\pm 5\%$  of the full range of the instrument.
2. Bellows assemblies with ranges from 0-30 in. W.C. to 0-139 in. W.C. range cannot be changed in the field. (Range springs are internal to the bellows.)
3. Bellows assemblies available in ranges from 0-140 in. W.C. to 0-60 PSID may be changed by changing only the range spring, providing the new range as confined between 0-140 in. W.C. and 0-60 PSID.
4. Bellows assemblies available in ranges from 0-61 PSID to 0-500 PSID may be changed by changing only the range spring, providing the new range as confined between 0-61 PSID and 0-500 PSID.
5. Calibration range of your DPU was carefully set at the factory; follow this procedure to maintain the original settings while changing the range spring. Zero the DPU, then remove the LP housing, range spring lock nut, and four retaining screws.
6. Unscrew the old range spring assembly and carefully thread the replacement assembly onto the bellows fitting. Occasionally pressing the range spring ring against its seat on the bellows isolation ring (see pg. 17 for part identification), thread the spring assembly to where, when the spring ring is against the bellows ring, the pointer indicates zero.
7. Rotate the spring assembly to align with screw holes in ring, add and tighten spring assembly lock nut, and replace four retaining screws.
8. Adjust pointer as necessary, and check calibration (see #4, pg. 6).

## REPLACING BELLOWS UNIT ASSEMBLY

When removing mounting bracket, **do not loosen the fill plug**, which is located in the top of the bellows unit assembly. If plug is loosened, the bellows fill fluid will be lost, and the instrument warranty will be void. To replace the bellows unit assembly:

1. Remove instrument from service.
2. Remove indicator lid, glass, pointer and scale plate.
3. Loosen drive arm screw, and slip drive arm rod off the bearing shaft.
4. Remove movement mounting screws, and lift movement assembly, drive arm, and linkage from the indicator case.
5. Remove the screws securing the case to the meter body and remove case from meter body.
6. Remove end housing bolts and the end housings.
7. Carefully unpack replacement bellows unit assembly and O-rings. To reassemble, follow steps 1 through 6 in reverse.
8. After assembly, calibrate the instrument in accordance with the procedure outlined.

## MAINTENANCE (Cont.)

### COMPLETE CALIBRATION

Normally, to restore an instrument to factory set tolerances, only a calibration check is required per #4 page 6.

Complete calibration may be required when the differential range has been changed, or when the meter body assembly has been replaced.

If a calibration check shows an indicator to be out of tolerance or if a complete calibration is required, remove the cover glass scale plate and pointer.

For the Model 1123, remove the cover glass, pointer and scale as follows:

1. Remove exterior face lid.
2. Remove cover glass and cover glass gasket.
3. Carefully remove pointer.
4. Using a 5/64 in. Allen wrench, remove scale retaining screws and scale.

For Series 1120 and 1220 (4½" & 6" only) remove lid, pointer and scale as follows:

1. Loosen the three lid screws and remove the face lid.
2. Carefully remove the pointer.
3. Use a 3/32 in. Allen wrench to remove dial mounting screws and scale.

At this point, the movement and all calibration adjustments will be accessible.

1. Vent low-pressure connection of meter body to atmosphere by removing the pipe plug.
2. Connect standard pressure source to high-pressure connection.
3. Apply 100 percent of full-scale differential pressure to high-pressure connection and release, to exercise bellows. Repeat exercise twice.
4. Check instrument to make sure there is no excessive play in pivots, that pivots are free of dirt, and that there are no loose screws or nuts.
5. Set movement; if movement is not clean, immerse in cleaning solution. Align movement in case by projecting a line through top left and bottom right dial mounting screws (Fig. 16, points 6 and 7) and resting extreme lower edge of brass bushing in sector gear (Fig. 16, Point 5) on that imaginary line. Proper hairspring tension is obtained by disconnecting gear sector from pinion (after unfastening movement linkage arm) and unwinding the spring (counterclockwise) approximately 1 turn; engage sector to pinion and release (pinion should rest at upper spline of sector). Refasten to linkage; point 3 should be in the center of sector slot, and point 2 should be approximately .960" (for 3" and 4-1/2" indicators) or 1-3/4" (for 6" indicators) from point 1.
6. Apply 50 percent of full-scale differential pressure to the high pressure connection, with the low-pressure connection left open to atmosphere. A line drawn thru points 1 and 2A should be parallel to a line drawn thru points 3 and 4. (See Fig. 16). Alternately, a line from point 1 and 2 should be at 90° to a line from point 2 to 3. DO NOT change these angles significantly once they are set.

7. Install a calibration scale ring and set the indicating pointer at 50% of full scale.

**NOTE:** Dials graduated for tank curve or flow (i.e., square-root scale), are furnished with dots on the dial at 20%, 50% and 80% of full-scale for calibration purposes.

8. Increase pressure to 80% of maximum differential pressure. Note if pointer is fast or slow (high or low).
9. Decrease pressure to 20%. Note if pointer is fast or slow (high or low).
10. Decrease pressure to 0. Note if pointer is fast or slow (high or low).

**NOTE:** At all times that corrections are being made, pointer must be reset at 50% of range.

11. If fast at 80%, fast at 20% and above zero, adjust movement counterclockwise. If slow and below zero, rotate movement clockwise.
12. If fast at 80%, slow at 20% and below zero, move sector gear linkage (See Fig. 16, Point 2) out. If slow at 80%, fast at 20%, and above zero, move linkage in. Only very slight movements are required.
13. If indicator reads correctly at 20%, 50%, and 80% but above zero, apply more tension on the hairsprings, or adjust movement counterclockwise; if below zero, decrease tension or adjust clockwise. (Disconnect the linkage on Fig. 16 at Point 2, rotate the sector gear until clear of the pinion gear; then, by rotating the pinion gear slightly, increase or decrease the tension as needed, clockwise to increase and counterclockwise to decrease (See #5).
14. After calibration has been completed, remove pointer, calibration scale ring, and reassemble case parts. When replacing pointer, position it as close as possible to zero and make final adjustment with zero adjust pointer gear.

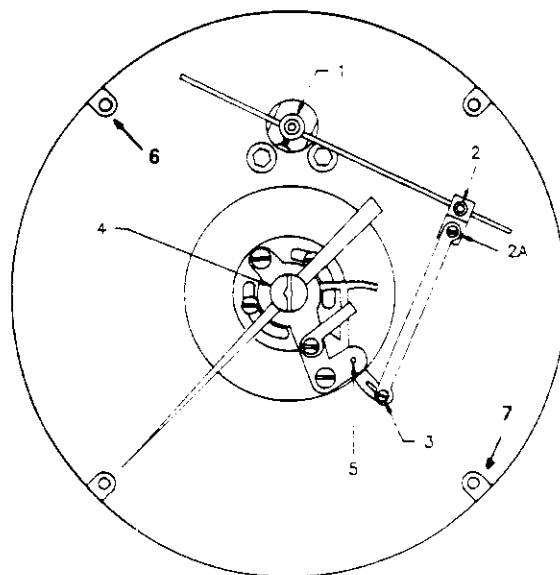


FIG. 16 INDICATOR ASSEMBLIES

## SWITCH ADJUSTMENTS

**NOTE:** Calibrate the indicator portion of Models 1224 and 1226 separately from switches and prior to adjusting switches by disconnecting Switch Linkage Arm (#42 on Parts List page 20 at Pt. #40). After adjusting switches, reconnect linkage and check calibration.

The switches used in the Meriam switch indicator are single pole double throw. Multiple Pole Double Throw is available through the use of externally-mounted relays. The set point of the individual switch is adjustable over the span of the dial from 10% increasing and 5% decreasing (or 10" W.C. and 5" W.C. respectively, whichever is greater) to 100% scale. That is, switch A or B may be set at the high or low end of the scale to open or close on increasing or decreasing rotation of the pointer.

Two circuits can be actuated at the same point under different voltage conditions by using an external relay which in turn is activated by one switch. The open - closed mode is determined by the external wiring hookup.

The set points of both switches are adjusted by removing the indicator bezel ring and lens. The switch locking screws and adjustment screws are located in the lower left hand quadrant of the dial face.

1. Unlock the switch set point location by turning the lock screws (slotted shaft) counter-clockwise; only one-half turn is needed. (See Fig. 17).
2. Apply a differential pressure across the D/P unit to indicate the desired value at which the switch is to be set.
3. Rotate the "Inc." adjustment screw next to the locking screw slowly and at the same time turn the locking screw clockwise to provide a slight friction to the adjustment screw. Continue to rotate the Inc. adjustment screw slowly until the circuit responds to the "make" or "break" of the switch.

**NOTE:** "Increase" rotation direction on dial means the set point will move up scale.

Only slight turning is needed; full-scale adjustment equals 1/3 turn.

If the pointer seems to hesitate and "jump" excessively at switch activation, check whether the switch arm linkage block (#41 on page 20) is within 1/2-3/4" of the the meter body shaft, and adjust as necessary.

4. Lock switch in place by turning the locking screw clockwise while holding the adjustment screw in place. Decrease pressure to zero and then increase pressure slowly and observe "make" or "break" point. If the set point has changed from the desired set point, repeat steps 2, 3, and 4.
5. It may be necessary to repeat the adjustment procedure two or three times to obtain a set point at the exact desired point. However, a precise non-changing set point can be achieved when the locking screw is adjusted to apply slight friction to the adjustment screw.
6. Repeat steps 2, 3 and 4 for second switch.
7. Replace bezel and lens assembly and return instrument to service.

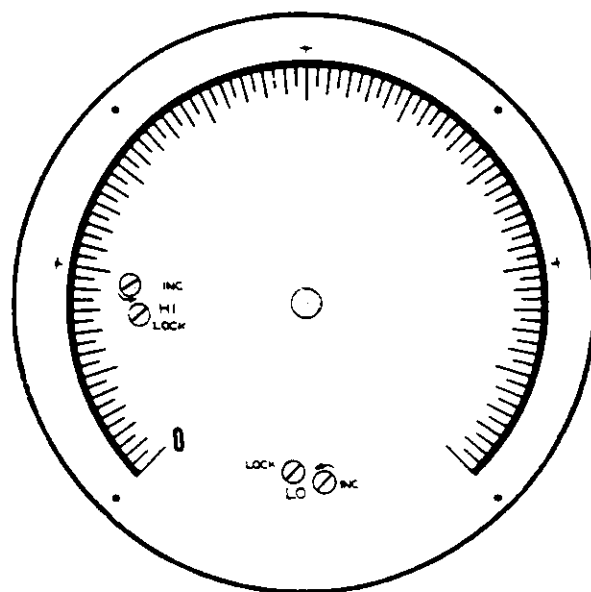


FIG. 17 SWITCH DIAL FACE

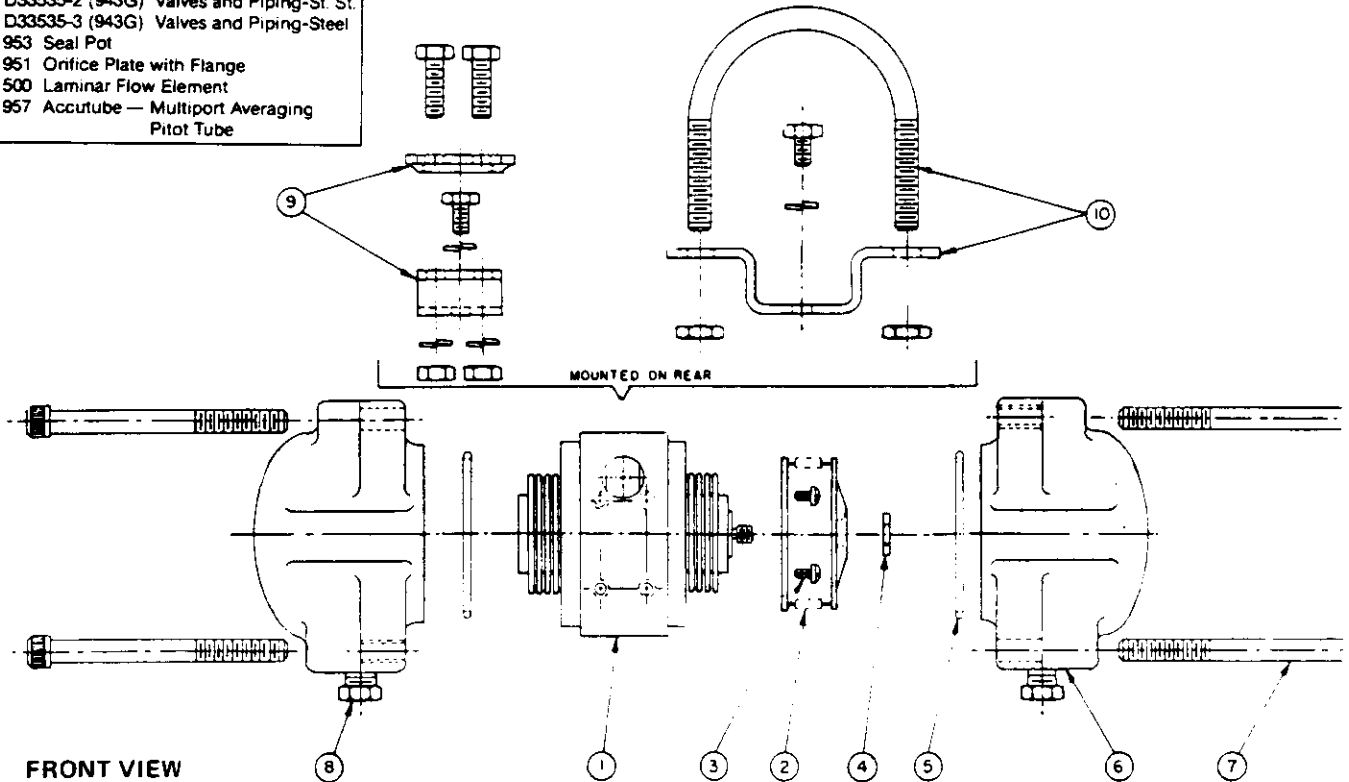
# REPLACEMENT PARTS FOR MERIAM MODEL 1020 BELLOWS DIFFERENTIAL PRESSURE UNIT

WHEN ORDERING:  
SPECIFY — QTY., PART NO., D/PU SERIAL NO., RANGE, CONSTRUCTION, SWP, MOUNTING STYLE

INDEX ITEM (1)	DESCRIPTION	QTY. REQ'D.	Brass Body PART NO.	Steel Body PART NO.	SS Body PART NO.	Monel PART NO.	NACE MR-01-75 PART NO.	
1	Bellow Unit Assy	1	CONSULT FACTORY — FILE NO 1020:110					
2	Range Spring Assy	1	CONSULT FACTORY — FILE NO 1000:413					
3	Screw Range Assy.	4	C80006-17	C80006-17	C80006-17	C80006-119	C80006-119	
4	Hex Nut, Range Spring	1	A1060-1	A1060-2	A1060-2	A1060-3	A1060-3	
*5	O-Ring, Housing Buna-N  Viton  Teflon Ethylene-Propylene Neoprene	1	A50862-1  A50862-2 (STD) A50862-3 A50862-4 A50862-5	A50862-1  A50862-2 (STD) A50862-3 A50862-4 A50862-5	A50862-1  A50862-2 (STD) A50862-3 A50862-4 A50862-5	A50862-1 (STD) A50862-2 A50862-3 A50862-4 A50862-5	A50862-1 A50862-2 A50862-3 A50862-4 A50862-5 (STD)	
6	End Housing SWP 500BR/1000BR/ 1500/3000 STL & SS SWP 6000 STL & SS	2	C-51468-4	C-51468-1 C-50645-1	C-51468-2 C-50645-2	C-51468-3 C-50645-3	C-51468-2 C-50645-2	
*7  (2)	Bolt End Housing SWP 500BR/1000BR/ 1500/3000 STL & SS  SWP 6000 STL & SS	  4 8 4	  A-50863-3 (A-50863-2)	  A-50863-3 (A-50863-1) A-50710	  A-50863-3 (A-50863-1) A-50710	  A-50863-3 (A-50863-1) A-50710	  A-51144-2 (A-51144-1) A-51150	
*8	Plug, End Housing SWP 500 to 6000 1/4" Hex Head 1/2" Sq. Head	2 2	D1560-1 D5118-4	D1560-2 D5118-2	D1560-4 D70136-8	D1560-6 D70136-17	D1560-4 D70136-8	
9	Mounting Kit Universal (STD)	1	A50505	A50505	A50505	A50505	A50505	
10	Pipe Saddle <i>Not Shown</i> Tank Hardware (Ryan Bracket) Pipe Stand		A50506  A50550 C50625	A50506  A50550 C50625	A50506  A50550 C50625	A50506  A50550 C50625	A50506  A50550 C50625	

(1) Parts are listed in correct assembly sequence.  
 (2) Part numbers in parenthesis are for end housing bolts which bolt to center plate. These bolts changed with end housings in 1985-86.  
 \*Recommended spare parts for two years of operation per 10 units. Combined with replacement parts for Model 1020 DPU. (See file no. 1020:460)

SUGGESTED ACCESSORIES
D33535-1 (943G) Valves and Piping-Brass
D33535-2 (943G) Valves and Piping-St. St.
D33535-3 (943G) Valves and Piping-Steel
953 Seal Pot
951 Orifice Plate with Flange
500 Laminar Flow Element
957 Accutube — Multipoint Averaging Pitot Tube



# REPLACEMENT PARTS FOR MERIAM 1100 SERIES BELLOWS D/P INDICATOR

WHEN ORDERING:

SPECIFY — QTY., PART NO., D/PI SERIAL NO., RANGE, CONSTRUCTION, SWP, MOUNTING STYLE

INDEX ITEM (1)	DESCRIPTION	QUANTITY REQUIRED	1123 PART NO.	1124 PART NO.	1126 PART NO.
1	Bellows D/P Unit	1	Refer to File No. 1020:460		
2	Indicator Case:				
	Bracket Mounting	1	B2038-2	C50001-1	C50046-1
	Flush Panel Mounting	1	B2038-2	C50001-2	C50046-2
3	Case Mounting Gasket	1	A50085	A50085	A50085
4	Case Mounting Screws	4	A3748-2	C80012-160	C80012-160
5	Indicator Movement	1	B51821	B51821	B51820
6	Movement Screws	2	C80002-8	C80002-8	C80002-15
7	Drive Arm Boss	1	A50419 (2)	A50038	A50038
8	Drive Arm Boss Screw	1	C80014-11	C80012-8	C80012-8
9	Drive Arm Rod	1	A50342 (2)	A50337	A50045
10	Drive Arm Screws	2	C80014-92	C80014-92	C80014-92
11	Linkage Block (1126 Only)	1	A50037	A50037	A50037
12	Movement Linkage Arm	1	A51823	A51837	A51822
13	Linkage Arm Screws	1	A3304	A3304	A3304
14	Shoulder Screw	1	A51831	A51831	A51830
15	Linkage Arm Spacer	1	A51835	A51835	A51834
16	Linkage Arm Nut	1	A51825	A51825	A51824
17	Movement Stop	1	A51203	A51203	A50479
18	Stop Movement Screw	1	C80002-13	C80002-13	C80002-13
19	Aluminum Dial:		Consult Factory File No. 1100:461		
	Standard or Special				
	Furnish Full				
	Description .....				
20	Rubber Bumper	1	A51146	A51146	A51146
*21	Dial Mounting Screws	4	C80012-1	C80012-161	C80012-161
*22	Aluminum Pointer (STD)	1	A50450-3	A50450-4	A50450-6
	Optional				
	Red Set Assy (Incl. Window)	1	A51798	A51802	A51801
	Micrometer Adjustable	1	N/A	A51180-4	A51180-6
23	Window Gasket	1	A3094	A3676-1	A51315
*24	Plexiglass Window	1	A50019	A3227	A50671
25	Screw for FF Mounting	4	N/A	C80012-40	C80012-162
26	Case Cover Bezel	1	A3154-2	B2042-2	B50038
*27	Cover Screw	3	C80000-4	C80021-8	C80021-3

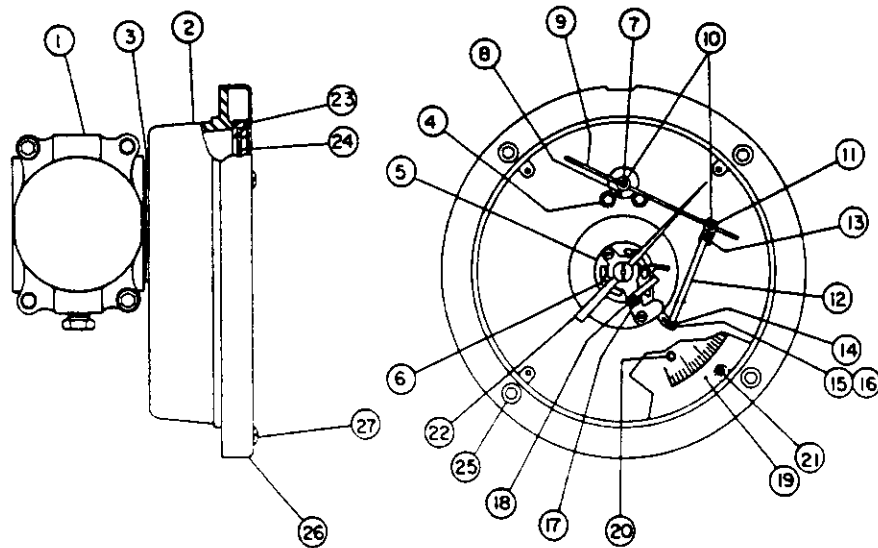
(1) Parts are listed in correct assembly sequence

(2) Drive Arm Rod and Drive Arm Boss are sold as a single assembly, P/N A50793

\* Recommended spare parts for two years operation per ten units combined with replacement parts for Model 1020 DPU. (File No. 1020:460)

### SUGGESTED ACCESSORIES

- B33535-1 (943G) Valves & Piping—Brass
- B33535-2 (943G) Valves & Piping—Stainless Steel
- B33535-3 (943G) Valves & Piping—Steel
- 953 ..... Seal Pot
- 951 ..... Orifice Plate with Flanges
- 500 ..... Laminar Flow Element
- 957 ..... Accutube Multiport Averaging Pitot Tube



# REPLACEMENT PARTS FOR MERIAM 1200 SERIES BELLOWS D/P INDICATING SWITCH

WHEN ORDERING:  
SPECIFY — QTY., PART NO., D/PI SERIAL NO., RANGE, CONSTRUCTION, SWP, MOUNTING STYLE, RATINGS

INDEX ITEM (1)	DESCRIPTION	QTY. REQ. (2)	1224 PART NO.	1226 PART NO.	1226 CSA
1	BELLOWS D/P UNIT	1	REFER TO FILE NO. 1020:460		
2	INDICATOR SWITCH CASE				
	a. BRACKET MOUNTING	1	C50057-1	C50050-1	C50050-3
	b. FLUSH PANEL MOUNTING	1	C50057-2	C50050-2	C50050-4
3	CASE MOUNTING GASKET	1	A50085	A50085	A50058
4	CASE MOUNTING SCREWS	4	C80012-160	C80012-160	C80012-160
5	BOX SPACER	1	A51330-1	A51330-1	A51330-1
6	SWITCH ASSEMBLY				
	a. SINGLE SWITCH - STANDARD	1	B50079-2	B50079-2	N/A
	b. SINGLE SWITCH CSA APPROVED	1	N/A	N/A	B50079-3
	c. DOUBLE SWITCH - STANDARD	1	B50080-2	B50080-2	N/A
	d. DOUBLE SWITCH - CSA APPROVED	1	N/A	N/A	B50080-3
	PARTS INCLUDED IN ABOVE SWITCH ASSEMBLIES:				
	7. SWITCH SUB-PLATE	1	A3541-2	A3541-2	A3541-2
	8. POST, ADJUSTABLE SWTCH PLATE AND CAM ASSEMBLY	1	A3610	A3610	A3610
	9. 1/4" LOCK WASHER	1	C80022-1	C80022-1	C80022-1
	10. ADJUSTABLE SWITCH PLATE	1 or 2	A3542-1	A3542-1	A3542-1
	11. MICROSWITCH MOUNTING POST	2 or 4	A3176	A3176	A3176
	12. MICROSWITCH POST SPACER	1 or 2	A3692	A3692	A3692
	13. INSULATING BARRIER (CSA UNITS ONLY)	1 or 2	N/A	N/A	A50508
	14. MICRO SWITCH	1 or 2	A3758	A3758	A3758
	15. SWITCH HOLDER PLATE	1 or 2	A3167	A3167	A3167
	16. SWITCH HOLDER NUT	2 or 4	C80019-1	C80019-1	C80019-1
	17. ROLLER ARM ASSEMBLY				
	a. R.H., LOW SET, SINGLE SWITCH	1	A50256	A50256	A50256
	b. L.H., HIGH SET, #2 SWITCH	OPT	A50314	A50314	A50314
	18. RETAINING RING - ADJ. SWITCH PLATE & ADJ. SCREW	2 or 3	A50229	A50229	A50229
	19. SWITCH PLATE LOCK SCREW				
	a. STANDARD	1 or 2	A3547-1	A3547-1	N/A
	b. CSA APPROVED	1 or 2	N/A	N/A	A3547-2
	20. THREADED BRAD	1 or 2	A3727	A3727	A3727
	21. SWITCH ADJUSTMENT SCREW	1 or 2	A3735	A3735	A3735
	22. ADJUSTMENT SCREW SPACER	1 or 2	A3736	A3736	A3736
	23. ADJUSTMENT SCREW TENSION SPRING	1 or 2	A3576	A3576	A3576
	24. SWITCH SUB-PLATE MOUNTING SCREW	3	C80000-152	C80000-147	C80000-147
	25. SWITCH SUB-PLATE SPACER	3	C80020-12	A50042	A50042
	26. CAM ASSEMBLY	1	A50200	A50200	A50200
	27. CAM SCREW	1	A80002-1	C80002-1	C80002-1
28	WIRING CABLE - INDICATE LENGTH IN FEET				
	a. STANDARD, SHEATHED, SINGLE SWITCH	1	B50078-1	B50078-1	N/A
	b. STANDARD, SHEATHED, DOUBLE SWITCH	1	B50079-3	B50078-3	N/A
	c. SEPARATE LEADS, CSA APPROVED				
	1. RED LEAD	1	N/A	A51043-1	A51043-1
	2. ORANGE LEAD	1	N/A	A51043-2	A51043-2
	3. BLUE LEAD	1	N/A	A51043-3	A51043-3
	d. SEPARATE LEADS, CSA APPROVED, #2 SWITCH				
	1. BROWN LEAD	1	N/A	N/A	A51043-4
	2. YELLOW LEAD	1	N/A	N/A	A51043-5
	3. VIOLET LEAD	1	N/A	N/A	A51043-6
29	RING TONGUE TERMINAL ASSEMBLY	1	N/A	N/A	A51195
30	RING TONGUE SCREW	1	N/A	N/A	C80002-27
31	WASHER	1	N/A	N/A	C80023-5
32	HEAT SHRINK TUBING	1	N/A	N/A	B900544-105AJO
33	CABLE CLAMP	1	N/A	A50515	A50515
34	CLAMP SCREW	1	N/A	C80002-24	C80002-24
35	MOVEMENT	1	B51821	B51820	B51820
36	MOVEMENT SCREWS	2	C80002-8	C80002-15	C80002-15
37	DRIVE ARM ROD	1	A50337	A50045	A50045
38	DRIVE ARM BOSS	1	A50038	A50038	A50038
39	DRIVE ARM SCREW - BOSS	1	C80012-8	C80012-8	C80012-8
40	DRIVE ARM SCREW	3	C80014-92	C80014-92	C80014-92
41	LINKAGE BLOCK	2	A50037	A50037	A50037
42	ADJUSTABLE SWITCH LINKAGE ARM	1	B50878-1	B50878-5	B50878-5
43	MOVEMENT LINKAGE ARM	1	A51837	A51822	A51822
44	LINKAGE ARM SCREW	2	A3304	A3304	A3304
45	SHOULDER SCREW	1	A51831	A51830	A51830
46	LINKAGE ARM SPACER	1	A51835	A51834	A51834
47	LINKAGE ARM NUT	1	A51825	A51824	A51824
48	MOVEMENT STOP	1	A51203	A50479	A50479
49	MOVEMENT STOP SCREW	1	C80002-13	C80002-13	C80002-13
50	ALUMINUM DIAL - FURNISH FULL DESCRIPTION	1	CONSULT FACTORY - FILE NO. 1100:461		
	a. STANDARD - INDICATE SINGLE OR DOUBLE SWITCH		CONSULT FACTORY - FILE NO. 1100:110S		
	b. SPECIAL				

(See next page for "Footnotes" and "Suggested Accessories".) □

INDEX ITEM (1)	DESCRIPTION	QTY. REQ (2)	1224 PART NO.	1226 PART NO.	1226 CSA
51	DIAL MOUNTING SCREWS	4	C80012-161	C80012-161	C80012-161
52	RUBBER BUMPER	1	A51146	A51146	A51146
53	POINTER - STANDARD	1	A50450-4	A50450-6	A50450-6
53	MICROMETER ADJUSTABLE POINTER (OPTIONAL)	1	A51180-4	A51180-6	A51180-6
53	RED SET POINTER (OPTIONAL AND IN ADDITION TO STD. OR MICRO)	1	A51802	A51801	A51801
54	WINDOW GASKET	1	A3676-1	A51615	A51615
55	WINDOW a. PLEXIGLAS - STANDARD b. SHATTERPROOF GLASS - OPTIONAL	1 1	A3227 A51920	A50671 A50672	A50671 A50672
56	SCREWS FOR FLUSH FRONT MOUNTING	4	C80012-40	C80012-162	C80012-162
57	CASE COVER (BEZEL) a. BLACK (CARBON STEEL) b. 304 STAINLESS STEEL (OPTIONAL)	1 1	B2042-2 N/A	B50038 B51635	B50038 B51635
58	WIRING COLOR CODE TAG a. SINGLE SWITCH b. DUAL SWITCH - SINGLE SWITCH TAG PLUS: c. DUAL SWITCH CSA - INGLE SWITCH TAG PLUS:	1 1 1	A50173-1 A50173-2 N/A	A50173-1 A50173-2 N/A	A50173-1 N/A A50173-3
59	COVER SCREWS a. STANDARD b. STAINLESS STEEL (USED WITH SS BEZEL)	3 3	C80021-8 N/A	C80021-3 C80021-7	C80021-3 C80021-7

(1) PARTS ARE LISTED IN THEIR CORRECT ASSEMBLY SEQUENCE

(2) WHERE TWO QUANTITIES ARE LISTED, THE LESSER QUANTITY TO SINGLE SWITCH UNITS AND THE GREATER QUANTITY TO DUAL SWITCH UNITS.

\*RECOMMENDED SPARE PARTS FOR TWO YEARS OF OPERATION (PER 10 UNITS). COMBINE WITH REPLACEMENT PARTS FOR MODEL 1020 DPU. (SEE FILE NO. 1020:460)

B33535-1  
B33535-2  
B33535-3  
953  
951  
500  
957

**SUGGESTED ACCESSORIES**

(943G) VALVES&PIPING - BRASS  
(943G) VALVES&PIPING - ST STEEL  
(943G) VALVES&PIPING - STEEL  
SEAL POT  
ORIFICE PLATE WITH FLANGE  
LAMINAR FLOW ELEMENT  
ACCUTUBE -MULTIPOINT AVERAGING  
PITOT TUBE

