



8900 Series

Emergency Relief Vents

Pressure Only or Pressure/Vacuum

SECTION I

I. DESIGN AND FUNCTION:

The 8900 Series is classified as an Emergency Relief Vent (ERV). The design allows it to be used as an emergency pressure only vent or a pressure/vacuum vent. This Series of Vents can be constructed as top guided or hinged design. Depending on the pressure requirement, vents can be assembled using a stack of weights or springs to achieve the desired set point pressure.

The 8900 Series can provide emergency pressure and vacuum relief beyond that furnished by the normal pressure/vacuum vent for atmospheric and low pressure tanks, as well as providing a convenient access for tank cleaning, inspection and repair.

Emergency Pressure Relief Vents provide relief from excessive internal pressure which may be caused by an abnormal condition, such as ruptured internal heating coils, an external fire or a failure of the tank blanketing system. Some Models are also designed to provide emergency vacuum relief as a result of loss of pressure caused by a break in the tank wall or a nozzle being dislodged from the base of the tank or sudden cooling of the tank.

The 8900 Series provides an effective vapor tight seal when the tank is not under emergency conditions. If the tank out breathing requirements exceed the capacity of the normal pressure relief vent, under emergency conditions, the pallet opens to allow escape of the vapors, preventing damage to the tank due to excessive pressure. The integral vacuum vent allows high flowing relief from the same unit.

This vent design is rugged but light weight for easy handling, inspection and maintenance. For Models 8910 and 8920 removal of the pallet assembly allows unobstructed access to the inside of the tank. For Models 8930 and 8940 use handle to raise the weighted pallet assembly and gain access to the inside of the tank.

Product Selection Guide		
Vent Function	Guiding	Model
Pressure Relief	Top Guided (Spring Loaded)	8910
Pressure/Vacuum Relief		8920
Pressure Relief	Hinged	8930
Pressure/Vacuum Relief		8940

SECTION II

II. INSTALLATION:

CAUTION

When installing any Valve Concepts venting device, any safety regulations and procedures appropriate to the specific plant site must be understood and followed in accordance with that facilities corporate legal and advisory policies.

CAUTION

DO NOT attempt to change pressure settings, either by adding additional weight to the pallet assembly or by changing the spring compression without consulting the factory.

Handle the 8900 Series carefully to insure seat tightness. Units could be damaged by over tightening the studs or mounting it on a tank nozzle flange that is not horizontal.

Carefully inspect the relief vent to insure that there are no packing materials inside or around the vent housing.

Before placing the vent on the tank nozzle, the flange face on the tank and the vent should be inspected. The standard vent is supplied with flat face flanges and can mate with 150# ASME or API 650 flanges. The connecting flanges must be flat within 0.015" (.381 mm), clean and free of scratches, corrosion and any tool marks.

Inspect the gasket and make sure it is compatible for

the service. It is recommended to use a full faced gasket to avoid deflection of the body flange.

The vent should be installed using wire cables or straps connected to the lifting lugs/eyebolts (39) located around the flange base. This will prevent any damage to the hood.

NOTE: At installation, the vent valve should be carefully lifted into position using the lifting brackets on the body.

CAUTION

The lifting brackets should only be used for lifting the vent valve into place and should NOT be used for any other purpose.

Lubricate all studs and nuts with an appropriate thread lubricant. If stainless steel fasteners are used, select an anti-seize lubricant such as moly-disulfide.

Align the gasket with the bolt circle of the flange.

Lower the vent body carefully on the nozzle flange; keep the gasket between the flanges. Install the studs and tighten the nuts by hand.

Using an alternating star pattern, tighten all the fasteners to one-half recommended torque - see Table 1. Make sure that the flanges are not distorted and that the gasket is evenly compressed. Finish tightening fasteners to torque values in Table 1.

Gasket Dimensions

FLANGE TYPE	O.D. in.	I.D. in.	B.C. in	Bolt Hole in.	Quantity
16" - 150#	23.50"	15.25"	21.25"	1.13"	16
20 - 150#"	27.50"	19.25"	25.00"	1.25"	20
24" - 150#	32.00"	23.25"	29.50"	1.38"	20
20" - API 650	26.00"	19.25"	23.50"	.75"	16
24" - API	30.00"	23.25"	27.50"	.75"	20

TABLE 1

Flange Type	Size	Qty Holes	Bolt (in) (UNC)	Torque (ft-lbs)	
				Raised Face	Flat Face
150# ASME	16"	16	1.000	52	104
	20"	20	1.125	63	110
	24"	20	1.250	86	148
API # 650	20"	20	0.625	35	53
	24"	20	0.625	43	61

SECTION III

III. MAINTENANCE:

The 8900 Series vents do not require any sort of routine lubrication or adjustments, but should be checked as part of a routine plant maintenance program to confirm that the vents are operating properly. The ERV is a protection device and as such will not normally cycle when in service.

In order to inspect the pallets and pallet diaphragms for damage the vent must be removed from the tank nozzle. Follow all safety guidelines your company has to decommission a vent for inspection. Cashco/Valve Concepts does not recommend that a vent be removed from a tank in service due to the potential of hazardous tank vapors or flammable tank vapors.

SECTION IV

IV. DISASSEMBLY of the 8910 and 8920 Guided - Spring Loaded Relief Vents:

See page 12 for a listing of parts. For Model 8910 (Figure 1) disregard item numbers 5 - 25, 28, 36, 40 - 60, 62 - 74 and 76. These parts are for vacuum service option for the Model 8920 and do not pertain to the pressure only function of the 8910.

DISASSEMBLY FOR INSPECTION

To remove the vent from the tank nozzle, loosen and remove the flange bolts and nuts from the tank nozzle and flange seat (1). Attach lifting cables or straps to the lifting lugs/eyebolts (39). Be sure to utilize all lifting lugs in order to keep the unit stable during lifting and transportation.



WARNING

SPRINGS UNDER COMPRESSION. Relieve spring compression per following steps. Failure to do so may result in flying parts that could cause personal injury.

A. Removal of Pressure Springs:

1. Place the vent flange (1) on a flat work surface. Measure the length of each compressed spring (33) from the top surface of the pressure pallet (3) to the top edge of the upper spring button (34). **Place a tag on each spring (33) and record the height measurement for each. These values will be required at re-assembly to reset the vent spring pressure prior to installation.**

2. Loosen and remove **one** "top" nut (35) from each of the adjusting screws (31). Rotate remaining nut (35) CCW evenly in 1/2" (13 mm) increments to prevent unequal loads on the pallet/diaphragm assembly. Continue this process until all nuts (35) are removed.

3. Lift up to remove upper spring buttons (34) (hole w/small I.D.) and springs (33).



WARNING

SPRING UNDER COMPRESSION. Relieve spring compression per following steps. Failure to do so may result in flying parts that could cause personal injury.

B. Removal of Vacuum Spring - 8920 Only:

1. Remove cap screws (28) from the weather hood (11) and lift off upper spring canister (15). Measure the length of the pallet stem (21), top edge of stem to the top surface of the upper spring button (14). Record this value. It will be required during re-assembly to reset the vacuum range spring pressure prior to installation.

Length of pallet stem _____

NOTE: DO NOT allow vacuum pallet assembly (18) to fall as disassembly continues.

2. Rotate each nut (25) CCW one at a time to remove and to release the compression of the spring (16). **NOTE: May need to grasp a section of the threaded stem (21) with soft-jawed pliers to prevent rotation of the pallet assembly (18). Maintain grip on stem (21) while carefully lowering vacuum pallet assembly (18) to rest on work surface below.**

Lift up to remove upper vacuum spring button (14) and spring (16).

NOTE: If vent was not supplied with a flame screen (5) remove lower spring button (14) and lower spring canister (13). If vent included a flame screen, before removing button (14) and canister (13), draw match "marks" between flange face of the lower spring canister (13) and weather hood (11).

C. Removal of Pressure Pallet Assembly:

1. Rotate nut (35) CCW three revolutions on each adjusting screw (31) to loosen connection between adjusting screw and pallet guide (30). Grasp adjusting screws (31) with hand and rotate each one CCW to remove adjusting screws and travel stops (37).

2. Remove lower spring buttons (32) (hole w/ large I.D.). **NOTE:** Not necessary to remove pallet guides (30) or guide pin (75). (Factory installed with Loctite - torqued to 15 ft-lbs.)

3. Carefully lift the pallet assembly (3) up off the flange seat (1), so not to damage the seating surface. Inspect the seat surface for any damage including but not limited to nicks and corrosion. If damage is found, the seat should be relapped or remachined to smooth finish. If remachining is required, contact Cashco/Valve Concepts for assistance.

D. Inspection of Diaphragms:

1. Position the pressure pallet assembly (3) on a work bench with the diaphragm (2) side face up.

2. Inspect the diaphragms (2,19) on both pallet assemblies (if applicable) for any signs of damage. Damages may include but are not limited to tears, crinkles/creases, and holes. If it is deemed that the diaphragm(s) need to be replaced, proceed with following steps to replace. If they are deemed to be in good condition, inspect the vacuum seat ring (8) for similar damages as for the flange seat (1) seating surface. These include but are not limited to nicks and corrosion. If damage is found, the seat surface may be relapped. If relapping the seating surface does not create a suitable seating surface, a new seat ring is required. Contact your local representative for assistance. Provide Serial Number, Product Code & Set Point Pressure(s) to place an order for parts.

E. Diaphragm Replacement:

For Pressure Pallet:

1. Remove hex nuts (27), lock washers (26), and diaphragm retainer ring (4) from the pallet. **NOTE:** Pressure set point will dictate the quantity and stack orientation of diaphragms. Record diaphragm's stack orientation for re-assembly.

2. Remove diaphragm (2). Clean the pressure pallet (3), especially the pallet groove, and inspect for nicks or scratches.

3. According to stack orientation of the diaphragms E.1 previous, lay new diaphragms (2) in the pallet (3) groove. Align holes in diaphragm (2) bolt circle over studs (29) in the pressure pallet (3).

4. Position diaphragm retainer ring (4) over studs (29) resting flat against the diaphragms (2). Install 1 lock washer (26) and 1 nut (27) to each stud (29), tighten to 5 ft. lbs. **NOTE:** Do not allow studs (29) to rotate and protrude out the backside of the pallet (3), end point of studs should be flush.

NOTE: For Model 8910 Vents proceed to IV. H.

For Vacuum Pallet:

1. Place threaded end of pallet stem (21) in a soft-jaw vise with pallet (18) face up.

2. Remove the cotter pin (56), nut (24), lock washer (23), and the flat washer (22).

3. Remove vacuum pallet (18) and diaphragm (19). Clean pallet (18), especially the pallet groove and inspect for nicks or scratches. **NOTE:** Vacuum pressure set point will dictate the quantity and stack orientation of diaphragms. Record diaphragm's stack orientation for re-assembly.

4. Install new diaphragm(s) (19) over short threaded end of stem (21) onto retainer plate (20). Apply a light coat of TFE paste on the top surface of the last diaphragm (19) around the edge of the center hole.

5. Place vacuum pallet (18) with the machined groove facing down on the diaphragm (19). Apply a light coat of TFE paste to short threaded end of stem (21).

6. Install flat washer (22), lock washer (23) and nut (24) onto the protruding threads of the stem (21). Use a torque wrench to tighten nut to 15 ft-lbs.

7. Insert cotter pin (56) through small hole in the stem (21) and wrap prongs around stem.

F. Vacuum Seat Ring Replacement:

- For ERV without Flame Screen:

NOTE: Installation of the pressure pallet diaphragms should be completed prior to installation of the vacuum seat ring.

1. Re-Orient the pressure pallet assembly (3) with vacuum seat ring (8) face down - use 4" x 4" blocks as support. **DO NOT ALLOW DIAPHRAGM (2) OR RETAINER RING (4) TO REST ON THE BLOCKS.**

2. Rotate cap screws (36) CCW to remove weather hood (11). Remove screen (6). Around the bolt circle of the weather collar (7) place match “marks” to indicate the location of each weather hood support (10).

3. Rotate each support (10) CCW and remove. Rotate seat ring nuts (73) CCW to remove nuts, lockwashers (74), weather collar (7) and gasket (5).

4. Re-Orient the pressure pallet assembly (3) with the seat ring (8) face up, again resting on the blocks. Rotate cap screw (9) CCW and remove seat ring (8) and seat ring gasket (5).

6. Clean sealing surfaces on seat ring (8) and both sides of pressure pallet (3).

7. Install new seat ring gasket (5). Position seat ring (8) on gasket (5), align holes and thread cap screws (9) into pallet using a star pattern and tighten to 15 ft. lbs.

8. Re-Orient the pressure pallet assembly (3) with the seat ring (8) face down, again resting on the blocks. Position new gasket (5) and weather collar (7) over cap screws (9).

9. Using the “marks” per 2. previous, install the weather hood supports (10) on the weather collar and tighten to 15 ft-lbs.. On remaining cap screws, install lock washers (74), nuts (73) and tighten to 15 ft-lbs..

10. Reposition the screen (6) around the weather hood supports (10). Align holes in weather hood (11) with holes in supports (10) and install cap screws (36), torque to 15 ft-lbs. Install lower canister (13) into weather hood (11).

11. From underside of pressure pallet (3) assembly slide vacuum pallet (18) assembly - threaded end of stem (21) first, up through center hole of lower canister (13).

12. Into the open end of the canister, install lower spring button (14) and spring (16) over stem (21) into the lower canister (13). Make sure that lower spring coil rests inside the retainer groove of the lower spring button (14).

13. Place upper spring button (14) on top of vacuum spring (16). Make sure that top spring coil rests inside the groove of the spring button.

14. Place one hand on the upper spring button (14) and compress the spring (16) until the threads

of pallet stem (21) protrude through upper spring button (14). With other hand, thread one jam nut (25) on to pallet stem (21).

NOTE: Check to ensure that as the pallet assembly (18) is lifted upwards that the vacuum seat ring (8) is centered and aligned with vacuum pallet (18) assembly.



WARNING

SPRING UNDER COMPRESSION. Exercise caution to avoid accidental spring release. Vacuum spring (16) is now under compression and the accidental release of force may result in flying parts that could cause personal injury.

15. Continue to rotate jam nut (25) CW until the height from the top of the pallet stem (21) to the top of the upper spring button (14) is equal to the value recorded per B.1. previous.

16. Thread a second jam nut (25) on pallet stem (21). Secure tight against first jam nut (25).

17. Place upper spring canister (15) over vacuum spring (16), align bolt holes in canister flanges.

18. Insert cap screws (28) into flange bolt holes and tighten snug - torque to 10 ft-lbs. **NOTE:** DO NOT over tighten screws. Proceed to “H”.

G. Vacuum Seat Ring Replacement: - For ERV with Flame Screen:

NOTE: Installation of the pressure pallet diaphragms should be completed prior to installation of the vacuum seat ring.

1. Orient the pressure pallet assembly (3) and vacuum seat ring (8) face up. Note alignment of the three cap screws in bottom of the lower spring canister (13) with respect to the location of the cap screws (9) around the weather collar (7). Place match “marks” on flame screen (40) and on weather collar (7) to indicate correct alignment of the flame screen bolt holes during re-assembly of the flame screen.

2. To dis-assemble flame screen from lower spring canister (13) rotate three cap screws (28) CCW and remove. **NOTE:** Support lower spring canister (13) and lower spring button (14) from below as cap screws are removed. They may fall out of weather hood.

3. Re-Orient the pressure pallet assembly (3) with vacuum seat ring (8) face down - use 4" x 4" blocks as support. **DO NOT ALLOW DIAPHRAGM (2) OR RETAINER RING (4) TO REST ON THE BLOCKS.**

4. Rotate cap screws (36) CCW to remove weather hood (11). Remove screen (6). Around the bolt circle of the weather collar (7) place match "marks" to indicate the location of each weather hood support (10).

5. Rotate each support (10) CCW and remove. Rotate seat ring nuts (73) CCW to remove nuts, lockwashers (74), weather collar (7), weather collar (41) and flame screen (40).

6. Re-Orient the pressure pallet assembly (3) with the seat ring (8) face up, again resting pressure pallet on the blocks. Rotate cap screw (9) CCW and remove seat ring (8) and seat ring gasket (5).

7. Clean sealing surfaces on seat ring (8) and both sides of pressure pallet (3).

8. Install new seat ring gasket (5). Position seat ring (8) on gasket (5), align holes and thread cap screws (9) into pallet using a star pattern and tighten to 15 ft. lbs.

9. Re-Orient the pressure pallet assembly (3) with the seat ring (8) face down, again resting on the blocks. Position flame screen (40), weather collar gasket (41) and weather collar (7) over cap screws (9). Ensure match marks are in alignment per G.1 and bolt holes.

10. Using the "marks" per G.4. previous, install the weather hood supports (10) on the weather collar and tighten to 15 ft-lbs. On remaining cap screws install lock washers (74), nuts (73) and tighten to 15 ft-lbs.

11. Reposition the screen (6) around the weather hood supports (10). Align holes in weather hood (11) with holes in supports (10) and install cap screws (36), torque to 15 ft-lbs.

12. With open end up, install lower spring button (14) into lower canister (13) and position both through the weather hood (11). Ensure alignment of holes between flame screen (40), lower canister (13) and lower spring button (14).

13. From below the pressure pallet assembly (3) insert three cap screws to secure flame screen to lower canister and spring button - tighten to 10 ft-lbs.

14. From underside of pressure pallet assembly slide vacuum pallet (18) assembly - threaded end of stem (21) first - up through the center hole of the lower canister (13).

15. Install spring (16) over stem (21) and into lower canister (13). Ensure that lower spring coil rest inside the retainer groove of the lower spring button (14).

16. Place upper spring button (14) on top of vacuum spring (16). Make sure that top spring coil rests inside the groove of the spring button.

17. Place one hand on the upper spring button (14) and compress the spring (16) until the threads of pallet stem (21) protrude through upper spring button (14). With other hand, thread one jam nut (25) on to pallet stem (21).

NOTE: Check to ensure that as the pallet assembly (18) is lifted upwards that the vacuum seat ring (8) is centered and aligned with vacuum pallet (18) assembly.



WARNING

SPRING UNDER COMPRESSION. Exercise caution to avoid accidental spring release. Vacuum spring (16) is now under compression and the accidental release of force may result in flying parts that could cause personal injury.

18. Continue to rotate jam nut (25) CW until the height from the top of the pallet stem (21) to the top of the upper spring button (14) is equal to the value recorded per B.1. previous.

19. Thread a second jam nut (25) on pallet stem (21). Secure tight against first jam nut (25).

20. Place upper spring canister (15) over vacuum spring (16), align bolt holes in canister flanges.

21. Insert cap screws (28) into flange bolt holes and tighten snug - torque to 10 ft-lbs. **NOTE:** DO NOT over-tighten cap screws.

H. Re-assemble Pallet to Flange Seat:

1. Lift pallet (3) sub-assembly up to a sufficient height to pass over tops of pallet guides (30). Lower sub-assembly coming to rest on the flange seat (1).

NOTE: Check to ensure that as the pallet assembly (3) is lowered, the flange seat (1) is centered and aligned with pressure pallet (3) assembly.

2. With open end up, place lower pressure spring buttons (32) (hole with large I.D.) over pallet guides (30) coming to rest on pressure pallet.

3. Position travel stops (37) on top of pallet guides (30) and thread adjusting screw (31) through stops and into top of pallet guides (30) hand tighten. Make sure that adjusting screws (31) threads are engaged fully into the pallet guides (30).

4. Rotate nuts (35) CW and wrench tighten against travel stops (37).

5. Slide pressure springs (33) over adjusting screws (31), make sure springs are seated in the spring button retaining groove.

6. Place upper pressure spring buttons (34) on springs (33), make sure springs are seated in the spring button retaining groove.

7. Thread one jam nut (35) CW onto each adjusting screw (31). Recalling the values recorded for the compressed height of each spring per A.1. previous; continue to rotate jam nuts CW using a star pattern until the height from the top of the pressure pallet (3) to the top of the upper spring button (34) is equal to the recorded value for each spring.

8. Thread a second jam nut (35) onto each adjusting screw (31) tighten two nuts against each other.

SECTION V

V. INSPECTION / DIAPHRAGM REPLACEMENT for **8930 and 8940** Hinged - Relief Vents:

See page 14 for a listing of parts. For Model 8930 (Figure 3) disregard item numbers 5 - 8, 10 - 16, 18 - 24, 28, 40, 56, and 73 - 74. These parts are for vacuum service option for the Model 8940 and do not pertain to the pressure only function of the 8930.

To remove the vent from the tank nozzle, loosen and remove the flange bolts and nuts from the tank nozzle and flange seat (1). Attach lifting cables or straps to the lifting lugs/eyebolts (39). Be sure to utilize all lifting lugs in order to keep the unit stable during lifting and transportation. Place the vent flange (1) on a flat work surface.

Model 8930 & 8940:

A. Inspection of Pressure Pallet Diaphragm:

1. Grasp handle (70), lift up to raise and open the weighted pallet assembly.

2. Inspect the diaphragm(s) (2) on the pressure pallet assembly for any signs of damage. Damages may include but are not limited to tears, crinkles/creases, and holes. If it is deemed that the diaphragm need to be replaced, proceed with following steps to replace. If the seating surface (1) is damaged, the seat surface may need to be relapped. If relapping the seating surface does not create a suitable seating surface, a new flange seat (1) is required. Contact your local representative for assistance. Provide Serial Number, Product Code & Set Point Pressure(s) to place an order for parts.

B. Diaphragm Replacement:

1. Remove hex nuts (27), lock washers (26), and diaphragm retainer ring (4) from the pallet. **NOTE:** Pressure set point will dictate the quantity and stack orientation of diaphragm(s). Record diaphragm's stack orientation for re-assembly.

2. Remove diaphragm(s) (2). Clean the pressure pallet (3), especially the pallet groove, and inspect for nicks or scratches.

3. According to stack orientation of the diaphragms B.1 previous, position new diaphragm(s) (2) in the pallet (3) groove. Align holes in diaphragm (2) bolt circle over the cap screws (49) in the pressure pallet (3).

4. Position diaphragm retainer ring (4) over cap screws (49). Install 1 lock washer (26) and 1 nut (27) to each cap screw (49), tighten all nuts to 5 ft. lbs.

5. Close the pressure pallet assembly. Return to Section II for Installation.

Model 8940:

A. Inspection/Replacement of Vacuum Pallet Diaphragm:



WARNING

SPRING UNDER COMPRESSION. Relieve spring compression per following steps. Failure to do so may result in flying parts that could cause personal injury.

1. Remove cap screws (28) from the weather hood (11) and lift off upper spring canister (15). Measure the length of the pallet stem (21), top edge of stem to the top surface of the upper spring button (14). Record this value. It will be required during re-assembly to reset the vacuum range spring pressure prior to installation.

Length of pallet stem _____

NOTE: DO NOT allow vacuum pallet assembly (18) to fall as disassembly continues.

2. Rotate each nut (25) CCW one at a time to remove and to release the compression of the spring (16). **NOTE: May need to grasp a section of the threaded stem (21) with soft-jawed pliers to prevent rotation of the pallet assembly (18). Maintain grip on stem (21) while carefully lowering vacuum pallet assembly (18) to rest on work surface below.**

Lift up to remove upper vacuum spring button (14) and spring (16).

NOTE: If vent was not supplied with a flame screen (5) remove lower spring button (14) and lower spring canister (13). If vent included a flame screen, before removing button (14) and canister (13), draw match "marks" between flange face of the lower spring canister (13) and weather hood (11).

3. Lift handle (70) up to raise the weighted pallet assembly and remove the vacuum pallet assembly (18).

4. Place threaded end of pallet stem (21) in a soft-jaw vise with pallet (18) face up.

5. Remove the cotter pin (56), nut (24), lock washer (23), and the flat washer (22).

6. Remove vacuum pallet (18) and diaphragm (19). Clean pallet (18), especially the pallet groove and inspect for nicks or scratches. **NOTE: Vacuum pressure set point will dictate the quantity and stack orientation of diaphragms.** Record diaphragm's stack orientation for re-assembly.

7. Install new diaphragm(s) (19) over short threaded end of stem (21) onto retainer plate (20). Apply a light coat of TFE paste on the top surface of the last diaphragm (19) around the edge of the center hole.

8. Place vacuum pallet (18) with the machined groove facing down on the diaphragm (19). Apply a light coat of TFE paste to short threaded end of stem (21).

9. Install flat washer (22), lock washer (23) and nut (24) onto the protruding threads of the stem (21). Use a torque wrench to tighten nut to 15 ft-lbs.

10. Insert cotter pin (56) through small hole in the stem (21) and wrap prongs around stem.

B. Vacuum Seat Ring Replacement - For ERV with Counter Weight Design:



CAUTION

Use overhead support and sling to secure Counter Weight. Failure to do so may result in falling parts that could cause personal injury.

1. Attach sling and overhead support around counter weight (58). Remove cotter pins (57) and slide cables (17) off ends of pin (50).

2. Pull pin (50) out of pivot arm assembly (46), spacers (51) and weight arm (47). Set counter weight assembly and parts aside.

3. Rotate nuts (55) CCW and remove. Push hinge pin (52) through pivot arm assembly (46). Lift pallet and vent hood assembly up to remove from flange seat (1) assembly.

4. Proceed to Step D. or E.

C. Vacuum Seat Ring Replacement - For ERV with Stack Weight Design:

1. Rotate top nuts (36) CCW and remove nuts, lock washers (68) and flat washers (67).

2. Lift up to remove stack of pressure weights (64). Maintain stack orientation, do not remove or add any weight that will change the factory calibrated pressure setpoint.

3. Rotate nuts (55) CCW and remove. Push hinge pin (52) through pivot arm assembly (46). Lift pallet and vent hood assembly up to remove from flange seat (1) assembly.

4. Rotate lower jam nuts (36) CCW two - three revolutions to loosen from weather hood. Rotate weight studs CCW and remove from top of weatherhood.

4. Proceed to Step D. or E.

**D. Vacuum Seat Ring Replacement:
- For ERV without Flame Screen:**

1. Position the pressure pallet assembly (3) with vacuum seat ring (8) face down - use 4" x 4" blocks as support. **DO NOT ALLOW DIAPHRAGM (2) OR RETAINER RING (4) TO REST ON THE BLOCKS.**

2. Rotate cap screws (36) CCW to remove weather hood (11). Remove screen (6). Around the bolt circle of the weather collar (7) place match "marks" to indicate the location of each weather hood support (10).

3. Rotate each support (10) CCW and remove. Rotate seat ring nuts (73) CCW to remove nuts, lockwashers (74), weather collar (7) and gasket (5).

4. Re-Orient the pressure pallet assembly (3) with the seat ring (8) face up, again resting on the blocks. Rotate cap screw (9) CCW and remove seat ring (8) and seat ring gasket (5).

6. Clean sealing surfaces on seat ring (8) and both sides of pressure pallet (3).

7. Install new seat ring gasket (5). Position seat ring (8) on gasket (5), align holes and thread cap screws (9) into pallet using a star pattern and tighten to 15 ft. lbs.

8. Re-Orient the pressure pallet assembly (3) with the seat ring (8) face down, again resting on the blocks. Position new gasket (5) and weather collar (7) over cap screws (9).

9. Using the "marks" per 2. previous, install the weather hood supports (10) on the weather collar and tighten to 15 ft-lbs.. On remaining cap screws, install lock washers (74), nuts (73) and tighten to 15 ft-lbs.

10. Reposition the screen (6) around the weather hood supports (10). Align holes in weather hood (11) with holes in supports (10) and install studs/jam nuts or cap screws (36), torque to 15 ft-lbs. Install lower canister (13) into weather hood (11).

11. From underside of pressure pallet (3) assembly slide vacuum pallet (18) assembly - threaded end of stem (21) first, up through center hole of lower canister (13).

12. Into the open end of the canister, install lower spring button (14) and spring (16) over stem (21) into the lower canister (13). Make sure that lower spring coil rests inside the retainer groove of the lower spring button (14).

13. Place upper spring button (14) on top of vacuum spring (16). Make sure that top spring coil rests inside the groove of the spring button.

14. Place one hand on the upper spring button (14) and compress the spring (16) until the threads of pallet stem (21) protrude through upper spring button (14). With other hand, thread one jam nut (25) on to pallet stem (21).

NOTE: Check to ensure that as the pallet assembly (18) is lifted upwards that the vacuum seat ring (8) is centered and aligned with vacuum pallet (18) assembly.



WARNING

SPRING UNDER COMPRESSION. Exercise caution to avoid accidental spring release. Vacuum spring (16) is now under compression and the accidental release of force may result in flying parts that could cause personal injury.

15. Continue to rotate jam nut (25) CW until the height from the top of the pallet stem (21) to the top of the upper spring button (14) is equal to the value recorded per A.1. previous.

16. Thread a second jam nut (25) on pallet stem (21). Secure tight against first jam nut (25).

17. Place upper spring canister (15) over vacuum spring (16), align bolt holes in canister flanges.

18. Insert cap screws (28) into flange bolt holes and tighten snug - torque to 10 ft-lbs. **NOTE:** DO NOT over tighten screws.

Proceed to F. or G.

**E. Vacuum Seat Ring Replacement:
- For ERV with Flame Screen:**

NOTE: Installation of the pressure pallet diaphragms should be completed prior to installation of the vacuum seat ring.

1. Orient the pressure pallet assembly (3) and vacuum seat ring (8) face up. Note alignment of the three cap screws (28) in bottom of the lower spring canister (13) with respect to the location of the cap screws (9) around the weather collar (7). Place match “marks” on flame screen (40) and on weather collar (7) to indicate alignment of the flame screen bolt holes during re-assembly of the flame screen.

2. To dis-assemble flame screen from lower spring canister (13) rotate three cap screws (28) CCW and remove. **NOTE: Support lower spring canister (13) and lower spring button (14) from below as cap screws are removed. They may fall out of weather hood.**

3. Re-Orient the pressure pallet assembly (3) with vacuum seat ring (8) face down - use 4” x 4” blocks as support. **DO NOT ALLOW DIAPHRAGM (2) OR RETAINER RING (4) TO REST ON THE BLOCKS.**

4. Rotate cap screws (36) CCW to remove weather hood (11). Remove screen (6). Around the bolt circle of the weather collar (7) place match “marks” to indicate the location of each weather hood support (10).

5. Rotate each support (10) CCW and remove. Rotate seat ring nuts (73) CCW to remove nuts, lockwashers (74), weather collar (7), weather collar (41) and flame screen (40).

6. Re-Orient the pressure pallet assembly (3) with the seat ring (8) face up, again resting pressure pallet on the blocks. Rotate cap screw (9) CCW and remove seat ring (8) and seat ring gasket (5).

7. Clean sealing surfaces on seat ring (8) and both sides of pressure pallet (3).

8. Install new seat ring gasket (5). Position seat ring (8) on gasket (5), align holes and thread cap screws (9) into pallet using a star pattern and tighten to 15 ft. lbs.

9. Re-Orient the pressure pallet assembly (3) with the seat ring (8) face down, again resting on the blocks. Position flame screen (40), weather collar gasket (41) and weather collar (7) over cap screws (9). Ensure match marks are in alignment per E.1 and bolt holes.

10. Using the “marks” per E.4. previous, install the weather hood supports (10) on the weather collar and tighten to 15 ft-lbs. On remaining cap screws install lock washers (74), nuts (73) and tighten to 15 ft-lbs.

11. Reposition the screen (6) around the weather hood supports (10). Align holes in weather hood (11) with holes in supports (10) and install studs/jam nuts or cap screws (36), torque to 15 ft-lbs.

12. With open end up, install lower spring button (14) into lower canister (13) and position both through the weather hood (11). Ensure alignment of holes between flame screen (40), lower canister (13) and lower spring button (14).

13. From below the pressure pallet assembly (3) insert three cap screws (28) to secure flame screen (40) to lower canister (13) and lower spring button (14) - tighten to 10 ft-lbs.

14. From underside of pressure pallet assembly slide vacuum pallet (18) assembly - threaded end of stem (21) first - up through the center hole of the lower canister (13).

15. Install spring (16) over stem (21) and into lower canister (13). Ensure that lower spring coil rest inside the retainer groove of the lower spring button (14).

16. Place upper spring button (14) on top of vacuum spring (16). Make sure that top spring coil rests inside the groove of the spring button.

17. Place one hand on the upper spring button (14) and compress the spring (16) until the threads of pallet stem (21) protrude through upper spring button (14). With other hand, thread one jam nut (25) on to pallet stem (21).

NOTE: Check to ensure that as the pallet assembly (18) is lifted upwards that the vacuum seat ring (8) is centered and aligned with vacuum pallet (18) assembly.



WARNING

SPRING UNDER COMPRESSION. Exercise caution to avoid accidental spring release. Vacuum spring (16) is now under compression and the accidental release of force may result in flying parts that could cause personal injury.

18. Continue to rotate jam nut (25) CW until the height from the top of the pallet stem (21) to the top of the upper spring button (14) is equal to the value recorded per A.1. previous.

19. Thread a second jam nut (25) on pallet stem (21). Secure tight against first jam nut (25).

20. Place upper spring canister (15) over vacuum spring (16), align bolt holes in canister flanges.

21. Insert cap screws (28) into flange bolt holes and tighten snug - torque to 10 ft-lbs. **NOTE: DO NOT over-tighten cap screws.**

Proceed to F or G.

F. Assemble Pallet Assembly & Counter Weight to Flange Seat Assembly:

1. Place pallet assembly on flange seat (1). Align pivot arm (46) with hinge (60) and insert hinge pin (52). Install nut (55).

2. Use overhead support and sling to lift counter weight (58). Align hole in weight arm (47) with pin hole in arm assembly (46). Press pin (50) through arm assembly (46), spacers (51) and weight

arm (47). Slip cables (17) over pin (50) ends and install cotter pins (57).

G. Assemble Pallet Assembly & Stack Weights to Flange Seat Assembly:

1. Place pallet assembly on flange seat (1). Align pivot arm (46) with hinge (60) and insert hinge pin (52). Install nut (55).

2. Position stack weights (64) over studs on top of jam nuts in vent hood (11). Maintain stack orientation, do not remove or add any weight that will change the factory calibrated pressure setpoint.

3. Install flat washers (67), lock washers (68) and hex nuts (36). Torque to 15 ft.-lbs.

SECTION VI

VI. ORDERING INFORMATION

NEW REPLACEMENT UNIT vs PARTS "KIT" FOR FIELD REPAIR

To obtain a quotation or place an order, please retrieve the Serial Number and Product Code that was stamped on the metal name plate and attached to the unit. This information can also be found on the Bill of Material ("BOM"), a parts list that was provided when unit was originally shipped. (Serial Number typically 6 digits).

NEW REPLACEMENT UNIT:

Contact your local Cashco Sales Representative with the Serial Number, Product code and the pressure / vacuum settings. With this information they can provide a quotation for a new unit including a complete description, price and availability.

PARTS "KIT" for FIELD REPAIR:

Contact your local Cashco Sales Representative with the Serial Number, Product code and Pressure / Vacuum settings. Identify the parts and the quantity required to repair the unit from the "BOM" sheet that was provided when unit was originally shipped.



CAUTION

Do not attempt to alter the original construction of any unit without assistance and approval from the factory. All purposed changes will require a new name plate with appropriate ratings and new product code to accommodate the recommended part(s) changes.

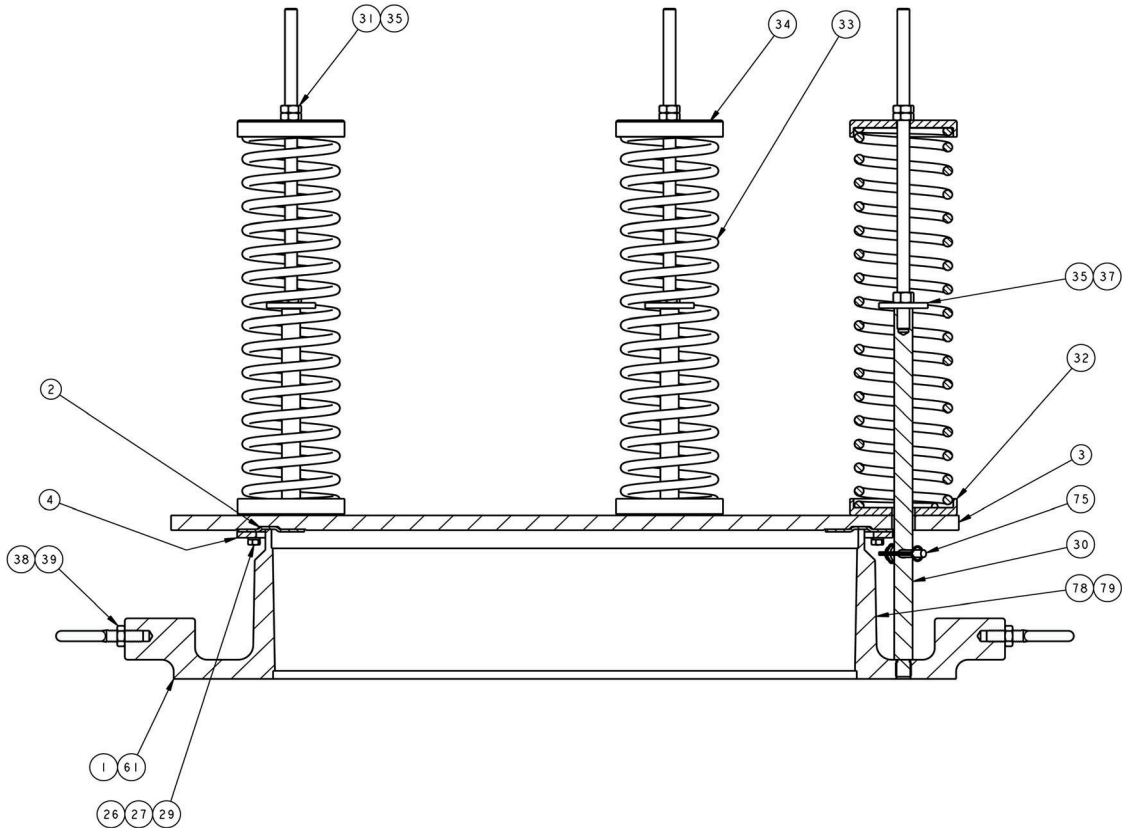
NOTE: Those part numbers that have a quantity indicated under "Spare Parts" in column "A" reflect minimum parts required for inspection and rebuild, - "Soft Goods Kit". Those in column "B" include minimum trim replacement parts needed plus those "Soft Goods" parts from column "A".

If the "BOM" is not available, refer to the cross-sectional drawings included in this manual for part identification and selection.

A Local Sales Representative will provide quotation for appropriate Kit Number, Price and Availability.

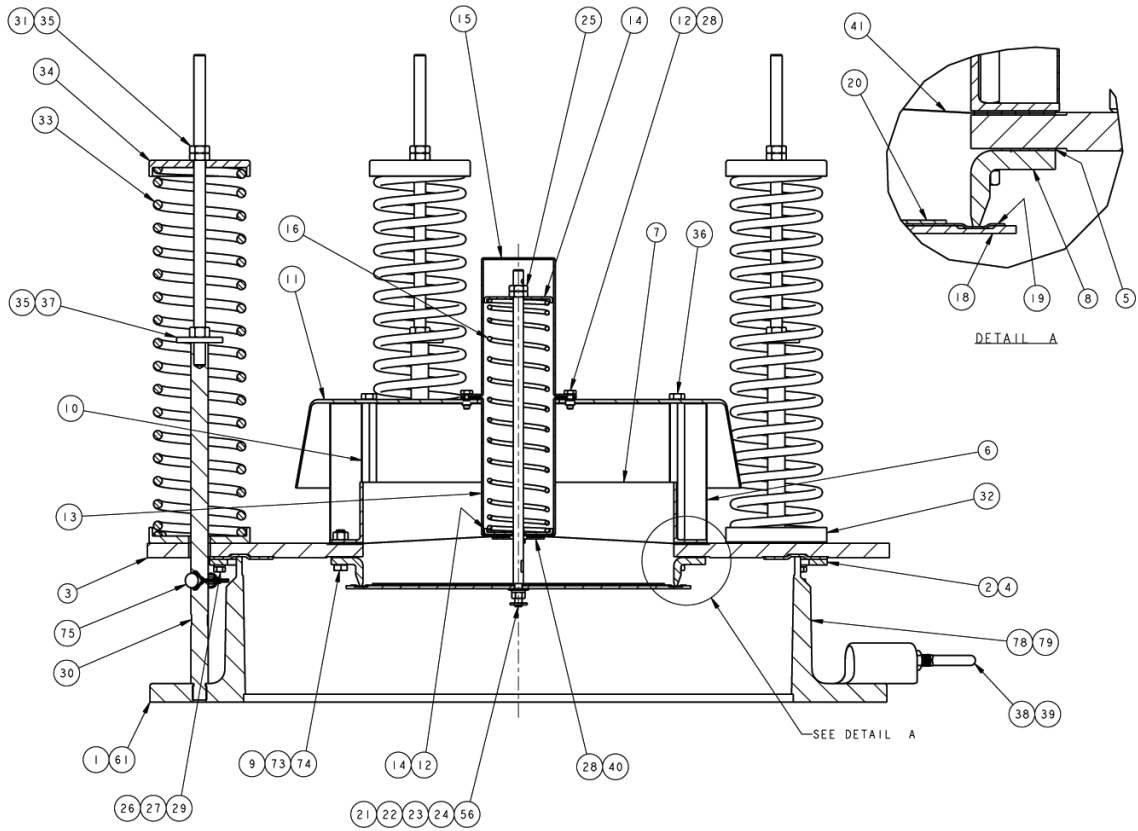
MODEL 8910 PRESSURE ERV Top Guided - Spring

Figure 1



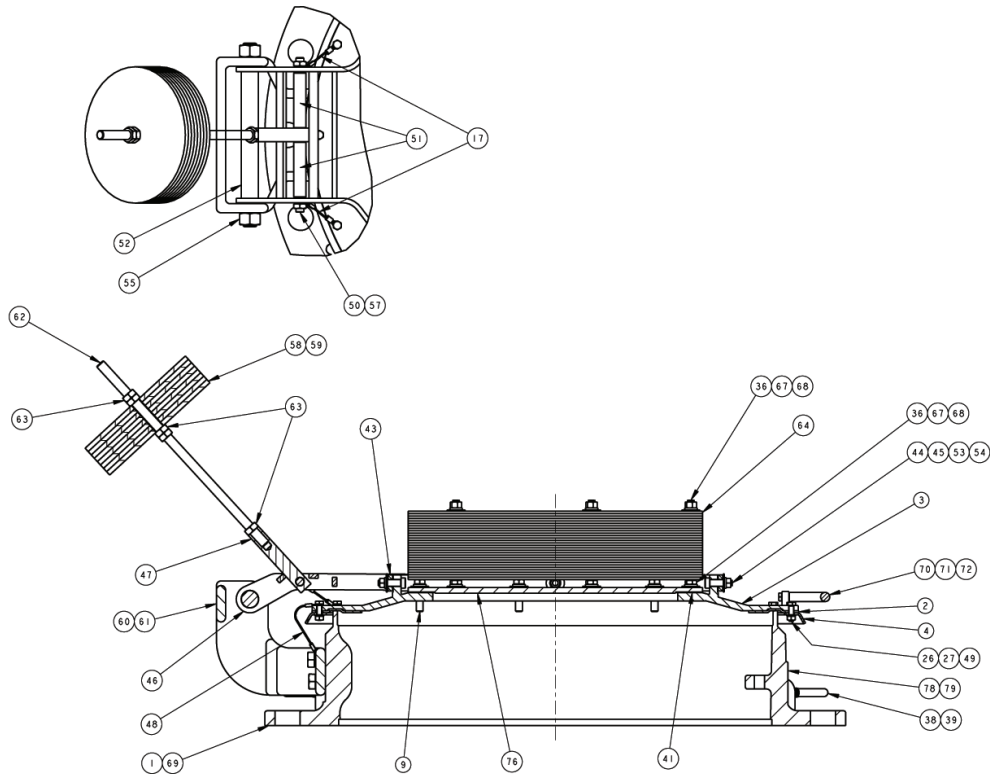
ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
1.	Flange Seat	23.	Lock Washer
2.	Press. Pallet Diaphragms *	24.	Finish Nut
3.	Pressure Pallet	25.	Jam Nut
4.	Diaphragm Retainer (Press.)	26.	Lock Washer
5.	Seat Ring Gaskets *	27.	Nut
6.	Screen	28.	Cap Screw
7.	Weather Collar	29.	Stud
8.	Seat Ring	30.	Pallet Guide
9.	Cap Screw	31.	Adjusting Screw
10.	Weather Hood Support	32.	Lower Press. Spring Button
11.	Weather Hood	33.	Pressure Spring
12.	Rivet Nut	34.	Upper Press. Spring Button
13.	Lower Spring Canister	35.	Jam Nut
14.	Vacuum Spring Button	36.	Cap Screw
15.	Upper Spring Canister	37.	Travel Stop
16.	Vacuum Spring	38.	Jam Nut
17.	Stabilizer Cable	39.	Eye Bolt
18.	Vacuum Pallet	40.	Flame Screen
19.	Vacuum Pallet Diaphragm *	41.	Weather Collar Gasket *
20.	Diaphragm Retainer (Vac.)	56.	Cotter Pin
21.	Pallet Stem	73.	Seat Ring Nut
22.	Flat Washer	74.	Seat Ring Lock Washer
	* Recommended Spare Parts	75.	Pallet Guide Pin
		61.	Hinge Bolt (Not Shown)

MODEL 8920 PRESSURE/VACUUM ERV
Top Guided - Spring
 Figure 2



MODEL 8930 PRESSURE ERV Hinged Design

Figure 3

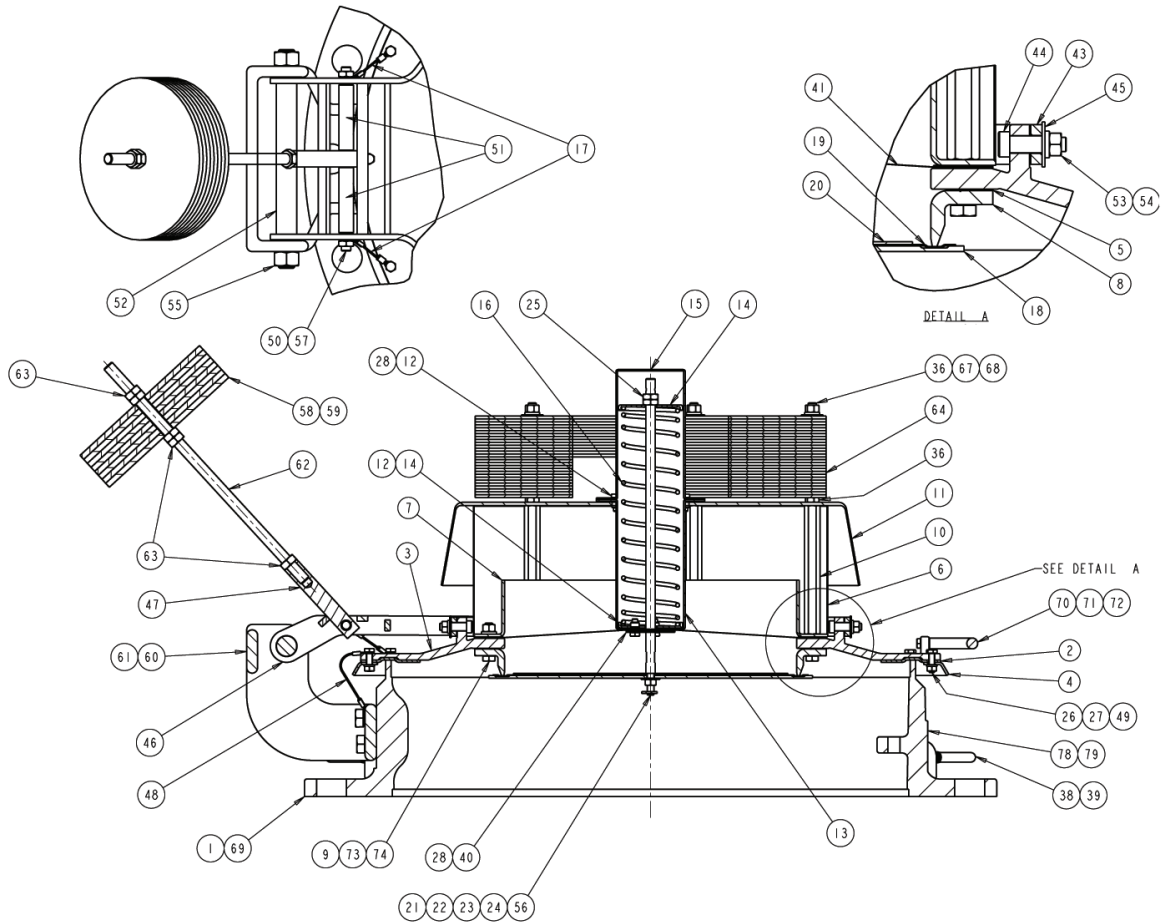


ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
1.	Flange Seat	43.	Pallet Swivel
2.	Press. Pallet Diaphragms *	44.	Shoulder Screw - Pivo Clip
3.	Pressure Pallet	45.	Plain Washer - Pivo Clip
4.	Diaphragm Retainer (Press.)	46.	Pin Arm Assembly
5.	Seat Ring Gaskets *	47.	Weight Arm
6.	Screen	48.	Strap
7.	Weather Collar	49.	Cap Screw
8.	Seat Ring	50.	Pin - Counter Weight
9.	Cap Screw	51.	Spacer _ Weight Arm
10.	Weather Hood Support	52.	Hinge Pin
11.	Weather Hood	53.	Lock Washer - Pivot Clip
12.	Rivet Nut	54.	Cap Screw - Pivot Clip
13.	Lower Spring Canister	55.	Hex Nut - Hinge Pin
14.	Vacuum Spring Button	56.	Cotter Pin - Vacuum Pallet
15.	Upper Spring Canister	57.	Cotter Pin - Counter Wt. Pin
16.	Vacuum Spring	58.	Counter Weight (SST)
17.	Stabilizer Cable	59.	Counter Weight (Lead)
18.	Vacuum Pallet	60.	Hinge
19.	Vacuum Pallet Diaphragm *	61.	Hinge Bolt
20.	Diaphragm Retainer (Vac.)	62.	Stud - Counter Weight
21.	Pallet Stem - Vacuum	63.	Lock Nut - Counter Weight
22.	Flat Washer	64.	Pressure Weight
23.	Lock Washer	67.	Flat Washer
24.	Finish Nut	68.	Lock Washer
25.	Jam Nut - Canister	69.	Set Screw - Slotted
26.	Lock Washer	70.	Handle
27.	Nut	71.	Handle Screws
28.	Cap screw - Canister	72.	Handle Lock Washer
36.	Cap Screw - Weather Hood	73.	Seat Ring Nut
38.	Jam Nut - Lift Lug	74.	Seat Ring Lock Washer
39.	Eye Bolt	76.	Vacuum Cover
40.	Flame Screen		
41.	Weather Collar Gasket *		

* Recommended Spare Parts

MODEL 8940 PRESSURE/VACUUM ERV Hinged Design

Figure 4



The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such product at any time without notice. Cashco does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Cashco product remains solely with the purchaser.



IOM ADDENDUM:

ATEX DIRECTIVE 2014/34/EU and THE EQUIPMENT AND PROTECTIVE SYSTEMS INTENDED FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES REGULATIONS 2016

Cashco declares that the products listed in the table below has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II of the ATEX Directive 2014/34/EU and given in Schedule 1 of The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016. Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN ISO 80079-36:2016 and EN ISO 80079-37:2016. The product will be marked as follows:



The 'X' placed after the technical file number indicates that the product is subject to specific conditions of use as follows:

1. The maximum surface temperature depends entirely on the operating conditions and not the equipment itself. The combination of the maximum ambient and the maximum process medium temperature shall be used to determine the maximum surface temperature and corresponding temperature classification, considering the safety margins described prescribed in EN ISO 80079-36:2016, Clause 8.2. Additionally, the system designer and users must take precautions to prevent rapid system pressurization which may raise the surface temperature of system components and tubing due to adiabatic compression of the system gas. Furthermore, the Joule-Thomson effect may cause process gases to rise in temperature as they expand going through a regulator. This could raise the external surface temperature of the regulator body and the downstream piping creating a potential source of ignition. Whether the Joule-Thomson effect leads to heating or cooling of the process gas depends on the process gas and the inlet and outlet pressures. The system designer is responsible for determining whether the process gas temperature may raise under any operating conditions.
2. Where the process medium is a liquid or semi-solid material with a surface resistance in excess of $1G\Omega$, special precautions shall be taken to ensure the process does not generate electrostatic discharge.
3. Special consideration shall be made regarding the filtration of the process medium if there is a potential for the process medium to contain solid particles. Where particles are present, the process flow shall be $<1\text{m/s}$ ($<3.3\text{ft/s}$) in order to prevent friction between the process medium and internal surfaces.
4. Effective earthing (grounding) of the product shall be ensured during installation.
5. The valve body/housing shall be regularly cleaned to prevent build up of dust deposits.
6. Regulators must be ordered with the non-relieving option (instead of the self-relieving option) if the process gas they are to be used with is hazardous (flammable, toxic, etc.). The self-relieving option vents process gas through the regulator cap directly into the atmosphere while the non-relieving option does not. Using regulators with the self-relieving option in a flammable gas system could create an explosive atmosphere in the vicinity of the regulator.
7. Tied diaphragm regulators with outlet ranges greater than 7 barg (100 psig) should be preset to minimize the risk that improper operation might lead to an outboard leak and a potentially explosive atmosphere.
8. All equipment must only be fitted with manufacturer's original spare parts.
9. Ensure that only non-sparking tools are used, as per EN 1127-1, Annex A.

	PRODUCT
REGULATORS	31-B, 31-N
	1164, 1164(OPT-45)
	1171, 1171(OPT-45), 1171(CRYO)
	2171, 2171(OPT-45), 2171(CRYO), 3171
	1465, 3381, 3381(OPT-45), 3381(OPT-40)
	4381, 4381(OPT-37), 4381(CRYO), 4381(OPT-45), 5381
	MPRV-H, MPRV-L
	PBE, PBE-L, PBE-H
	CA-1, CA-2
	CA1, SA1, CA4, SA4, CA5, SA5
	DA2, DA4, DA5, DA6, DA8
	DA0, DA1, DAP, SAP
	SLR-1, SLR-2, PTR-1
	ALR-1, ULR-1, PGR-1
	BQ, BQ(OPT-45), BQ(CRYO)
	123, 123(CRYO), 123(OPT-45), 123(OPT-46G)
	123-1+6, 123-1+6(OPT-45), 123-1+6(OPT-46G), 123-1+6+S, 123-1+6+S(OPT-40)
	1000HP, 1000HP(OPT-37), 1000HP(OPT-45), 1000HP(OPT-45G), 1000HP(CRYO)
	1000HP-1+6, 1000HP-1+8, 1000LP, 1000LP(OPT-45), 1000LP(OPT-46G)
	6987
	8310HP, 8310HP-1+6, 8310HP-1+8, 8310LP, 8311HP, 8311LP
	345, 345(OPT-45)
	BA1/BL1, PA1/PL1
	C-BPV, C-PRV, C-CS
	D, D(CRYO), D(OPT-37), D(OPT-20), D(OPT-45)
	DL, DL(LCC), DL(OPT-45)
	BR, BR(CRYO)
	HP, HP(LCC), HP(OPT-45), HP(OPT46G), HP-1+6+S(OPT-40), HP-1+6+S
	P1, P2, P3, P4, P5, P7
	B2, B7
	POSR-1, POSR-2
	5200P, 5300P
	135
NW-PL, NW-SO	
CG-PILOT	
FG1	
CONTROL VALVES	RANGER, 987, PREMIER
	964, 521, 988, 988-MB, 989
	2296/2296HF
	SCV-30, SCV-S
TANK BLANKETING	8700, 8910, 8920, 8930, 8940
	2100, 2199
	3100, 3200, 3300, 3400, 3500, 3600, 3700
	1078, 1088, 1100, 1049
	5100, 5200, 5400, 5500
	4100, 4200, 4300, 4400, 4500, 4600
MISC	764P/PD, 764-37, 764T

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