

M105
Rev. A
Type S Flowmeters:
1" with 800 Series Registers

Operating and Maintenance Manual for **neptune** Type S Flowmeters

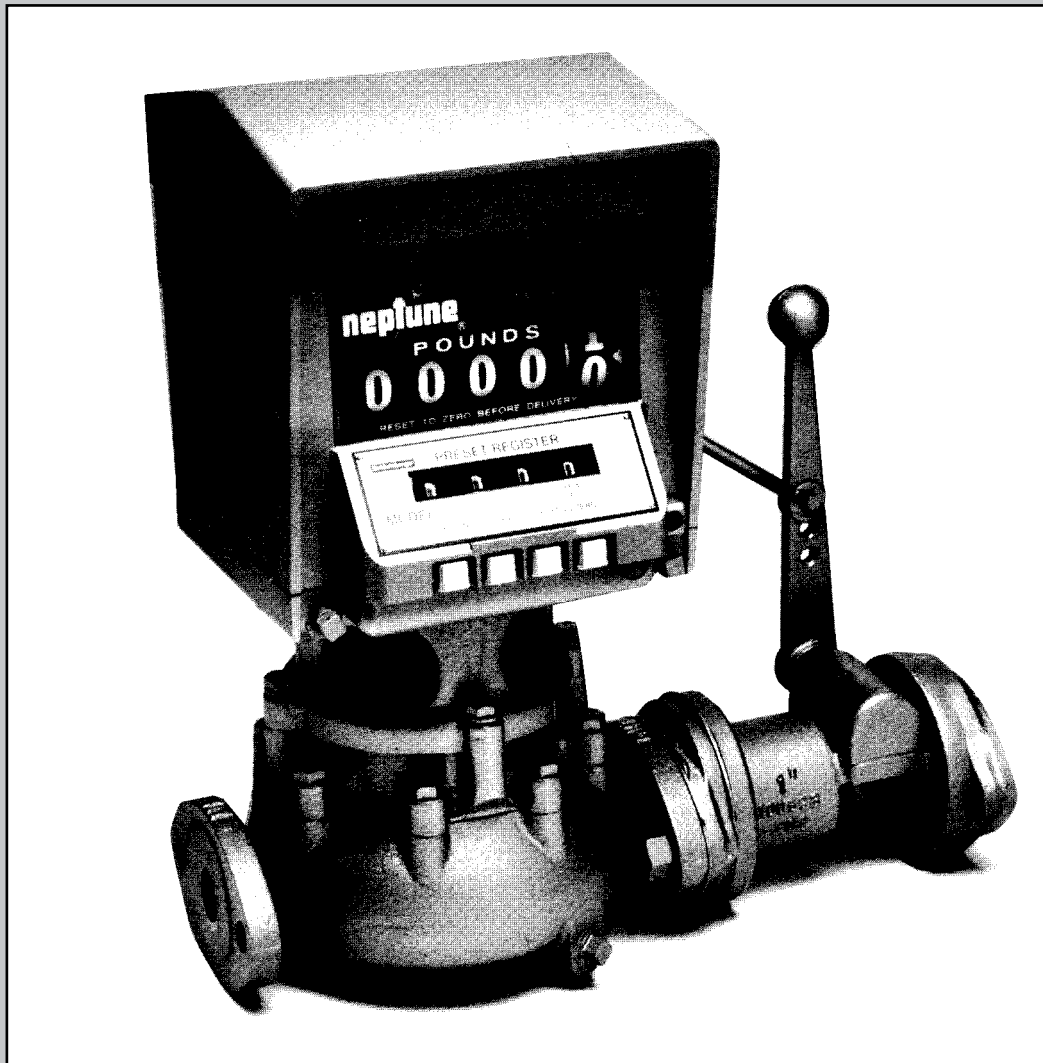


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INSTALLATION

For correct installation of Actaris Flowmeters the experience of Actaris is always available for your assistance. Do not hesitate to call the nearest authorized Actaris distributor.

Plan the installation in such a way as to allow the strainer to be coupled directly to the inlet of the flowmeter. Where this is not possible, any piping between these units should be thoroughly cleaned out.

Be careful to allow room for easy removal of the strainer basket.

Air releases cannot be supplied for all liquids, but where an air release valve is used, it should be installed in a position as close as possible to the inlet of the flowmeter. This will insure the removal of the greatest possible amount of air from the liquid before metering.

Use pipe cement or tape on male threads only.

On Open-Ended Systems, the piping on the outlet side of the flowmeter should rise above the height of the flowmeter in order to prevent draining flowmeter. Where a trap is not possible, an anti-drain valve is recommended.

Experience has shown the need for a valve bypass connection to be installed around the flowmeter. This arrangement permits product flow in the event that the flowmeter must be removed for repair.

Where an air release valve is used, the vent pipe should be 3/4" inside diameter pipe or tubing. Care should be taken to prevent any possible obstruction to the free flow of air in this line. This line should be connected to a drip collecting tank or returned to liquid supply tank.

The connecting piping should be firmly secured to prevent strain on the flowmeter casing. Provide for expansion or contraction of long runs of piping due to temperature changes, with self aligning couplings, or expansion joints.

All piping on the inlet side of the flowmeter should be very thoroughly cleaned out. Whenever possible, place a spool in the place of the flowmeter and flush out all lines thoroughly before the flowmeter is installed. The majority of service calls on new installations would be eliminated if these directions were followed.

Inlet and outlet are clearly marked; do not install backwards.

On Preset Models, the bottom of the valve is below the base of the flowmeter. It is, therefore, necessary to install spacers underneath the flowmeter base when mounting the entire assembly on a platform support. Provide space for the removal of valve bonnet and internal parts on underside of valve. Operating valve handle must have sufficient clearance to be easily opened.

To change the direction in which the register will face with respect to the pipe, see "To Rotate Register."

Open line valves slowly to provide gradual filling of the flowmeter and to prevent overspeeding with air. Pass sufficient liquid to clear the lines of air. Check the rate of flow. It should not exceed the rated capacity of the flowmeter.

On pump systems, set the bypass of the pump so that the maximum pressure at no time exceeds 125 psi. When the installation is completed, check that the shock pressure (the pressure as the shut-off or Preset Valve is closed) at the flowmeter to ensure it does not exceed 125 psi. The pressure may be checked by installing a pressure gauge at the inlet of the flowmeter. Do not try to increase the flow through undersize pipes and fittings by means of excessive pressures, as this will result in leaking gaskets and collapsed air release floats when air release equipment is used.

Temperature of the liquid should not exceed that specified for the flowmeter.

Test the flowmeter as per instructions herein. All flowmeters are carefully calibrated and tested at the factory, and no adjustment should be necessary. Instructions for correcting the calibration, if the registration appears to be inaccurate, are contained elsewhere in this manual.

INSTALLATION

Before Installing The Flowmeter

Piping

Air Vent Line

When Installing

After Installing

OPERATION

When the installation is still new, the strainer should be cleaned very frequently. After the system has had a chance to be thoroughly washed out, periodic cleaning is recommended.

1. Reset the register to zero by turning operating knob to the rear stop. On Printer models, first insert ticket.
2. On Preset models, set the Preset wheels to the desired quantity.
3. Start pump-Open Preset Valved (or other delivery valve is Preset Valve is not used).
4. After completing delivery on Printer models, stamp final reading on ticket by turning operating knob to the front stop and remove ticket.

The cumulative totalizer is visible through the mask at the upper right-hand corner of the register.

Press the setting buttons inward until the desired quantity is noted on the Preset wheels.

Pushing the red emergency stop button will trip the valve. After it has been used either the delivery may be completed automatically as originally set by re-opening the valve, or the mechanism may be set for a new figure. The accuracy of delivery in either case is not affected.

To insert a ticket be sure that the operating knob is turned to its forward stop. Then depress the Dust Bar and insert the ticket in the ticket slot under it, "face-down, bottom end first" as noted on the instruction plate. Turn the operating knob to its rear stop. This resets the visible wheels to zero, locks the ticket in place, and prints the initial reading on the ticket.

OPERATION

Cleaning the Strainer

To Operate the Flowmeter

Totalizer

To Set the Preset Mechanism

Emergency Stop

To Insert and Remove the Tickets

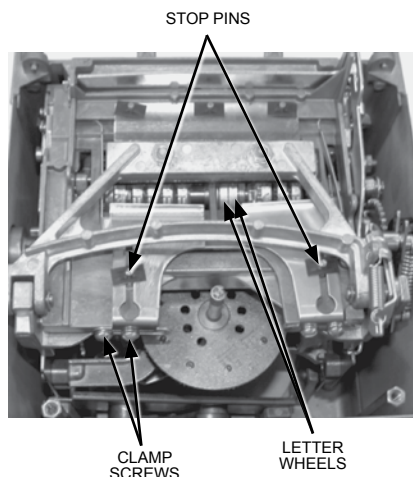
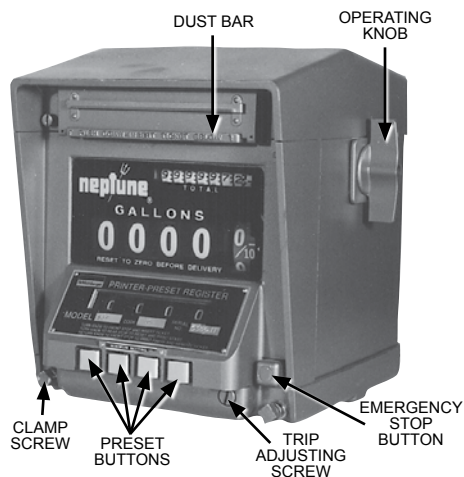


Figure 1

Preset 800 Series Printer Register

Figure 2

Print Unit Adjustments

It is now impossible to remove the ticket without tearing it.

Upon completion of delivery, turn the operating knob to its forward stop. This operation prints the final reading and releases the ticket.

The Printer Registers are shipped from the factory with the ticket guides properly adjusted. If for any reason it is necessary to reposition the ticket, proceed as follows:

1. Remove top cover.
2. Insert a ticket into the printer. Loosen the clamp screws on the rear of the ticket guides. Move the guides to the right or left as required. Tighten clamp screws. The ticket must slide freely between the guides.

If the ticket binds at the forward end of the guide, remove the guide and rebend the tail.

3. Replace the top cover and reseal.

To Adjust Ticket Guides

CALIBRATION

When testing flowmeters having registers reading in pounds the testing should be done with reliable scales which will hold 400 or more pounds of product plus the container. A flowmeter actually measures volume, and the weight per given volume of product changes with a change in temperature. Therefore, it is necessary to test this type of flowmeter with the product passing through the flowmeter at the normal operating temperature.

It is advisable to calibrate all flowmeters measuring viscous liquids by weight since it is difficult to properly drain these liquids from volumetric type test measures.

When checking the calibration of the flowmeter, use a calibrated test measure of sufficient size that the flowmeter will operate at normal flow rate for at least one (1) minute. For checking this flowmeter, use a 50 or 100 gallon volumetric test measure of approved design (a container with a conical upper portion terminating in a long narrow neck that is fitted with a slight gauge).

Erratic registration is an indication of trouble in the system and is usually caused by air or dirt in the measuring chamber. Do not try to correct this by recalibrating the flowmeter, but first check for the presence of air in the line; then if the trouble has not been found, clean the flowmeter as directed.

Over-registration is an indication of air, whereas under-registration is generally caused by dirt or pipe scale in the measuring chamber, by the liquid bypassing the flowmeter in some manner, or by a damaged or worn internal mechanism.

Consistent over-registration or under-registration indicates need for recalibration. See Form TSG-310 for recalibration procedures. These forms can be obtained from your nearest Actaris distributor, or contact Actaris Metering Systems, 1310 Emerald Road, Greenwood, SC 29646.

REGISTER MAINTENANCE

Register Parts are such that only minor field repairs are advisable. When a register is in need of extensive service or repair other than that for which instruction is given here, it is recommended that the register be returned to the nearest Actaris distributor for repair. If a replacement register is needed, be sure to specify the exact model of the register replaced as well as the change gears in the register.

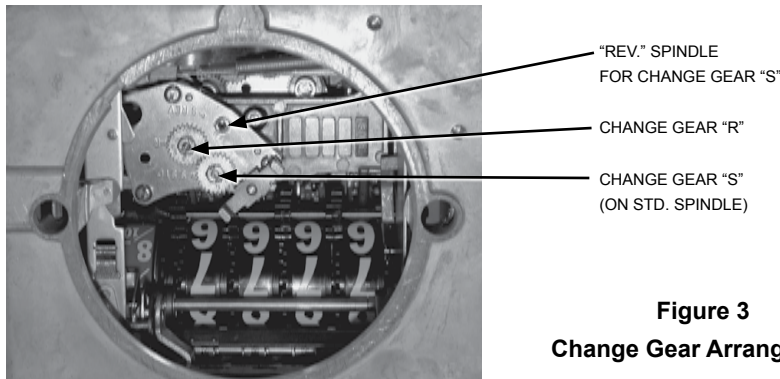


Figure 3
Change Gear Arrangement

800 SERIES REGISTER

Loosen the two clamp screws on lower front of the register. Lift the register off. On auto-Stop models the valve linkage must first be disconnected. (*Remove cotter pin and washer at valve end.*)

When one register is removed and another substituted, (1) Check the number of teeth on the change gears (*Figure 3*). They must be the same as the gears on the old register **and on the same respective spindles**. The number of teeth is stamped on each gear. To remove these gears, close the split end of the spindle with a pair of pliers and pull off the gear. After putting on a gear, spread the end of the spindle slightly. (2) Make sure that the position of the "Gear shifter" is the same on the new register as on the old one. Each hole is lettered for convenience.

NOTE: Type S meters supplied since 1990 do not utilize the gear shifter mechanism.

CALIBRATION

Flowmeters Reading In Pounds

REGISTER MAINTENANCE

800 SERIES REGISTER

To Remove Register From Flowmeter

Register masks are made of plastic and require special treatment. Instructions for cleaning are given below:

If the mask becomes soiled with grease and oil, solvents for these substances, such as kerosene or naphtha, may be used to remove dirt. However, sprays that are commonly employed in cleaning glass windshields must not be used as cleaners.

A water solution of nonabrasive soap is recommended for washing grease, oil or dirt from the mask. It is then cleaned by rubbing gently with a soft cloth, in a manner similar to cleaning window glass; rinsing the mask in clean water, and finally drying.

Scouring cleanser and similar material must not be used in cleaning the mask since they contain abrasives that scratch the surface.

The use of solvents, such as acetone, ethyl acetate, benzene and ethylene dichloride to brighten the surface of the mask is never recommended since these substances soften the surface of the plastic.

Note: large magnetic drive assembly accompanies 800 series register.

To Clean Register Mask

View Looking at Back of Register

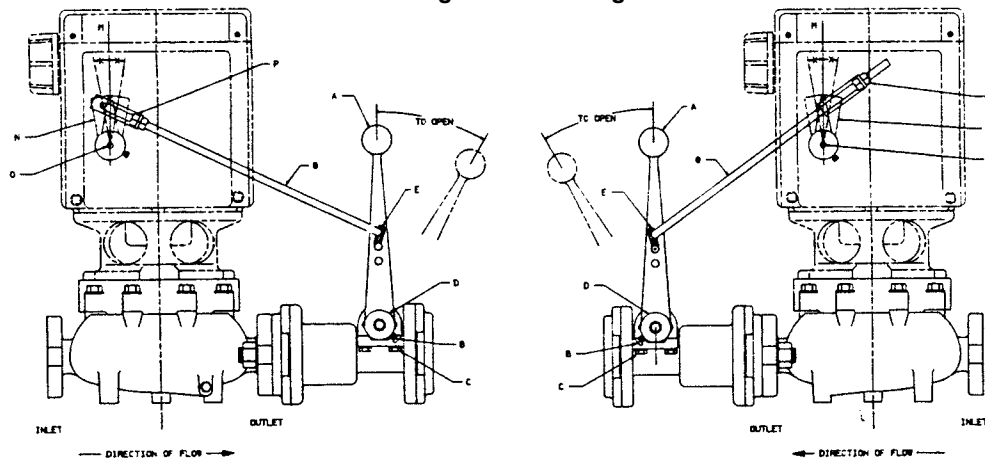


Figure 4

Left-Hand Assembly

Right-Hand Assembly

TO ROTATE REGISTER

When the flowmeter is assembled as a Left Hand assembly and it is desired to change it to a Right Hand assembly, or vice versa, proceed as follows:

1. Remove cotter pins (E) from valve linkage.
2. Unscrew the outside register link lock nut (P) and remove connecting rod (G).
3. Remove register link (N), rotate 1/2 turn and reassemble onto register as described in appropriate valve adjustment instructions. (Page 5)
4. Loosen two clamp screws on lower front of register, lift register up and turn register 180°.
5. Remove four handle housing assembly hex screws (C) and remove handle housing assembly from valve.
6. Remove valve handle set screw (B) and slide handle off bushing. Remove two cam retaining screws (*not shown*). Remove shaft seal plug (D). Disassemble valve operating shaft and valve operating cam. Reassemble valve operating shaft and install valve operating cam in the reverse direction. Reinstall two cam retaining screws and shaft seal plug. Reinstall housing assembly with valve operating cam acting on pilot rod. Secure with four hex screws (C). Reassemble valve handle (A) on knurled knob in position as shown for specific assembly.

After completing the above instructions, the valve linkage must be adjusted in accordance with the procedure for the specific type valve as outlined on page 5.

To Rotate the Register

1" TYPE S FLOWMETER AUTO STOP VALVE ADJUSTMENT

Note: Before any adjustment of the Double Trip or Single Trip Auto-Stop Valve is made, be sure that the Auto-Stop setting wheels indicate a quantity, other than zero, to insure that the trip mechanism of the register is in proper position.

To Adjust Valve Linkage With Valve At Outlet of Flowmeter

1. Depress the emergency stop button on the register and turn the shaft (O) clockwise (as viewed from rear of register.)
2. Assemble register arm (N) on knurled knob in position as shown for specific assembly. (Figure 5) Arm should move an equal distance each side of vertical center line (M) (Angle $x=x$).
3. Assemble one nut (P) on connecting rod (G) and the other end of the connecting rod to the center hole in handle (A) using washers and cotter pins (E).
4. Open valve all the way. Turn shaft (O) counter clockwise to latch up mechanism. With valve held open, tighten nut (P) against register arm link. Then assemble and tighten second nut at (P).
5. Depress the emergency stop button and allow the valve to close. At this point the linkage between the valve and the register must be free. If it is not, the above adjustments must be rechecked.
6. Set the register to deliver the minimum quantity and open the valve to run product through the flowmeter.
7. After the initial trip occurs the valve should close to the intermediate flow position. This rate will vary depending on product metered. If the valve closes too far, or all the way, adjust nuts (P) to provide additional rod length.
8. It is sometimes necessary to change the position of the handle. This can be done by loosening handle screw (B) and repositioning the handle as follows: If the register mechanism will not latch up, position the handle further toward the register. If the valve will not close, the handle may be positioned away from the register. Fine adjustments may be made by changing the effective length of connecting rod (G) utilizing nuts (P). The rod length (G) may also be varied by positioning the end of the rod in the upper or lower holes in the valve handle.

View Looking at Back of Register

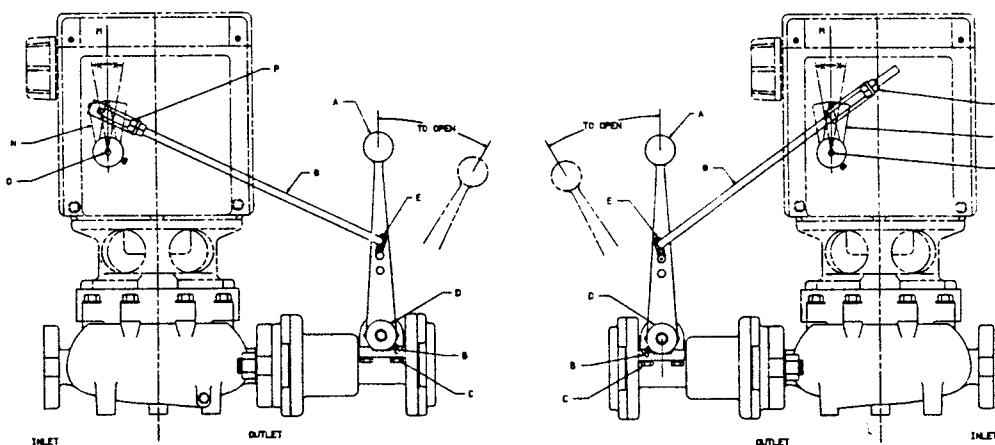


Figure 5

Left-Hand Assembly

Right-Hand Assembly

MEASURING CHAMBER

This operation is not difficult and may be performed by any competent mechanic. No special tools are required. No trouble need be expected if these few simple, but important directions are followed. Do not open the flowmeter until you have checked over all other possible causes of erratic registration.

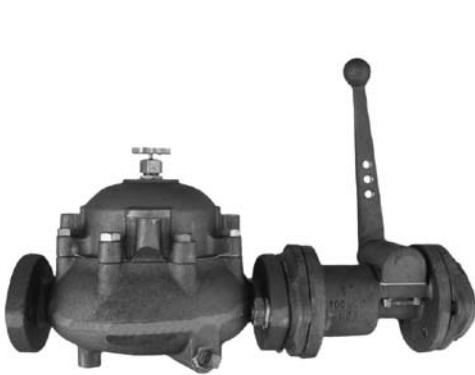


Figure 6
Meter Assembled



Figure 7
Meter Disassembled

1. Prepare a clean surface on which to place the parts as they are removed. The parts, though sturdy, are machined to close tolerance and should be handled with care. Have a replacement gasket ready before opening the flowmeter.
 2. Remove the register.
 3. Remove the flowmeter cover, taking care not to injure the gasket.
 4. Remove the measuring chamber from the flowmeter casing. If the chamber sticks, it may be necessary to tap maincase to free it - insert maincase bolts in holes and hit head of bolt while pulling upward on chamber. Remove thrust roller bearing plate.
 5. Remove the upper half of the chamber. Be careful not to scratch or nick any part of the chamber.
 6. Lift out the disc piston by its spindle.
 7. The chamber is now completely disassembled. The parts may be most easily cleaned of scale, etc., by means of a good, coarse, stiff bristle (not wire) brush and gasoline or suitable cleaning agent. All foreign matter may be removed in this manner. Do not use abrasives, such as emery cloth or sandpaper.
1. Clean the joints where the two chamber halves fit together.
 2. Check that the thrust roller rotates freely in the disc position.
 3. Assemble the disc piston into the lower chamber half, aligning the slot in the former with the diaphragm in the chamber half. The disc piston cannot be dropped into the chamber vertically but must be assembled at a right angle.
 4. Assemble the upper chamber half to the lower. The diaphragm must fit into its slot in the upper half. The upper and lower halves should then snap together.
 5. Insert the thrust roller (bearing) insert. The thrust roller must not be in the path of the plate or either part may become damaged. Never use a hammer to insert.
 6. Operate the disc position slowly; it should move freely without any "catch." If it does not, check that the upper and lower chamber halves are fitted tightly together. If they are, then the fault lies within the chamber and it must be disassembled to check for foreign matter or burrs.
 7. Clean out the casing.
 8. Lift the chamber by the piston spindle and lower it into position in the main casing. The top

MEASURING CHAMBER

To Remove and Disassemble

To Reassemble Chamber in the Flowmeter

of the chamber should be level with the gasket seat. If it is not, pressing by hand should do so.

9. When replacing the cover, first inspect the gasket and then set the arm of the gear train so that it will not come down on the piston spindle.
10. Make sure that the cover is down on its seat before tightening the bolts.

Leakage just below the register is the sign of leaking stuffing box.

Remove the register and register adapter. If tightening the stuffing box nut by the fingers does not stop the leak, replace with a newly packed nut. It may also be necessary to replace the spindle. These nuts are carefully packed and the hole machine-reamed to the size of the spindle at the factory. Do not try to repack because hand-packed nuts cause excessive friction and scoring of the spindle.

1. Remove the register and register adapter.
2. Remove star connection (from flowmeter spindle) using a No. 8 Allen Wrench.
3. Remove the flowmeter cover with gear train assembly attached. Keep dirt out of the flowmeter, and avoid injury to the cover gasket.
4. Unscrew the stuffing box nut (1).
5. Remove the clamp nut (2); gear train assembly can be removed from under side of flowmeter cover.
6. Install replacement gear train making sure that the replacement has the same reduction. **Note: Pack gear train and housing full with non-water soluble grease on enclosed type.**
7. When replacing the cover, first inspect the gasket and then set the arm of the gear train so that it will not come down on the piston spindle.

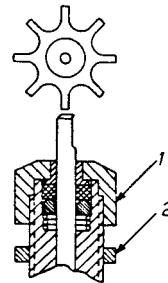


Figure 8
Stuffing Box

Stuffing Box Leakage at the Stuffing Box Loose or Worn Stuffing Box Nut

To Replace the Gear Train

General Maintenance

GENERAL MAINTENANCE

In the maintenance of Actaris Type S" Flowmeters, little is necessary other than to see that the proper conditions of operation are preserved. These conditions, once the flowmeter has been properly installed, consist merely of guarding against foreign matter, such as sediment and air, and excessive heat damaging the disc piston. Also, do not permit the flowmeter to be operated at a rate of flow greater or less than that recommended.

The liquid passing through the measuring chamber must be free of grit and other forms of sediment in order to prevent unnecessary friction and the scoring of the piston and chamber. Evidence of trouble from this source will be found in the under-registration of the flowmeter.

Periodic cleaning of the strainer at the inlet of the flowmeter will help to insure against this trouble. In the design of this unit, particular care has been taken to make this operation as simple as possible.

Being an instrument which measures by volume, a flowmeter will record the passage of air as well as the liquid being measured. Over-registration is the result. The Air-Release valve is intended to prevent this condition by venting this air before it passes through the measuring chamber.

2" Type 3B units, due to the limited available space, will not separate an emulsion of air and liquid. Even tank air release valves will not efficiently separate air from extremely viscous liquids.

When testing, sufficient size of receiving tank should be used to permit operating the flowmeter at normal flow rate, for at least one minute.

Before a flowmeter is placed in storage, the measuring chamber must be flushed with suitable liquid, such as mineral oil. Water may be used if freezing conditions are not likely.

Sediment

Air

Testing

Storage

TROUBLESHOOTING GUIDE

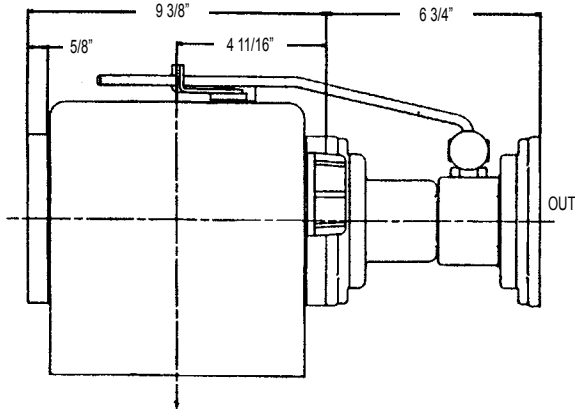
1. **Register Not Working when Liquid is Flowing**
By-pass around flowmeter not shut off.
Frozen condensation inside register.
Register in need of repair.
Sheared key on "Change Gear" -caused by ice in register.
2. **Leakage at the Stuffing Box**
Loose or worn stuffing box nut or worn spindle.
3. **Chronic Leakage at the Main Case Gasket**
Broken gasket or loose bolts.
Excessive line or shock pressure.
4. **Reduction in the Rate or Complete Stoppage of Discharge**
On gravity or on pump systems (pump laboring):
Blocked strainer due to sediment or frost.
Partially open valve in system.
On pump systems (pump not laboring):
Pump bypass stuck open.
Air release valve fails to close allowing liquid and pressure to dissipate back to supply.
Worn pump.
5. **Over-Registration-Erratic**
On pump systems:
Air Release Valve jamming on air vent plugged allowing air to pass through the flowmeter.
Leaks in the suction line such as at valves, valve stems, pump packing, or flange gaskets causing emulsion of air and liquid.
Air pockets in closed-end piping in the suction line.
Excessive suction caused by valves only partly open, suction piping too small or suction lift too great.
6. **Under Registration-Erratic**
Dirt in the measuring chamber.
Badly worn measuring chamber.
Main casing distorted or damaged.
Dirt under the seat of the measuring chamber at the outlet port (after cleaning).
Leakage around the flowmeter due to partly open by-pass valve.
Damaged internal parts.
7. **Consistent Over- or Under-Registration**
Flowmeter in need of calibration.
8. **Liquid Leaking Out the Air Release Vent**
Worn, damaged or defective valve unit.
9. **Valve Will Not Latch Open**
See "To Adjust Valve Connecting Link."

TROUBLESHOOTING

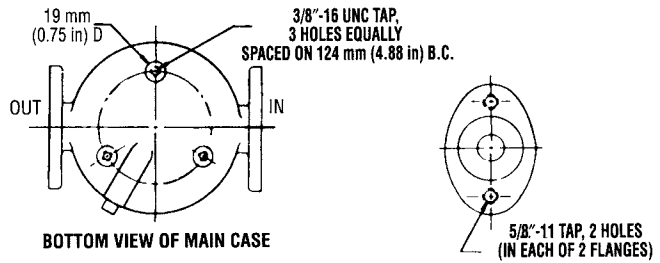
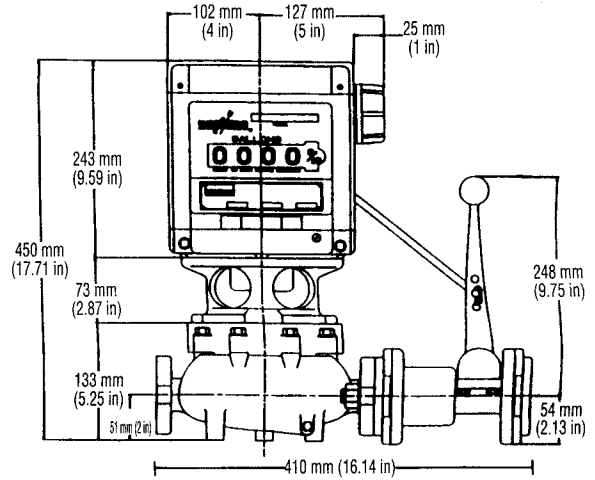
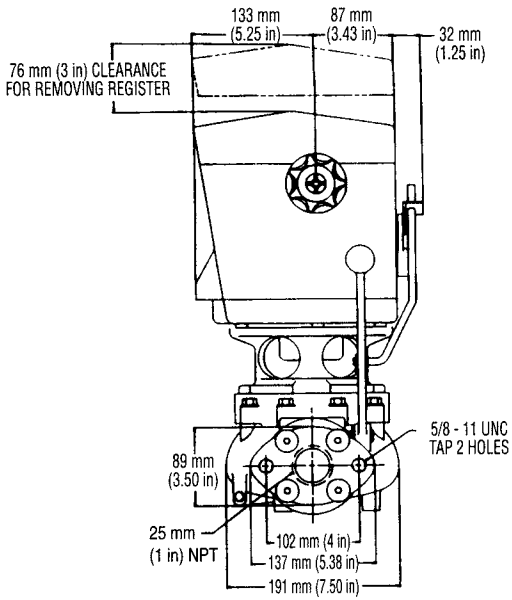
Preset Models

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1" TYPE S FLOWMETER with 800-SERIES REGISTER



25 mm (1 in) Type S with 800 Series Register



Specify Genuine Neptune Replacement Parts