Operation and Service Guide
for 2-Way & 3-Way
Solenoid Operated Explosion Proof Valves

Please follow your company’s safety procedures whenever working on Kadant Johnson valves and read all of the instructions completely before proceeding.

Please refer to the assembly drawings for part identification. If you have further questions, please contact your representative or Kadant Johnson.

OPERATION

Figure 1 shows the 3-Way valve lever in its normal down position. The upper valve (steam inlet) is closed and the lower valve (vent) is open.

Figure 2 shows the position of the valve lever when current is applied to the solenoid. The lower valve is now closed, the upper valve is now open. In this position the lower valve must be tightly seated and at the same time the solenoid plunger must be properly seated in the solenoid.

To enable both the lower valve and the solenoid plunger to seat, a leaf spring is provided on the lever, to which the pull of the solenoid is applied. On the upward stroke, the lever is stopped when the lower valve comes to its seat; the solenoid plunger, however, continues its stroke until seated, the overrun of the plunger being taken up by the leaf spring. In this position (Figure 2), the spring should be deflected 1/16” to 3/32”.

ADJUSTMENT

The need for adjustment of the valve lever may be indicated by a steam leak at the lower valve, excessive vibration of the solenoid plunger, or lost tension on the leaf spring. Any such adjustment should be made when the solenoid is energized, with the lever in the upper position.

Loosen the locknut (C) and turn the valve rod (D) with a pair of pliers until the proper spring tension is applied to the leaf spring. After making the necessary adjustment, tighten locknut (C). Care must be exercised in making the adjustment so as not to place so much tension on the spring that the solenoid plunger cannot seat properly.

Do not adjust the push rod connecting the plunger to the lever. It is factory set and never needs adjusting.

REPLACEMENT OF VALVE SEATS AND VALVES

STEP 1. Be sure to screw valve seats all the way into the casting.

STEP 2. Insert valves into valve guides. Insert retaining clips into slots in guides; bend over ends of retaining clips to hold in place.

STEP 3. Adjust lower valve (vent); see “Valve Lever Adjustment”.

STEP 4. Return floating push rod between valves: First insert rod into recess in bottom valve, then place upper valve in position with push rod in recess. Test for proper length of rod, see Step 3 of “Replacement of Push Rod”.

STEP 5. Replace spring in recess in top valve guide.

STEP 6. Replace cap. (Check to be sure gasket is okay.)

REPLACEMENT OF FLOATING PUSH ROD (Between the Two Valves)

Generally this rod will last for many years with little or no wear at its ends. Unless it is bent do not replace. However, if replacement is warranted:

STEP 1. Make sure that lower valve is in proper adjustment; see “Valve Lever Adjustment”.

Figure 1. Valve lever down in normal position. Upper valve closed. Lower valve open.

Figure 2.
STEP 2.
Insert push rod into recess in bottom valve, then place upper valve in position with push rod in its recess.

STEP 3.
Adjust upper valve with cap and spring removed. Hold upper valve guide in position with one hand applying slight downward pressure. With other hand, raise valve lever slowly. The floating push rod should be short enough to allow 1/8˝ upward movement of solenoid plunger before the push rod lifts the top valve off its seat.

If push rod is too long, remove and grind a little off the end. Repeat as necessary until push rod is proper length. CAUTION: Grind push rod carefully. It can easily be ground off too much.

STEP 4.
Replace spring in recess in top valve guide.

STEP 5.
Replace cap. (Check to be sure gasket is okay.)

STEP 2.
Remove the (4) 1/4˝-20 x 5/8˝ cap screws. Now lift off the solenoid frame for replacement.

STEP 3.
For reassembly reverse the above steps. During reassembly raise and lower plunger to be sure solenoid frame is aligned.

PLUNGER REPLACEMENT

STEP 1.
First remove the solenoid according to proceeding steps.

STEP 2.
Unscrew one of the two 5/16˝-24 locking nuts and slide the pin out from the lower portion of the plunger.

STEP 3.
Lift up and replace the plunger.

STEP 4.
Reassemble by reversing the above steps.

MAINTENANCE SUGGESTIONS

STEP 1.
Keep packing nut just reasonably tight and replace packing if it becomes dry and hard.

STEP 2.
If solenoid coil overheats, check packing, push rod setting (see Step 3 of “Replacement of Push Rod” above), voltage and line pressure.

STEP 3.
Periodically check lower valve adjustment. See “Valve Lever Adjustment”.

SOLENOID BUZZ AND CHATTER
(Causes and Remedies)

A solenoid will buzz and chatter only because the plunger is not seating accurately at point (A) noted on Figure 4. These

REPLACEMENT OF SOLENOID COIL OR PLUNGER

Before replacing solenoid coil or plunger, wire valve lever in UP position to prevent floating push rod from being displaced from the recess in upper or lower valve.
Be sure to remove the wire afterward.

COIL REPLACEMENT

STEP 1.
Remove or unscrew explosion proof cover.

Figure 3

Figure 4
two surfaces are milled perfectly smooth. If contact between them is true and accurate, the solenoid when energized will be absolutely quiet, except for a slight hum which is characteristic. An air gap of any sort is the only cause for buzz or chatter. This air gap may be caused by foreign matter between the plunger and the frame, or by mechanical misalignment which does not permit the plunger to seat squarely. (See Figures 5 and 6).

If the buzz can be stopped by manually moving the plunger end of the valve lever, then the cause is misalignment; if not, the buzz is most likely caused by foreign matter.

FOREIGN MATTER

The remedy is obvious — simply clean the two milled surfaces. Then these surfaces must be carefully examined, since quite frequently the foreign matter has scored and pitted the two surfaces leaving burrs which will produce an air gap. With a good mill file, and with care, these surfaces can be restored to their original smoothness.

MISALIGNMENT

The possible causes are many — tight pin bearings, bent valve stem, bent valve lever, binding between plunger and plunger guides, interference between plunger and plunger stop. The plunger should line up vertically from all angles with the solenoid proper. After all “freeing up” and misalignments which are visible have been taken care of the procedure is to “pull in” the plunger by hand and hold it in position with not too much pressure. Then energize the solenoid, noting the direction in which the plunger end attempts to move. If, as shown in Figure 5, the tendency is toward the left, the plunger is seating as indicated. Adjustments to rectify this are then in order.

Occasionally the buzzing problem can be overcome by reversing the solenoid plunger — that is, removing it, turning it 180°, and reinstalling. In such cases the buzzing is apparently caused by unavoidable inaccuracies in machining either the plunger or the frame or both.

With the valve gear, and normally open valves, considerable buzz can be caused by too much spring tension or overloading. The valve stem must be adjusted to relieve this excess tension as shown in Figure 2.

Always bear in mind that the solenoid will not buzz or chatter if the plunger is seating properly and there is no air gap.

KADANT JOHNSON 2-WAY NORMALLY CLOSED SOLENOID VALVE

To meet some operating conditions, a Kadant Johnson 2-Way Normally Closed Solenoid Valve is occasionally installed in the discharge line from the condensate chamber of the Kadant Johnson System, as shown in Figure 7.

INSTALLATION

STEP 1.
Check voltage with voltage marked on nameplate.

STEP 2.
Check pressure with differential pressure capacity marked on nameplate.

STEP 3.
Install with arrow pointing in direction of flow.

STEP 4.
To protect the solenoid, a Kadant Johnson Overload Protector should be provided in the circuit.
MAINTENANCE

See Figures 8 and 9.

STEP 1.
A clearance of 1/32” to 3/64” between push rod and valve face (A) is required. When necessary, adjust valve stem (B) by loosening locknut (D), turning stem (B) to provide above clearance, then tightening locknut (D) again securely.

STEP 2.
Keep packing nut (C) just reasonably tight, and replace packing (E) if it becomes dry and hard.

STEP 3.
If solenoid coil overheats, check packing, push rod setting (see step 1 above), voltage and line pressure.

KADANT JOHNSON 2-WAY NORMALLY OPEN SOLENOID VALVE

See Figure 10.

Operation and adjustments are the same as for the lower valve of the 3-way valve shown on page 1.