



INSTALLATION & SERVICE INSTRUCTION MANUAL FOR KATES FLOW RATE CONTROLLERS, MODEL N.

IMPORTANT

1. THE KATES FLOW RATE CONTROLLER IS DESIGNED TO ACCURATELY REGULATE FLOW RATES AND IS PRECISION BUILT WITH EXACTING TOLERANCES AND FINISHES. TO INSURE SATISFACTORY PERFORMANCE, THE REGULATED FLUID **MUST BE CLEAN** AND FREE OF DIRT OR SOLIDS. THE INSTALLATION OF A 100 MESH STRAINER OR A 150 MICRON FILTER IS RECOMMENDED, JUST UPSTREAM OF THE CONTROLLER.
2. EQUALLY IMPORTANT: WHEN DIS-ASSEMBLING, SERVICING, OR CLEANING THE CONTROLLER, THE INTERNAL PARTS **MUST BE HANDLED WITH CARE** TO PREVENT DAMAGING THE SURFACE FINISH IN ANY WAY.
3. OPERATION OF A KATES FLOW RATE CONTROLLER SUPPLIED BY A POSITIVE DISPLACEMENT PUMP, WILL BE SATISFACTORY **ONLY** IF A PRESSURE-RELIEVING VALVE IS CONNECTED BETWEEN THE PUMP AND THE CONTROLLER TO BYPASS EXCESS FLUID BACK TO THE FLUID SOURCE, OR TO THE INTAKE OF THE PUMP.

INSTALLATION

1. The Kates Flow Rate Controller is shipped fully assembled, ready for operation, with all parts in place. It is completely self-contained, requires no outside source of power, no straight piping runs, and is as simple to install as an ordinary angle valve.
2. Upstream and downstream shutoff valves and a bypass valve should be installed so that the controller may be opened for inspection and cleaning without requiring complete system shutdown. (See fig. 2)
3. Before installing the controller, be sure to flush out the piping system to remove any foreign material such as dirt, scale, chips, etc.
4. All controllers are constructed substantially, but pipe supports should be located so that the controller is not subject to mechanical load due to piping, or to the expansion or contraction of piping.
5. The controller should be installed at a point in the pipe where it will be completely filled with liquid under all conditions of operation. The preferred axis of the controller is vertical, with the bonnet up. **INLET IS AT SIDE** and outlet connection is at bottom. On threaded connections, apply pipe thread compound sparingly to male threads only, so that surplus will not get inside the controller.

START UP PROCEDURE

1. The stainless steel indicating scale should be at front, readily visible to operator. If not, proceed as follows:
 - a) Loosen and remove the bonnet bolts.
 - b) Lift the bonnet straight up and turn until the indicating scale faces front.
 - c) Make sure the bonnet O-ring is in good condition and is in place.
 - d) Lower the bonnet slowly, at the same time turning the adjuster bar until the slot on the end of the adjuster shaft fits over the cross bar in the torque tube, and the shoulder on the lower face of the bonnet fits into the body. When properly assembled, bonnet will seat squarely on the body all the way around.
 - e) Replace and tighten the bonnet bolts.
2. By hand, turn the adjuster bar in both directions until the stop pin inside the controller prevents further rotation. If it does not turn easily without sticking, or if it does not hit the stop pin in both directions, follow directions below "To Clean Controller".
CAUTION: Never use a wrench or attempt to force the bar to turn.
3. Turn the adjuster bar clockwise until it hits the internal stop pin. The lowest set point at right hand end of indicating scale should now line up with the pointer. If not, loosen the four dial clamp screws about three revolutions. Making sure that the adjuster shaft does not turn, rotate the adjuster bar until index mark on the pointer lines up with the lowest set point on the indicating scale, and retighten the screws.
4. Turn the adjuster bar until the desired flow rate mark on the indicating scale lines up with the index mark on the pointer.
5. Place controller in service by opening upstream and downstream shutoff valves and closing the bypass valve around the controller. Controller will now regulate the flow rate at the set value.
NOTE: Avoid slamming the controller with pressure.
6. If there is air trapped in the top of the controller, this should be purged by the liquid after a short period.
7. When the flowing fluid temperature is above room temperature, especially with viscous fluids, there may be a "warming up" period until the controller reaches the same temperature as the fluid. During this warming up period, the controller may be somewhat sluggish in action. If desired, this warming up period may be eliminated by the use of a heating coil or jacket.
8. During the first few days of operation, gasketed joints should be observed and tightened if necessary.

SERVICE INSTRUCTIONS

The Kates Flow Rate Controller has only one moving element, and is designed so that there are no complex linkages, delicate bearings, or any failure-prone components. Therefore, occasional cleaning may be the only servicing the controller will require.

CAUTION: MAKE SURE THAT THE CONTROLLER IS RELIEVED OF PRESSURE BEFORE ATTEMPTING TO SERVICE OR CLEAN.

TO CLEAN CONTROLLER

CAUTION: in all cleaning operations, be very careful not to scratch, nick or mark any surfaces or edges.

1. The controller operates by downward flowing liquid and is self cleaning for most liquids. Downflow design also will allow drainage on shutdown of many systems if discharge shutoff valve is closed after inlet shutoff valve.
2. It is not necessary to remove the controller from the line to clean. If installation includes proper shutoff and bypass valves, operate these and take controller off stream or control. (See fig. 2)
3. Arrange a clean area where internal parts can be placed and kept free of dirt.
4. Remove bonnet bolts, lift bonnet assembly straight up, remove bonnet O-ring, and place both in the clean area.
5. Lift out the torque tube and place in the clean area.
6. Lift out the entire internal assembly consisting of the spring adjustment nut, the spring cap, the spring, the retaining pin, the valve rod, the valve rod nut, the impeller cylinder, the valve sleeve, and the impeller, and place all in the clean area.
7. Stand the internal assembly on a flat surface that will not damage the bottom of the valve sleeve. Push the spring cap down by hand, hold it, and remove the retaining pin from the valve rod. Note the position of the top of the spring adjustment nut with respect to the top of the valve rod, and remove. Release pressure slowly and lift off spring cap and spring, and place in the clean area.
8. Remove the valve rod nut and take apart the internal assembly and place in the clean area.
9. Remove the valve tube lock screws and lift out the valve tube and place in the clean area.
10. DO NOT remove the orifice plate unless it is damaged or unless the orifice plate O-ring and lower body O-ring must be replaced. If the orifice plate must be removed, remove the flange bolts and lift off the upper section of the controller body (after first disconnecting inlet piping). Remove both existing O-rings by prying them out, using a blunt-ended hook, being careful not to scratch either groove. Install new O-rings; replace the orifice plate, and the body's upper section, making sure that the upper body section seats squarely on the lower body section. Install and tighten the flange bolts.
11. Thoroughly clean all parts that have been removed from the controller by immersing them in a suitable solvent. Clean and flush inside of flow controller body and the valve tube with the solvent, and drain. All surfaces, especially the metering orifice, the valve tube and integral valve ports, must be COMPLETELY CLEAN. Any dirt, sediment, coating or gummy residue must be completely removed. Wipe all parts and surfaces dry with a clean, lint-free cloth.
12. Replace the valve tube, being sure that it seats squarely in the body counterbore, and install and tighten the valve tube lock screws.
13. Put together the internal assembly, (valve rod, impeller cylinder, valve sleeve, and impeller) and replace and tighten the valve rod nut.
14. Stand the internal assembly on a flat surface that will not damage the bottom of the valve sleeve. Insert the spring, the spring cap, and press down so the spring adjustment nut can be threaded on the valve rod. Make sure that the top of the spring adjustment nut is in the same position with respect to the top of the valve rod as before, and insert the retaining pin into the valve rod. Slowly release.
15. Lower the internal assembly into the body, carefully guiding the valve sleeve down over the valve tube so as to not damage either part, and being sure that the flange at the upper end of the impeller cylinder seats squarely on the orifice plate (not on the vertical stop pin). Make sure that the impeller and the valve sleeve will move freely up and down as the spring is compressed and relaxed.
16. Replace the torque tube so that the driving lugs at the lower end fit into the slots in the top of the impeller cylinder. After installation, turn the torque tube and be sure that the impeller cylinder will turn in both directions until hitting the vertical stop pin.
17. Replace the bonnet, bonnet O-ring, bonnet bolts and tighten.
18. Place controller in service as specified under steps 1-8 listed under the heading "START UP PROCEDURE".

TO REPLACE ADJUSTER SHAFT PACKING:

1. The only packing required is between the adjuster shaft and the bonnet. This consists of a PTFE thrust washer and an O-ring of standard size and of a material that is suitable for use with the liquid flowing through the controller.
2. To replace the thrust washer and O-ring, take the controller off stream or control (see fig. 2). Remove the bonnet; then remove the roll pin in the adjuster bar, and lift off the adjuster bar assembly. The adjuster shaft can now be removed by pulling it through the bonnet from the inside.
3. Remove the existing O-ring by prying it out of the groove in the shaft, using a blunt-ended hook. (With a PTFE O-ring, first immerse the adjuster shaft in warm water to slightly soften the O-ring).
CAUTION: Be careful not to scratch the groove or the shaft.
4. Remove the existing thrust washer, and replace with a new thrust washer. Run the washer down the shaft until it rests on the shoulder.
5. Slide a new O-ring down the adjuster shaft until it fits properly in the groove. (With a PTFE O-ring, first immerse it in warm water to soften it slightly.)
6. Carefully push the adjuster shaft through the bonnet from the inside until the thrust washer is held tightly between the shoulder on the shaft and the shoulder on the bonnet. Keeping the stem in this position, replace the adjuster bar assembly, and the roll pin.
7. Replace the bonnet, and put the controller in service by following Steps 1-8 listed under the heading "START UP PROCEDURE".

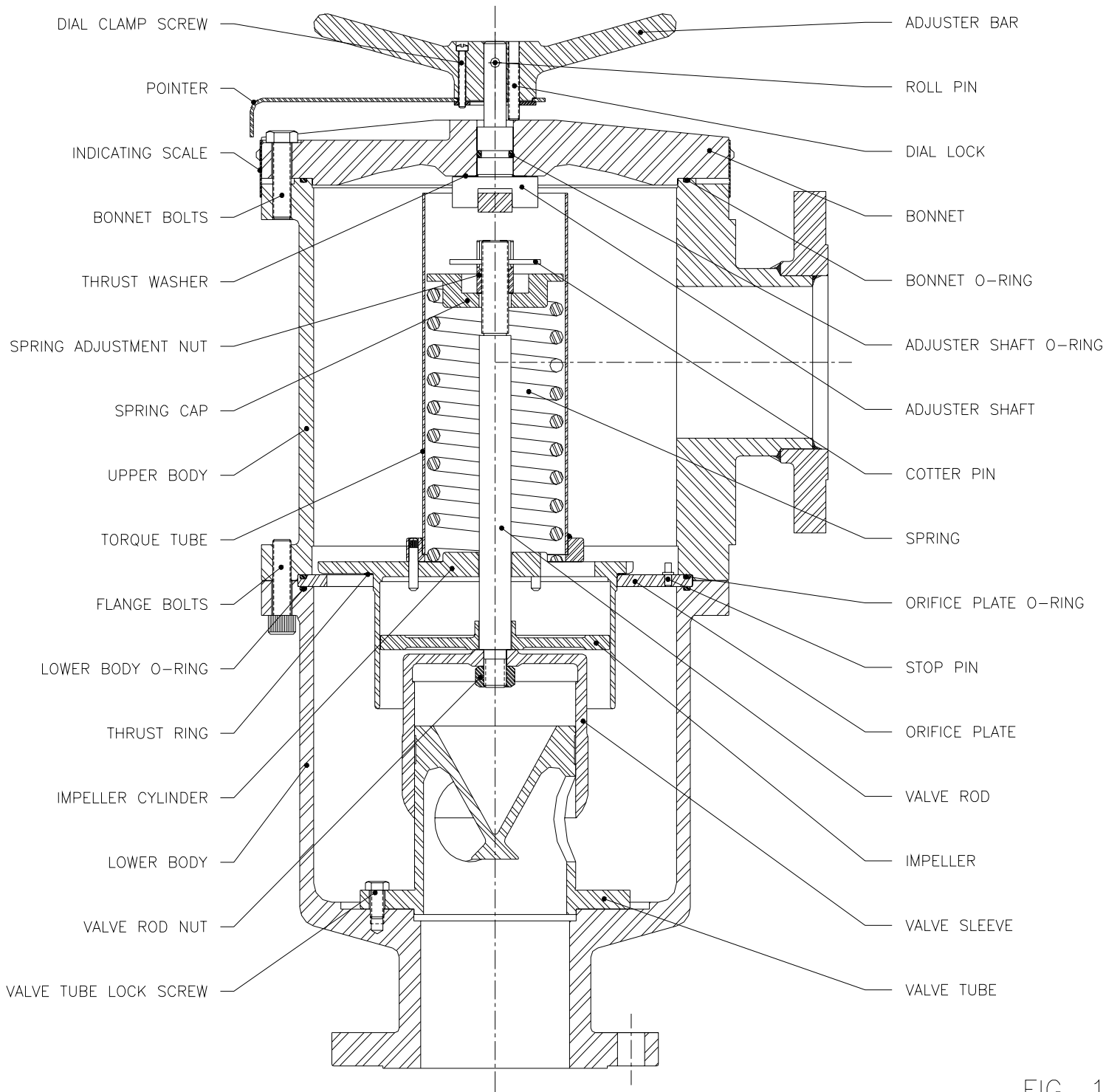


FIG. 1

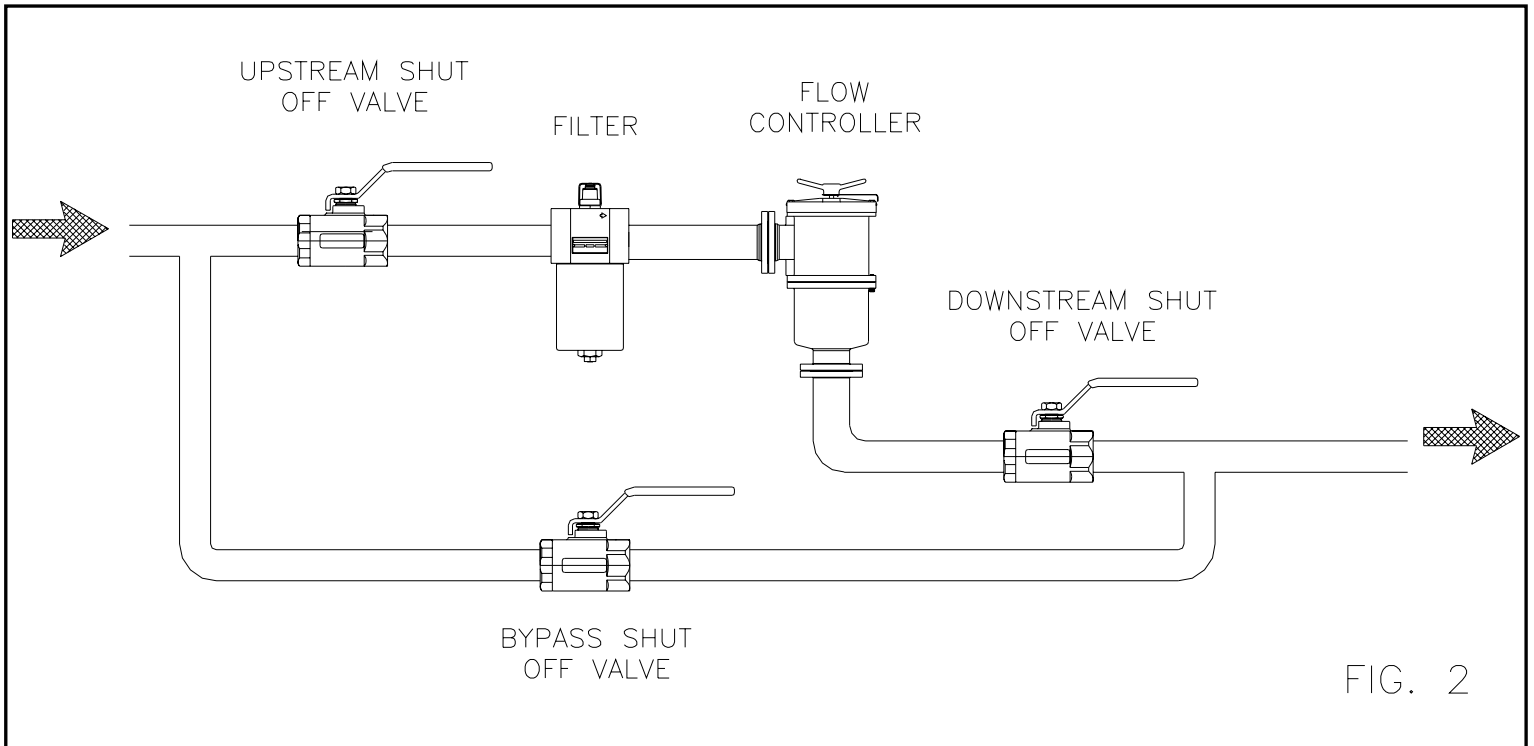


FIG. 2

PRODUCT WARRANTY

The W.A. KATES COMPANY guarantees every piece of equipment manufactured by it to be inspected, tested, and free from defects in workmanship or material when shipped from its factory. No warranty of corrosion resistance of any parts or assembly is expressed or implied.

This guarantee is valid for one year from date of shipment from its plant. Within that time, the W.A. KATES COMPANY will replace free of charge any equipment returned, with shipping charges prepaid, found to have been defective at time of shipment.

This warranty does not apply to : (a) damage resulting from misuse or inadequate handling; (b) damage resulting from continued use after defect is apparent; (c) any other damage, loss or liability; or (d) any piece of equipment that is changed, modified or altered in any way after it leaves the factory.

The liability of the W.A. KATES COMPANY shall be limited to the replacement, f.o.b. our factory, of any equipment found to have been defective at time of shipment with duplicate or similar equipment of equal performance rating, but such liability shall in no event exceed the contract price for said equipment.

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