

OPERATING AND MAINTENANCE MANUAL

Series 3060 3-Way Control Valves



Series 3060

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1.0 INTRODUCTION

1.1 Scope

This instruction manual includes installation, operation and maintenance information for Norriseal Series 3060. Refer to separate manuals for instructions covering controllers and positioners.

1.2 Description

A Series 3060 Valve is designed for general purpose use in liquid and gas control applications with either diverting or blending 3-way service. It has a hammer nut bonnet, quick change O-ring sealed trim and pressure balanced actuator.

The **common port** is the inlet port for diverting service and the outlet port for blending and combining service. The **upper and lower ports** are used as the outlet ports for diverting service and the inlet ports for blending or combining service.

1.3 Valve Identification

The valve nameplate lists the serial number, series number and model number as well as other information applicable to the particular valve assembly, including trim size, trim and plug materials and pressure and temperature limits. It is attached to the upper diaphragm housing of each valve assembly.

Always refer to the serial and model numbers on the valve nameplate when ordering replacement parts.

WARNING!

Maximum allowable pressures for the valve body and actuator and the

maximum allowable pressure at the maximum temperature for the valve are shown on the nameplate mounted on the actuator. If pressure is capable of exceeding these limits, install relief valves or other over-pressure protection devices in the pressure lines.

CAUTION!

Before disassembly or maintenance, all pressures in this device must be relieved. Failure to do so may result in personal injury or device damage. There may be uncontrolled venting or spilling that leads to personal injury, loss of process control or environmental contamination.

CAUTION!

When ordered, the valve configuration and construction materials were selected to meet specific pressure, temperature, pressure drop and fluid conditions. Since some body/trim material combinations are limited in their pressure drop and temperature ranges, do not subject the valve to other conditions without first contacting the Norriseal sales office or your sales representative.

2.0 Valve Installation and Start-Up

1. Before installing the valve, inspect it for shipment damage and for anything that may have collected during packing and shipping. Remove protectors from body end connections.
2. Blow out all pipelines to remove pipe scale, chips, welding slag and other foreign materials. Threaded and gasketed surfaces should also be free of any foreign materials.
3. Install the valve so the common port is the inlet port for diverting

service and the outlet port for blending or combining service. The upper and lower ports are the outlet ports for diverting service and the inlet ports for blending or combining service.

4. Install the valve using good piping practice. For flanged bodies, use a suitable gasket between the body and pipeline flanges. For threaded (NPT) bodies, use pipe thread sealant on external pipe threads. For smooth operation, the valve should be installed in an upright position with the actuator vertical above the body.
5. Do not install the valve in a system where the working pressures can exceed those marked on the nameplate.
6. Connect the instrument air to the upper and lower housings of the actuator. Refer to the nameplate for the maximum instrument air pressure. Stem movement may be checked by observing the position indicator in the actuator diaphragm housing.

3.0 Valve Maintenance

WARNING!

Before attempting any repairs, take the following steps:

1. Shut off all supply lines to the actuator.
2. Release the process pressure.
3. Vent the actuator supply pressure.

Valve parts are subject to normal wear and must be inspected and replaced as necessary, with the frequency of inspection and maintenance depending upon the severity of service conditions. The following

sections describe the procedures for disassembling and re-assembling the valve for normal maintenance and troubleshooting. All maintenance operations may be performed while the valve body remains in line. Refer to Table 1 for a maintenance schedule. Refer to Table 2 for troubleshooting.

3.1 Valve Disassembly

1. Remove the instrument air from the actuator
2. Remove the hammer nut from the body by turning it counterclockwise with a mallet.
3. Lift the hammer nut off of the body along with the packing plug, seat/cage, plug and stem.
4. Remove the plug from the stem by loosening and removing the nut on the lower end of the stem. The plug assemblies of series 3060 are spring loaded. The stem has sufficient thread length to unload all spring force before the nut reaches the end of the stem. The lower valve plug on the series 3060 must be removed for access to the stem nuts.
5. If the actuator/ valve stem connector has been removed, the stem and trim assembly can be removed from the packing plug. Loosen the packing retainer and remove the stem from the packing plug. If the valve plug needs replacing, always replace the entire plug and stem assembly.
6. Lift the lower seat and seal out of the body.

CAUTION!

Use care to avoid damaging gasket sealing surfaces. The surface finish of

TABLE 1 MAINTENANCE SCHEDULE *

ITEM	INSPECTION SCHEDULE
Valve Trim (Seat Cage, Plug & Insert)	Inspect every 6 months, under normal service conditions (low pressure drop and no sand or abrasives in fluid). Or inspect every 2 months, under service conditions, such as high pressure drop, corrosion, or fluid with sand.
Stem Packing	Inspect Packing at least once a year.
Actuator	Inspect Diaphragm, Spring and Stem once a year.
Body	The body should last many years under normal conditions. However, under severe conditions of corrosion or erosion from sand in the flowing fluid, high pressure drops, or high fluid velocity, body life may be greatly reduced. Inspect the body each time the bonnet is removed.
Bonnet	Inspect Bonnet once a year or whenever trim inspection is done
Seals	Inspect gaskets and O-Rings each time valve is disassembled.

* Under certain operating conditions, this suggested maintenance schedule will not be adequate and a shorter time schedule may be required.

the valve stem is critical for making a good packing seal. The inside surface of the cage assembly or cage retainer is critical for smooth operation of the valve plug and for making a seal with the piston ring. The seating surfaces of the valve plug and seat ring are critical for right shutoff. Assume all of these parts are in good condition and protect them accordingly unless inspection reveals otherwise.

3.2 Trim Inspection

1. Visually inspect the valve plug and seat for signs of erosion, pitting scratches and damage from corrosion. A magnifying glass can be helpful in determining the type and severity of any damage that may be present.
2. Fit the plug and the seat together. While looking into the bottom of the seat, hold the trim set against a bright light. If any light can be seen between the plug and seat contact surfaces, this is an indication of a poor seat condition.

3. Determine the magnitude of any wear or corrosion damage. Many times the metal seat contact surfaces can be fully restored by relapping. Soft seat parts must be replaced.

3.3 Trim Restoration

CAUTION!

Over lapping will widen the lap band and can reduce seat tightness.

1. Lap the plug to the seat:

- a. This process does not apply to plugs with soft seat inserts.
- b. Clean the plug and seat in solvent and wipe dry.
- c. Use lapping compound Clover Boron-Carbide Grade 2A or equivalent products from another manufacturer.
- d. Using a stir stick or similar device, apply lapping compound sparingly at 3

or 4 places approximately equidistant along the seat surface on the plug. If you use too much compound you run the risk of uneven lapping of the surfaces.

- e. With lapping compound applied to the plug, fit the seat against the plug and begin lapping the trim with firm hand pressure, rotating the seat back and forth against the stationary plug. Occasionally change hand gripping points on the seat to redistribute applied pressure during the lapping process. (Keep the seat as concentric to the plug as possible during the lapping.)
- f. Under an adequate light source, visually inspect the lapped contact surfaces of the seat and plug.
- g. The seat shall have a circular uninterrupted lap band approximately 1/32" to 1/16" in width at the base of the seating chamfer.
- h. The plug will have a definite continuous lap band approximately 1/32" to 3/32" in width without being grooved.
- i. The finished lap areas of the seat and plug shall have a continuous smooth, close grained, dull appearance with no skips or tears.
- j. Wash plug and seat in solvent to remove all lapping compound and wipe the parts dry.

3.4 Replacement of

Teflon V-Ring Packing

1. Remove the packing nut and the packing retainer from the bonnet. Pull out the old packing with a hook. Do not scratch the packing box wall or stem. The packing may also be pushed out using a rod inserted through the hole in the bottom of the bonnet. It is also possible to pull up and push down on the stem until the packing pops loose since the packing is spring loaded.
2. Clean the packing box and all metal parts.
3. Install the new packing and associated parts in the following sequence (be careful not to damage the packing during installation):
 - a. The upper packing retainer with the female "V" toward the packing.
 - b. The rings with the "V" pointing downward toward the body.
 - c. Male "V" packing ring
 - d. Lower packing retainer
 - e. Packing spring
4. Replace the valve plug/ stem assembly and install the bonnet on the body using new O-rings.

CAUTION!

If the packing is to be re-used and was not removed from the bonnet, use care when re-installing the bonnet to avoid damaging the packing with the stem threads.

NOTE: Use all new O-rings and seals for re-assembly

Re-assemble the valve by reversing

the order of the disassembly procedure in Section 2.3.

3.5 Valve Re-Assembly

1. Clean all gasketed surfaces, including the body, bonnet and guide.
2. A light coat of lubricant may be used on the soft seals to help with assembly.
3. Assemble the plug parts on the stem arranging the plug, plug insert, seals and plug as shown on the Norriseal valve drawing. Fasten the plug and parts to the stem with a nut and cotter pin as required. The plug assemblies of series 3060 are spring loaded. Turn the stem's nut until the distance from the nut face to the end of the stem agrees with the dimension on the parts list.
4. Place the upper seat spacer and the upper seat/cage over the stem. Install the seal on the upper seat/cage.
5. Push the stem through the bonnet packing without damaging the packing.
6. Install the seal on the lower seat/cage and install the lower seat/cage into the body's seat cavity.
7. Install a new packing plug O-ring into the packing plug's groove.
8. Mount the packing plug with the plug/stem assembly onto the body and lower seat/cage.
9. Turn the hammer nut clockwise and tighten it with a mallet.
10. Mount the actuator on the bonnet and connect the actuator stem to the valve stem.

4.0 Repair Kit

Norriseal provides four repair kits for use in valve maintenance: a valve repair kit, a valve seal kit, a trim repair kit and an actuator repair kit. Contact the Norriseal sales office or your local sales representative to order parts.

5.0 Trouble Shooting

TABLE 2 Trouble Shooting

Symptom	Probable Cause(s)	Corrective Action(s)
1. Valve will not cycle when instrument air is applied to the actuator.	<ul style="list-style-type: none"> • Broken valve stem • Diaphragm ruptured or torn • Diaphragm plate connection at the top may be loose 	<ul style="list-style-type: none"> • Replace stem • Remove upper diaphragm housing. Inspect the diaphragm and replace if necessary • Inspect the plate-to-stem connection and tighten if loose
2. Excessive trim leakage with valve closed.	<ul style="list-style-type: none"> • Insufficient shut-off force from actuator • Foreign object interfering with plug-to-seat contact • Plug and seat contact surfaces may be worn or damaged 	<ul style="list-style-type: none"> • For reverse actuator – increase spring load • Remove actuator and bonnet from the body to inspect the trim and remove foreign objects if present • Inspect critical surfaces of the plug and seat. <ul style="list-style-type: none"> -for minor damage: lap seat surfaces -for severe damage: replace the plug and seat
3. Fluid leakage from top of bonnet.	<ul style="list-style-type: none"> • Stem packing is worn or loose 	<ul style="list-style-type: none"> • For non-adjustable spring loaded packing remove and replace packing • Body/ bonnet gasket may be worn or damaged
4. Fluid leakage from body/ bonnet joint	<ul style="list-style-type: none"> • Some or all bonnet studs may be loose • Body/bonnet gasket may be worn or damaged 	<ul style="list-style-type: none"> • Check studs and nuts, tighten if necessary • Inspect gasket, replace if necessary
5. Instrument air leaks from outer edge of diaphragm housings.	<ul style="list-style-type: none"> • Cap screws securing upper and lower housings may be loose 	<ul style="list-style-type: none"> • Inspect cap screws, tighten if necessary
6. Instrument air leaks from the actuator vent connection located in the upper housing of the reverse actuator or lower housing of direct actuator.	<ul style="list-style-type: none"> • Diaphragm may be torn or ruptured, allowing air to leak through 	<ul style="list-style-type: none"> • Disassemble upper and lower housing to inspect the diaphragm and replace if damaged.
7. Valve stem movement is sticky or jerky.	<ul style="list-style-type: none"> • Valve stem or actuator stem may be bent or misaligned 	<ul style="list-style-type: none"> • Disassemble the valve and/or actuator to inspect the stem and replace if bent or otherwise damaged.

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