

OPERATING AND MAINTENANCE MANUAL

Series 2026/2027A NO FREEZE VALVE



Series 2026



Series 2027A

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1.0 INTRODUCTION

1.1 Scope

This instruction manual includes installation, operation and maintenance information for Norriseal Series 2026/2027A No-Freeze Valves.

1.2 Description

The Series 2026/2027A is specifically designed as a high pressure dump valve for separators and other process vessels. The valve has a hammer nut closure. The body screws directly into the vessel connection. This places the inner valve inside the vessel which allows any warm fluid present to slow freezing inside the valve body.

Norriseal valves are equipped standard with reverse action #12 spring-diaphragm pneumatic actuators. These valves are available with non-adjustable packing. Non-adjustable packing consists of PTFE V-rings, with a spring below the packing to maintain a positive stem seal.

CAUTION!

The instructions provided herein should be completely reviewed and understood prior to installing, operating or repairing this equipment. All CAUTION and WARNING notes must be strictly observed to prevent personal injury or equipment damage.

WARNING!

Before disassembly or maintenance, all pressures in this device must be relieved. Failure to relieve pressures may result in personal injury or device damage. The resulting uncontrolled venting or spilling of line fluids may cause personal injury, loss of process control or environmental contamination.

1.3 Valve Identification

The nameplate is attached to the upper diaphragm housing of each valve assembly with information about specific valve assemblies.

Always use only genuine Norriseal replacement parts when you service valves. Please refer to the serial and model numbers on the nameplate when ordering replacement parts.

WARNING!

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

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 using good piping practice. Use **PTFE** tape or pipe thread sealant on external pipe threads.
4. Do not install the valve in a system where the working pressures can exceed those marked on the nameplate.
5. Where piping is insulated, **DO NOT** insulate the valve above the hammer nut.
6. Connect the supply pressure to the actuator. Refer to the nameplate for the maximum supply pressure. Check for proper valve operation by cycling the actuator several times.

WARNING!

Do not exceed the maximum supply pressure specified on the valve nameplate. Under no circumstances should the actuator supply pressure ever exceed 55 psig for #12 actuators.

7. Actuators may require a spring adjustment to suit specific operating conditions. To adjust the actuator spring setting proceed with the follow steps:
 1. Loosen the lock nut on the adjusting screw on top of the actuator spring housing.
 2. Turn the adjusting screw **CLOCKWISE** to increase the spring's preload and plug seating force to achieve tighter shutoff. Turn the adjusting screw **COUNTERCLOCKWISE** to reduce the preload.
 3. Tighten the lock nut after adjustment.

NOTE: Adjust the spring tension only enough to achieve shutoff and fully open the valve at the actuator supply pressure. Do not exceed the maximum allowable pressure.

3.0 Valve Maintenance

WARNING!

Before attempting any repairs, take the following steps:

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

3.1 Actuator Disassembly

3.1.1 ADJUSTABLE REVERSE (FAIL CLOSED) ACTUATOR:

1. Vent and disconnect supply pressure from the actuator.
2. Loosen the lock nut on the adjusting screw on top of the actuator spring housing. Turn the adjusting screw **COUNTERCLOCKWISE** until the spring's preload is completely removed (de-energized).
3. Remove the nuts and screws from around the diaphragm housing flange and remove the upper diaphragm housing, spring and upper retainer.
4. Remove the nuts from the top of the stem.
5. Remove the lock washer, spring retainer, bearing washers, O-ring, diaphragm plate.
6. Unthread the lower housing from the yoke or bonnet.

TABLE 1 MAINTENANCE SCHEDULE *

ITEM	INSPECTION SCHEDULE
Valve Trim (Seat, Plug)	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 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.

3.1.2 NON-ADJUSTABLE REVERSE (FAILED CLOSED) ACTUATOR

1. Vent and disconnect supply pressure from the actuator.
2. Remove the nuts and screws, with the exception of the two extra-long screws and nuts, from around the diaphragm housing the flange.

6. Remove the lock washer, spring retainer, bearing washers, O-ring, diaphragm plate and diaphragm.
7. Unthread the lower housing from the bonnet.

WARNING!

There is spring tension on the upper diaphragm housing.

3. Slowly loosen the nuts on the extra-long screws equally to relieve the spring tension. Remove the upper diaphragm housing and springs.
4. Remove the springs on top of the diaphragm plate.
5. Remove the nut from the top of the stem.

3.2 Actuator Re-Assembly

To re-assemble the actuator, lubricate all O-rings and simply reverse the steps of the disassembly procedure in Section 3.1 for the appropriate actuator.

3.3 Valve Disassembly

CAUTION!

Use care to avoid damaging O-ring sealing surfaces. The surface finish of the valve stem is critical for affecting a reliable packing seal. The plug guiding bore of the seat/cage is critical for smooth operation of the valve plug. The seating surfaces of the valve plug and seat/cage are critical for tight shutoff.

Assume all of these parts are in good condition when disassembling the valve and protect them accordingly.

1. Vent and disconnect supply pressure from the actuator.
2. Remove all spring compression. Loosen the nut on the actuator adjusting screw and turn the adjusting screw COUNTERCLOCKWISE until all spring compression is removed from the actuator spring.

WARNING!

Before attempting any repairs, isolate the control valve from the system and make sure that all pressure is released from the valve body both upstream and downstream. Shut off and vent the supply lines to the actuator.

3. Unthread the hammer nut (turning COUNTERCLOCKWISE) from the valve body by striking the lugs with a hammer.
4. Lift the entire topworks (bonnet, actuator, stem and plug) from the valve body and place on a suitable work surface.

CAUTION!

Provide adequate support to avoid damaging trim or bending the stem when disassembling the plug.

5. Loosen the lock nut on the stem above the valve plug and unthread the plug from the stem.
6. Pull the cage from the valve body.
7. Use a punch in the valve inlet port to knock out the valve seat.
8. Remove packing washer, spring and retainer plug from packing. Pull the valve stem out of the bonnet.

9. Use the hook-shaped tool to remove the V-ring packing and O-ring. Remove stem bushing.

CAUTION!

Use care to avoid damaging or scratching bonnet bore.

3.4 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 damage that may be present.
2. Fit the plug and the seat together. While looking into the orifice from the bottom of the seat, hold the trim set in front of a bright light. If any light can be seen between the plug and seat contact surfaces, it is probably a poor fit.
3. Determine the magnitude of any wear or corrosion damage. Often the plug and seat contact surfaces can be fully restored by re-lapping. Replace any parts that are beyond restoration.
4. Examine the stem for pitting, scratches or damage in an area adjacent to the packing and O-ring. If worn, replace the stem.

TABLE 2 - LAPPING COMPOUNDS

TRIM MATERIAL	LAPPING* MATERIAL
300 Series SST 17-4PH SST 440C SST	Clover Boron-Carbide Grade 2A
Tungsten Carbide	9U Heavy Diamond

* Equivalent products from other manufacturers may be used.

3.5 Trim Restoration

CAUTION!

Over lapping will widen the lap band and reduce plug seating force.

NOTE: This process does not apply to plugs with soft-seats inserts.

1. Clean plug and seat in solvent and wipe dry.
2. Select the appropriate lapping compound as show in Table 2.
3. 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.
NOTE: The use of excess compound runs the risk of uneven lapping of the surfaces.
4. With the lapping compound applied to plug, fit the seat against the plug and begin lapping trim with firm hand pressure applied by rotating the seat back and forth against a 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 lapping.)
5. The seat should have a circular uninterrupted lap band that does not exceed 1/32" in width at the base of the seating chamfer.
6. The plug will have a definite continuous lap band that is approximately the same width without being grooved.
7. The finished lap areas of the seat and plug shall have a continuous smooth, close grained, dull appearance with no skips or tears.

8. Wash the plug and seat in solvent to remove all lapping compound and wipe the parts dry.
9. Under an adequate light source, visually inspect the lapped contact surfaces of the seat and plug.

3.6 Valve Re-Assembly

CAUTION!

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

NOTE: *Install and lubricate all new O-rings prior to re-assembly.*

Re-assemble the valve by reversing the order of the disassembly procedure in Section 2.3.

4.0 Repair Kits

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

Symptom	Probable Cause(s)	Corrective Action(s)
1. The valve leaks when in the closed position.	<ul style="list-style-type: none"> • There is something under the plug or the valve plug and seat are worn. 	<ul style="list-style-type: none"> • If it's a spring closing valve, remove the spring tension from the valve. Remove the valve top from the body by loosening the hammer nut. By visual inspection, you can see whether the plug and seat are worn. The plug is usually the first thing to be replaced.
2. The valve leaks. The seat and plug are OK, the spring is OK, and there is nothing under the plug.	<ul style="list-style-type: none"> • The pressure drop is too great across the valve. 	<ul style="list-style-type: none"> • If the spring is compressed all the way, then the valve orifice is too big. Check the valve pressure drop table for limits on the pressure drop.
3. The valve will not open.	<ul style="list-style-type: none"> • The pressure drop across the seat is too great. 	<ul style="list-style-type: none"> • Reduce the spring tension. If this does not allow the valve to open, then the valve orifice is too big. Consult the pressure drop table for a smaller plug size.
4. The process fluid leaks from the bonnet weep hole.	<ul style="list-style-type: none"> • The bonnet-to-valve stem packing failed; the valve stem may be worn or damaged. 	<ul style="list-style-type: none"> • Disassemble the actuator (3.1) and valve (3.3). Inspect bonnet and stem sealing surfaces. The packing must have some installation fit interference with both. Replace the worn component(s) as necessary.
5. The process fluid leaks from between the hammer nut and bonnet and/or valve body.	<ul style="list-style-type: none"> • The bonnet-to-valve stem packing failed. The valve stem may be worn or damaged. 	<ul style="list-style-type: none"> • Remove the actuator assembly at the hammer nut (3.3). Inspect the O-ring and sealing surfaces of the bonnet and valve body. Replace the worn component(s) as necessary.
6. Reverse-acting (fail-closed) actuators only: Supply pressure leaks from around the actuator stem at the top of the yoke window opening or from the bonnet weep hole.	<ul style="list-style-type: none"> • The valve stem-to-bonnet O-ring failed. 	<ul style="list-style-type: none"> • Disassemble the actuator (3.1) and valve (3.3) and inspect the O-ring, bonnet and valve stem sealing surfaces. Replace the worn component(s) as necessary.
7. The supply pressure leaks from the diaphragm housing vent plug when the valve is not moving.	<ul style="list-style-type: none"> • The actuator diaphragm is punctured. 	<ul style="list-style-type: none"> • Disassemble the actuator (2.1) and replace diaphragm and diaphragm-to-diaphragm plate O-ring

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