Model 15KX Small Volume High Pressure Regulator (Loader)

MAINTENANCE INSTRUCTIONS

Contents

NOTE: The following drawings form a part of this Instruction:	
Assembly Drawing:	As Applicable
Parts List:	As Applicable
Special Tools:	041-00007

Refer to Appendix for the application assembly drawing and parts list. Item numbers used in the text are the same as those on the assembly drawing.

Description of Components

The Model 15KX Regulator body contained the inlet and outlet port fittings, and inlet valve assembly. The regulating diaphragm assembly is mounted over the body cavity at the base of the valve stem unit, and is held in place by the clamp ring. The relief valve is mounted in the head of the diaphragm bolt.

The spring barrel houses the operating spring, stem unit, and thrust bearing and is vented to permit flow from relief valve to atmosphere. The handwheel gearbox assembly is mounted over the spring barrel. The compression of the operating spring is controlled by the handwheel, and the relief valve setting is controlled by a relief adjusting screw in the op of the stem unit.

A filter unit is provided inside the inlet port fitting, and a bracket and plate for panel mounting are included with the unit.

Disassembly Procedure

1. Remove Model 115KX Regulator from mounting as follows:
   a. Remove pressure supply from inlet port.
   b. Turn handwheel (33) counterclockwise to limit.
   c. Disconnect line fittings.
   d. Remove handwheel screw (17), nameplate (22) and handwheel (33).
   e. Remove mounting screws and plate, and remove regulator from panel.
2. Clamp regulator body tightly in vise, holding across outside diameter of body so that port fittings are accessible.
3. Remove capscrews (25).
4. Lift off cover (2), pinion (10), planet gears (11), ring gear (13), and drive plates (34).
5. Working through side slot in spring barrel, remove guide button (6) from stem and adjusting nut.
6. Remove spring barrel (1) from body (4), using special spanner wrench 041-00007 or 041-00024.
7. Closure (50) may be removed from top of spring barrel, using two spanner wrenches as above.
8. Lift out stem unit subassembly, operating spring (3) and spring ring (38).
9. Remove trust bearing (32). This may have remained seated either in the spring barrel or on stem unit.
10. Disassemble stem unit (14) from inside stem (30).
    a. Remove relief stem (14) from inside stem (30).
    b. Nylok nut (19) may be removed from relief stem for inspection of nylon insert.

c. From top of stem (30), remove relief adjusting screw (18), bearing disc (49), and locking spring (48).

d. If necessary, stem nut (46) may be removed by removing snap ring (31) and stop collar (16).

11. Remove diaphragm capscrews (39) and clamp ring (28).
12. Lift out diaphragm assembly, spring guide (42) and support spring (43).
13. Disassemble diaphragm assembly as follows:
    a. Hold diaphragm bolt (23) across flats with 9/16" open end wrench.
    b. Remove diaphragm nut (24), plate (5), gasket (41), and four-piece diaphragm unit (40). Use care in handling non-metallic parts.
    c. Remove relief seat retainer (12).
    d. Remove valve seat (20), shims (35), and valve pin (26) from retainer. If necessary, use 1/16" drift pin and very lightly tap top end of valve pin to force seat out.
    e. Lift out relief valve (8) and spring (9) from diaphragm bolt recess.

NOTE: Keep relief seat, pin, and valve separate from inlet valve parts to facilitate reassembly. These parts look alike but are not interchangeable.

14. Disassemble inlet valve from body as follows:
    a. Remove inlet seat retainer (12).
    b. Remove valve seat (21), valve pin (27) and shims (35) from retainer. If necessary, use 1/16" drift pin to knock out seat and valve pin, same as relief seat, step 13-d.
    c. Lift out valve (7) and spring (9),

NOTE: Keep inlet seat, pin, and valve separate from relief valve parts to facilitate reassembly. Parts are not interchangeable.

15. Remove port fittings (44) and shims, if any.
16. Remove filter (45) from inlet port fittings.

This completes disassembly of Model 15KX Regulator.

Cleaning and Inspection

1. All parts should be clean before inspection. Metal parts may be cleaned with a petroleum solvent. Non-metallic parts should be cleaned in a mild alkaline solution with a water rinse.
2. Examine all threads; and sealing surfaces of valves, valve seats, and port fittings, for damage which might impair fluid-tight seals.
3. Check gear teeth, drive plate pins, and thrust bearing for galled surfaces or other damage which might impair smooth operation. See that drive pins are secure in drive plate.
4. Examine clamping surfaces of body, clamp ring, and diaphragm plate for roughness which might affect diaphragm seal.
5. Examine two diaphragms and Teflon shield for damage which might impair sealing, especially at inner and outer edges.
6. Examine gasket on diaphragm bolt, and nylon thread insert in Nylok relief stem nut.
7. Examine filter in inlet port fitting. If feasible, it maybe be cleaned and re-used. If not, discard and replace with a new one.

Discard any parts found to be defective and replace. Use only RedQ spare parts. The 15KX Regulator is manufactured to extremely close tolerances which must be maintained if the regulator is to function properly.

On all spares or replacement parts orders, give part numbers, part name, and serial number of the regulator involved.

Lubrication

In units used in ordinary pressure systems, use Molykote Type G lubricant. For units in supercleaned service, use Kel-F 90 grease. Apply lubricant sparingly to the following parts:

1. Threads only, on inlet and outlet port fittings.
2. Threads on spring barrel.
3. Threads on stem unit.
4. Races on thrust bearing.
5. Drive plate planet gear pins.
6. Gear faces.
7. Shaft of pinion.

Regulator parts are now ready for reassembly.

Reassembly Procedure

Provide equipment for bench testing with dry compressed air or nitrogen at rated inlet pressure, while unit is being assembled. Assembly torques are given in Table I, below:

Table 1

ITEM	PART NAME	ASSEMBLY TORQUE
(1)	Spring Barrel	75 ft-lb
(12)	Retainer, valve seat	20 to 22 ft-lb
(17)	Handwheel screw	12 ft-lb
(24)	Nut, Diaphragm	10 ft-lb
(25)	Capscrews, gear cover	20inch-lb
(39)	Capscrews, clamp ring	5 ft-lb
(44)	Port Fittings: Corrosion-resistant steel Aluminum	 140 ft-lb 75 ft-lb
(50)	Spring Barrel Closure	75ft-lb

A. BODY UNIT SUBASSEMBLY

1. Install supercleaned filter (45) in one port fitting (44). This becomes the inlet port fitting.
2. To install port fittings, clamp body securely in visa with soft jaws, holding across O.D. of body. Use great care not to damage raised surface in top of body.
3. Install inlet and outlet port fittings (44). On aluminum models, insert port fitting shims. Use torque per Table I to ensure a tighten metal-to-metal seal.
4. Assemble inlet valve parts and install in body unit (4).
   a. Insert spring (9) and valve (7) in body recess.
   b. Insert pin (27) and valve seat (21) in inlet seat retainer (12).
   c. Seat retainer over valve in body recess and tighten, using torque per Table I.
5. Before proceeding further measure projection of valve pin (27) above inlet seat retainer, using depth micrometer. If pin projects more than .010 or less than .008 inch, adjust shims (35) until pin projects .008 to .010 inch (shim No. 299179 is .006" thick; Shim No: 299245 is .002" thick. Use as required.)

Torque inlet seat retainer per Table I before measuring.

6. After correct projection of valve pin (27) has been established, inlet valve assembly may be tested as follows:
   a. Mount regulator in bench test set-up.
   b. Apply rated inlet gas pressure to inlet port and check for leaks at inlet valve and port fittings, using approved bubble fluid.
   c. If inlet leak is detected, re-torque inlet seat retainer. If leak persists, disassemble and re-inspect valve seating surfaces and retainer threads. Reassemble with care, being sure all parts are seated properly.
   d. If port fitting leak is detected, re-torque. If leak persists, inspect seating surfaces and threads.
7. After leaks are eliminated, wipe off bubble fluid and continue reassembly.

B. DIAPHRGAM BOLT SUBASSEMBLY

1. Install relief vale parts in diaphragm bolt (23).
   a. Insert spring (9) and valve (8) in diaphragm bolt recess.
   b. Insert pin (26) and valve seat (20) in relief seat retainer (12).
   c. Mount a 9/16" open-end wrench in a visa so that the flats on the diaphragm bolt can be set in the wrench while another wrench is applied to the retainer.
   d. Screw retainer down over valve in diaphragm bolt recess and tighten, using torque per Table I.
2. Measure pin projection as in inlet valve diaphragm bolt recess and tighten, using torque per Table I.
3. Mount diaphragm bolt (23) carefully in visa, gripping head of relief retainer in visa jaws.
4. Over threaded end of diaphragm bolt, mount four-piece diaphragm unit (4) and Kel-F grease gasket (41). Refer to Figure 1, sheet 12.
5. Install diaphragm plate (5) and nut (24) using torque per Table I to tighten nut.

CAUTION

Hold diaphragm plate (5) against rotation, to prevent wrinkling of diaphragm shields in unit (40) while tightening nut (24).

6. In body recess (4), place support spring (43) and spring guide (42) over inlet valve.
7. Remove diaphragm bolt assembly from vise and seat over spring guide in body (4).
8. Install clamp ring (28) with six capscrews (39). Torque capscrews per Table I.

C. OPERATING PARTS, PRELIMINARY

1. Stem subassembly:
   a. Install stem nut (46) on stem (30) and run up to top of threads (left hand thread). Install stop collar (16) and retaining snap-ring (31).
   b. Install relief locking spring (48) bearing disc (49) and relief adjusting screw (18) in top of loader stem. Screw in relief adjusting screws until head is just below flush with top of stem.
   c. Seat thrust bearing (32) over top of stem.
2. Relief stem subassembly:
   a. If Nylok nut (19) is a new one, it may be necessary to pre-shape the nylon insert by screwing it over a standard 5/16-24 screw. If any excess nylon appears on washer faces of nut, remove it at this time.
   b. Install Nylok nut over end of relief stem (14) and run nearly to limit of threads.
3. Spring barrel subassembly:
   a. Install closure (50) in top of spring barrel (1) using two special spanner wrenches No, 041-00007 or 041-00024. Torque per Table I.
4. Clamp body subassembly tightly in visa with soft jaws, holding across outside diameter of body.
5. Place spring ring (38) over end of diaphragm bolt.
6. Slide relief stem inside loader stem.
7. Hold loader stem inside operating spring (3) and seat over spring ring in body.
8. Screw spring barrel (1) to body (4) at same time guiding loader stem into position through hole in top closure.
9. Be sure spring barrel is properly seated on should of body, and wrench spring barrel hand tight.

D. ADJUSTMENT OF RELEIF STEM STOP NUT (19)

NOTE: The following assembly and adjustment must be repeated every time the regulator is disassembled for maintenance.

1. Using 1/8" hex key wrench, turn relief adjusting screw (18) clockwise, while holding stem against rotation with 9/16" hex or open-end wrench. Continue turning screw in until it bottoms solidly with moderate hand torque on hex wrench.

CAUTION

Keep this setting fixed during the following steps.

2. Disassemble operating parts, removing spring barrel (1), stem assembly, and operating spring (3).
3. Remove relief stem from stem subassembly, and mount vertically in visa, gripping hex end in vise jaws.
4. Lower loader stem over relief stem.
5. Screw Nylok nut (19) on relief stem toward loader stem, until gap between nut and bottom of loader stem measures .030 +/- .001 inch. (Use feeler gage).
6. Now back off relief screw (18) approximately two turns. Keep this setting fixed during the remaining assembly of operating parts, and at the start of Performance tests, Section VI.

E. OPERATING PARTS, FINAL

1. After completing adjustment of relief stem stop nut, replace body (4) in vise.
2. Reassemble relief stem, loader stem, operating spring and spring barrel over body, as before, steps c-4 through c-9.
3. Tighten spring barrel (1) using spanner wrench 041-00007 or 041-00024. Torque per Table I.
4. Install guide button (6) in stem nut (46) through side slot in spring barrel.
5. Drop drive plate (34) over hex end of stem.
6. Assemble planet gear (11) on drive plate pins.
7. Slide ring gear (13) into place, meshing with planet gears, and rotate until three cap screw holes line up with top closure on spring barrel.
8. Slide fiber washer (47) down over pinion (10), and mesh pinion with planet gears.
9. Place cover (2) over pinion and ring gear, and install three capscrews (25), using torque per Table 1.

10. Omit mounting attachments until after Performance tests, Section VI.
11. Place handwheel (33) over pinion, and install nameplate and handwheel screw (17), using torque per Table I, while holding handwheel against rotation.

Model 15KX Regulator is now ready for Performance Tests.

Performance Test Procedure

1. Turn regulator handwheel counterclockwise to limit and mount in bench test set-up with dry air or nitrogen pressure not exceeding rated inlet, but not less than rated outlet pressure of the regulator being tested.
2. To the outlet line attach a suitable pressure gage and a means of shutting of outlet flow, such as a needle valve.
3. Admit rated pressure to inlet port of regulator.
4. Shut off outlet flow.
5. TESTS:
    a. Turn handwheel slowly clockwise to get maximum outlet pressure. (Do not disturb relief screw setting made in Section V., step D.-6.) Outlet pressure should follow smoothly without excessive lags or jumps.
    b. Watch outlet pressure gage. Outlet locked-up pressure should not creep up.
    c. Crack outlet needle valve momentarily and re-close. Outlet pressure should return quickly to set level and should not creep up.
    d. Check for leaks around port fittings, using an approved bubble fluid.
    e. Check for leak through side slot in spring barrel.
    f. Turn relief screw clockwise until steady venting is obtained.
    g. Turn relief screw counterclockwise until venting just stops; then turn about one turn further to get a stable setting.
    h. Turn handwheel counterclockwise to limit, to give zero outlet pressure. Open outlet needle valve. There should be no flow to outlet line.
6. TEST RESULTS:

If the regulator fails to pass the foregoing tests, it must be disassembled and re-inspected as follows, and damaged parts replaced:

a. Erratic response to handwheel may be caused by distorted diaphragm; or out-of-tolerance ends on operating spring.

b. c. and h. Outlet creep and flow are caused by inlet valve leaks. Inspect inlet seat retainer and inlet valve parts for damage to threads and/or sealing surfaces. Reassemble with care, using torque per Table I on inlet seat retainer.

d. If port fittings leak. Check torque per Table I. If leak persists, inspect fittings and body for damage to threads and/or sealing surfaces.

e. If relief valve was set properly, leak through spring barrel slot may be caused by defective relief valve assembly ir by damaged diaphragm. Inspect relief seat retainer and relief valve parts for damage to threads and/or sealing surfaces. Inspect diaphragm for damage especially at inner and outer edges. Reassemble with care, using torque per Table I on diaphragm nut (24) and on relief seat retainer (12).

f. If relief valve will not vent when adjusting screw is turned clockwise, re-measure projection of relief valve pin above relief seat retainer, Section V.B.-2.

g. If relief valve will not stop venting when screw is reversed, inspect relief valve seating and sliding surfaces, and valve spring.

7. After regulator passes satisfactory all tests under step 5., remove handwheel and install mounting brackets and plate:
    a. Install mounting brackets (36) on spring barrel (1) using bracket screws (37).
    b. Drop mounting plate (29) over spring barrel and start screws into bracket.
    c. Replace handwheel (33) and nameplate (22) over pinion, and fasten in place with handwheel screw (17).

The RedQ Model 15KX Regulator is now ready for service.

For final adjustments to be made after regulator is installed in operating locations, refer to:

W-15KX-BOO-1, INSTALLATION AND OPERATING INSTRUCTIONS.

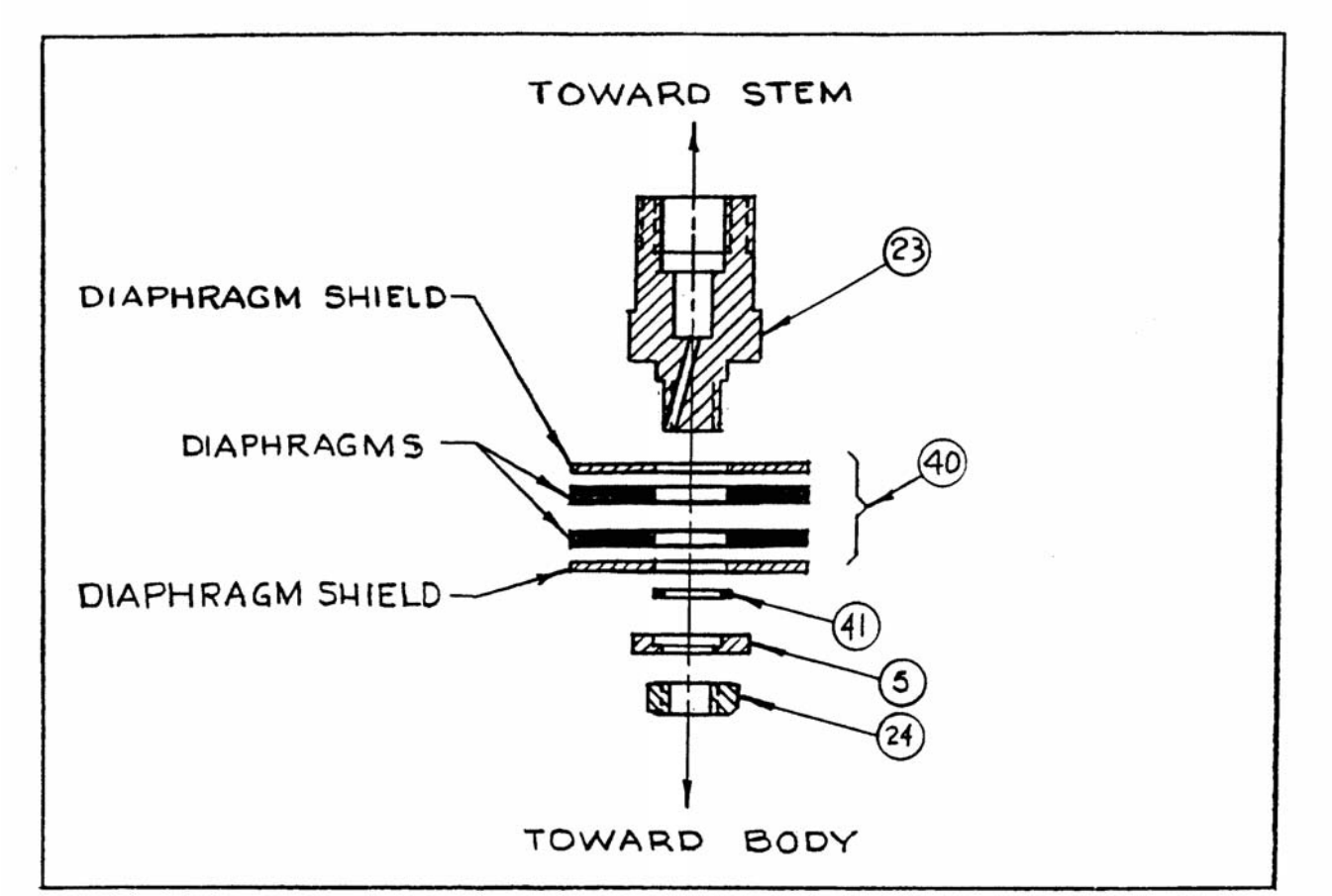

FIGURE 1: DIAPHRGAM BOLT SUBASSEMBLY

Showing orientation of four-piece diaphragm unit (40)

Appendix

Assembly Drawing . . . . . As Applicable
Parts List. . . . . As Applicable
Special tools:. . . . . 041-00007, Special spanner wrench

RedQ
Dresser, Inc.
2822 S. 1030 W.
Salt Lake City, Utah 84119
Phone: 801.487.2225 Fax: 801.487.2587
www.mooneycontrols.com