



**INSTALLATION & SERVICE INSTRUCTION MANUAL
W.A. KATES FLOW CONTROLLERS
FC VALVE MODELS E THRU M**

IMPORTANT

1. W. A. Kates flow rate controllers are designed to accurately regulate flows and are precision built with exacting tolerances and finishes. To insure satisfactory performance, the regulated fluid must be clean and free of dirt and/or solids. The installation of a filter is recommended, just upstream of the controller.

MODEL	STRAINER	FILTER
E, F, G	200 Mesh	75 Micron
J, K, M	150 Mesh	100 Micron

2. Equally important: When disassembling, 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 W. 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. W. A. Kates flow rate controllers are 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 figure 3)
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 fluid under all conditions of operation. The preferred axis of the controller is vertical, with the bonnet up. The inlet is at the side and the outlet connection is at the 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 pointer on the stainless steel nameplate should be at the front, readily visible to the operator. If not, proceed as follows:
 - a. Loosen and remove the bonnet bolts.
 - b. Lift the bonnet straight up and turn until the pointer faces the front.
 - c. Make sure the body O-ring is in good condition and is in place.
 - d. Lower the bonnet slowly, at the same time turning the flow rate setting knob until the key on the end of the adjuster shaft fits into the slots in the orifice sleeve, and the shoulder on the lower face of the bonnet fits into the body. (Note: If the flow rate setting knob does not turn, loosen the dial lock screw. See figure 1) When properly assembled, the bonnet will seat squarely on the body all the way around. (See figure 1)
 - e. Replace and tighten the bonnet bolts. (See figure 4)
2. By hand, turn the flow rate setting knob 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 service directions below, "To Clean Controller".
CAUTION: Never use a wrench or attempt to force the knob to turn.
3. Turn the flow rate setting knob clockwise until it hits the internal stop pin. The lowest set point (at the right hand end of the dial) should now line up with the pointer. If not, loosen the dial clamp screws on the top of the knob, turn the dial until the lowest set point on the dial lines up with the pointer then retighten the screws.
4. Turn the flow rate setting knob until the desired flow rate mark on the dial lines up with the pointer on the nameplate.
5. Place the controller in service by opening upstream and downstream shut off valves and closing the bypass valve around the controller. Use caution; during start-up, open valves slowly to avoid pressure surges. The controller will now regulate the flow rate at the set value. (See figure 3)

NOTES:

- a. If there is air trapped in the top of the controller, this should be purged by the liquid after a short period.
- b. 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.
- c. During the first few days of operation, gasketed joints should be observed and tightened if necessary.

SERVICE INSTRUCTIONS

W. A. Kates flow rate controllers have only one moving element, and are 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:

1. The controller operates by downward flowing fluid and is self-cleaning for most liquids. Down-flow design also allows drainage on shutdown of many systems if discharge shutoff valve is closed after the 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 the controller off stream or control. (See figure 3)
3. Arrange a clean area where the internal parts can be placed and kept free of dirt.
CAUTION: In all cleaning operations, be very careful not to scratch, nick, or mark any surfaces or edges.
4. Remove the bonnet bolts, lift bonnet assembly straight up, remove body O-ring, and place both in the clean area.
5. Lift out the orifice sleeve with piston assembly and place in the clean area.
6. Slowly lift out the impeller, valve sleeve assembly, and spring then place in the clean area.
7. Remove the orifice cylinder clamp screws and lift out the orifice cylinder then place in the clean area.
NOTE: Normally it is not necessary to remove the valve tube to clean it sufficiently. If it must be removed, follow instructions below, "To Remove Valve Tube".
8. Thoroughly clean all parts that have been removed from the controller by immersing them in a suitable solvent. Clean and flush inside of the flow controller body and the valve tube with the solvent then drain. Because of the small size of the orifice slot and the closely fitted parts, it is very important that all parts and surfaces, especially the orifice slots and valve ports, be completely clean, and that any dirt, sediment, coating or gummy residue be completely removed. Wipe all parts and surfaces dry with a clean, lint-free cloth.
9. Replace orifice cylinder and tighten clamp screws; replace the spring, impeller, and valve sleeve assembly on the valve sleeves. Make sure that the valve sleeve will slide freely on the valve tube with no sticking.
10. Replace orifice sleeve and make sure it turns freely in both directions until it hits the vertical stop pin.

11. Replace the body O-ring then lower the bonnet slowly, at the same time turning the flow rate setting knob until the key on the end of the adjuster shaft fits into the slots in the orifice sleeve, and the shoulder on the lower face of the bonnet fits into the body. When properly assembled, the bonnet will seat squarely on the body all the way around. (See figure 1) See that the pointer is in front where the set point can be read. Replace and tighten the bonnet bolts. (See figure 4)
12. Place the controller in service as specified under steps 2 – 7 in “Start Up Procedure”.

TO REMOVE VALVE TUBE:

1. If the valve tube must be removed, for cleaning or replacement, first remove all other internal parts of the controller. (Steps 1 – 7 above in “To Clean Controller”.)
2. Remove the valve tube screws, lift out the valve tube, and clean with solvent.
3. Before replacing the valve tube, be sure that it is clean. Also be sure the counter-bore at the bottom is clean, as it forms a seal for the valve tube.
4. Install valve tube, replace valve tube screws, and tighten them securely.
5. Reassemble controller according to steps 9 – 12 above in “To Clean Controller”.

TO REPLACE ADJUSTER SHAFT PACKING:

1. The only packing required is between the adjuster and the bonnet. This consists of a PTFE thrust washer and an O-ring of standard size, of a material that is suitable for use with the fluid flowing through the controller. For high pressures, a thrust bearing is used. (See figure 2)
2. To replace the thrust washer and O-ring, remove the bonnet then remove the flow rate setting knob clamp screw, lifting the dial and knob assembly upwards. 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. Observe that there are flats at the top of the shaft and the bottom of the hole in the knob. Place the knob on shaft with both sets of flats aligned so the shaft will key into the knob. Support the shaft from below then press or tap knob

down on the shaft. If flats on the shaft do not fit into those in knob, turn knob slightly then tap or press it down into place. Replace the knob clamp screw to hold knob in place.

7. Replace the bonnet and put the controller in service by following steps 2 – 7 as listed under “Start Up Procedure”.

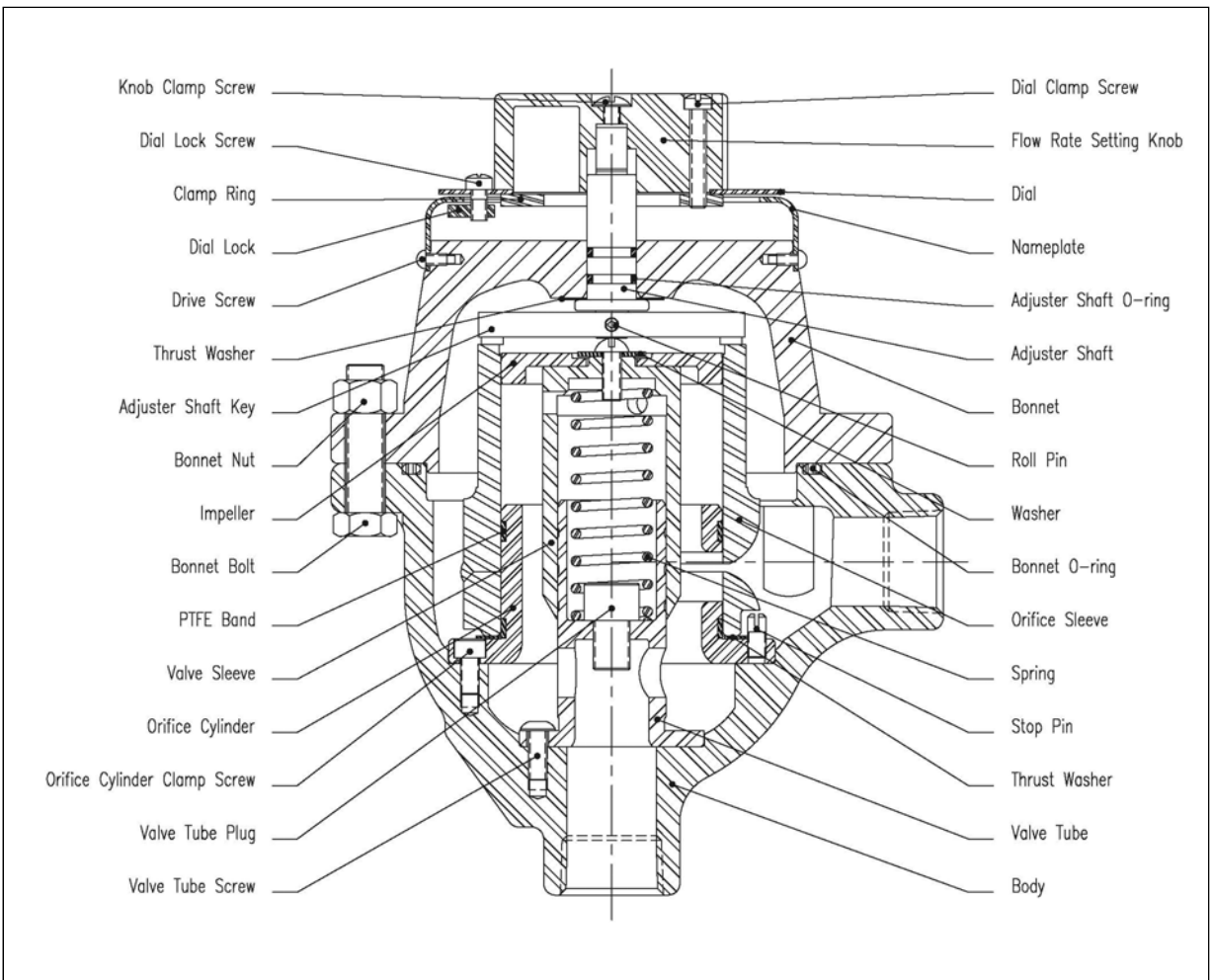


Figure 1

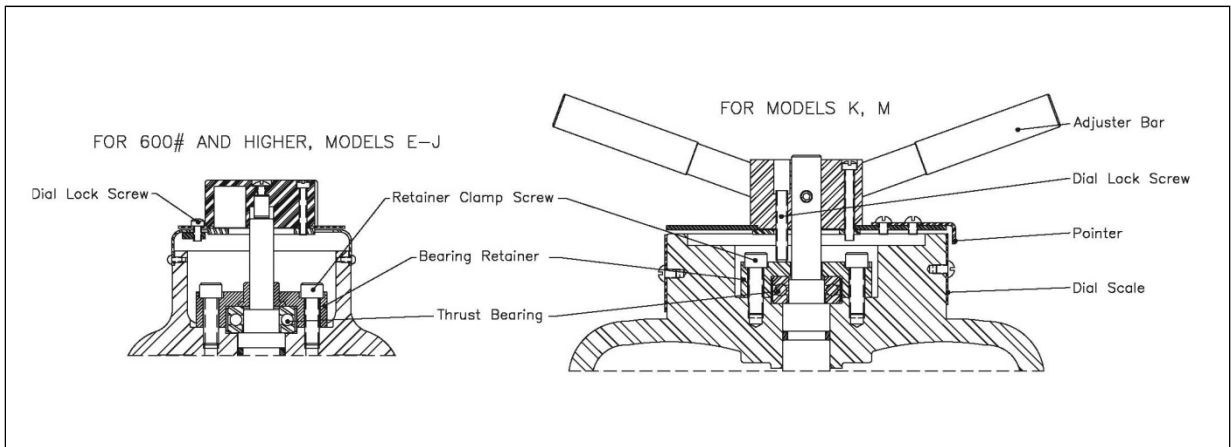


Figure 2

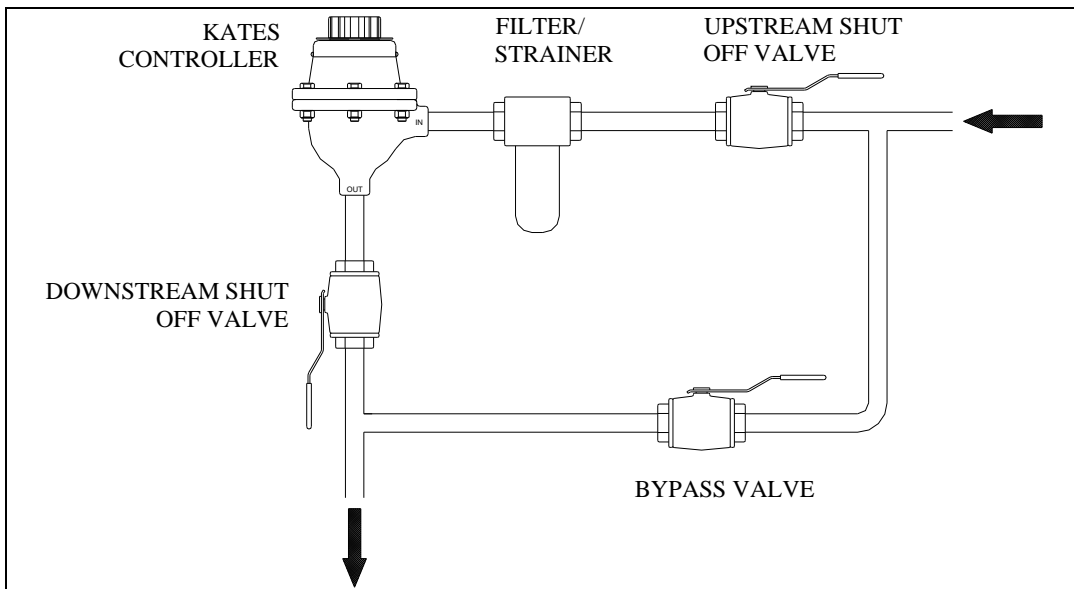


Figure 3

Body/Bonnet Bolt Torque (ft-lb)				
Pressure Class	Model Numbers			
	EFG	J	K	M
150#	6	13	15	43
300#	15	33	39	110
600#	59	98	-	-
900/1500#	138	-	-	-

Figure 4

LIMITED PRODUCT WARRANTY

Custom Valve Concepts guarantees every product manufactured to be inspected 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 the date of shipment from its plant. Within that time, Custom Valve Concepts will replace free of charge any product returned with shipping charges prepaid, found to have been defective at the time of shipment.

This warranty does not apply to; a) damage resulting from misuse or improper handling; or b) damage resulting from continued use after defect is apparent; or c) any other damage, loss or liability; or d) any product that has been changed or modified or altered in any way after it leaves the factory; or e) damage resulting from inadequate filtration or particle contamination; or f) damage resulting from corrosion due to improperly specified materials (i.e.; corrosion resistance).

The liability of Custom Valve Concepts shall be limited to the replacement, F.O.B. our factory, of any product found to have been defective at the time of shipment with duplicate or similar product of equal performance rating, but such liability shall in no event exceed the contract price for said product.

John D. Faule
 President/Owner
 Custom Valve Concepts