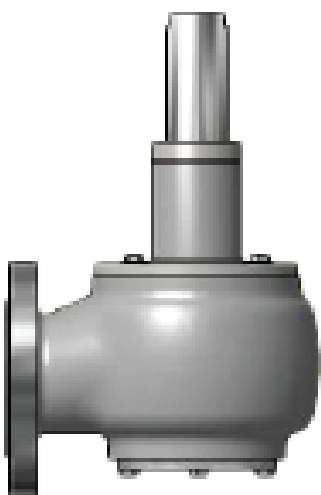




ANDERSON GREENWOOD TYPE 4410HV VACUUM RELIEF VALVE INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Before installation, these instructions must be carefully read and understood.



SAFETY PRECAUTIONS

Read and understand this instruction manual before installing, operating or performing maintenance on the Anderson Greenwood Type 4410HV Vacuum Relief Valve (VRV) following all precautions and warnings noted herein.

NOTE

This manual is issued for guidance only and does not affect our standard terms and conditions and our Product Limited Warranty, all of which are available on request.

! WARNING

This product is a safety related component and improper application, installation or maintenance of the valve or the use of parts or components not supplied by Emerson Automation Solutions Final Control UK Ltd may result in failure of the valve.

The information and technical data contained in this document are subject to change without notice. Emerson Automation Solutions Final Control UK Ltd does not warrant that the specifications are current and assumes no responsibility for the use or misuse thereof. The purchaser should verify that there have been no changes to the specifications prior to use.

The relief valve must be isolated from tank pressure before servicing. All gas/vapour must be blocked and pressure safely vented. Wear appropriate protective clothing and breathing apparatus if hazardous gas/vapours are present. Use appropriate lifting equipment where required.

GENERAL DESCRIPTION

The Anderson Greenwood Type 4410HV VRV is employed in gas/vapour service applications for low pressure storage tanks, vessels or applications requiring vacuum protection with high capacity flow requirements. This product helps to prevent damage to the tank and also prevents the tank's contents from escaping, ensuring the safety of personnel and the surrounding environment.

Vacuum valves are designed to limit the maximum vacuum that can exist in a tank due to outflow of the tank contents or due to changes in temperature as a result of environmental conditions.

The Anderson Greenwood Type 4410HV VRV consists of a flanged tank connection with a vacuum seat which draws atmospheric pressure into the tank being protected.

- For ease of maintenance the vacuum seat is removable.
- Polytetrafluoroethylene (PTFE) coated internals are supplied as an all-weather option.

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OPERATION

The Anderson Greenwood Type 4410HV VRV is a direct acting vent valve with a spring-loaded pallet to keep the valve closed. When tank vacuum acting on the seat sealing area equals the opposing force acting on the pallet, the valve is on the threshold of opening. Any further increase in vacuum will cause the vacuum pallet to begin to lift thus breaking the vacuum by allowing atmospheric air to be drawn into the tank (inbreathing).

In order for the valve to open and achieve its design lift, an increase in vacuum will be required. The Type 4410HV VRV has been designed to achieve this design lift and rated capacity within 10% increase in vacuum. Vacuum settings are changed by altering the compression on the vacuum setting spring.

VACUUM SETTING

If the vacuum settings are to be verified prior to installation, it is recommended that a test rig with a suitable accumulator be used having the following general features:

- Observed vacuum shall be measured in the accumulator tank.
- The flange on which the valve is mounted shall be vertical.
- The valve should be tested using clean air or nitrogen.

Remove valve from shipping container and remove all packaging. Check that the vacuum setting, the rated capacity and other details on the nameplate are correct.

Vacuum Setting Verification

For verification of the vacuum setting, the flow rate out of the accumulator should be limited such that when the vacuum setting is reached, the point at which atmospheric pressure is admitted to the accumulator can be observed.

1. Ensure that the test rig is clean and fasten the valve securely to the test flange.
2. Check nameplate for required vacuum setting.
3. Establish a steady flow out of the test vessel to increase the inlet vacuum slowly. The adjusted vacuum setting is the vacuum at which no further rise is observed. Repeat a further two times to ensure repeatability.

Vacuum Setting Adjustment (See Figure 1)

The valve has been factory set to the required setting, however, if it is necessary to make a vacuum setting adjustment, this can be done as follows:

1. Remove cap (21) and release locknut (19).
2. The vacuum setting can be increased or reduced using adjusting screw (17). Turning clockwise will increase vacuum setting and anticlockwise will decrease vacuum setting. After adjustment, secure adjusting screw (17) using locknut (19). Ensure cap gasket (20) is in place and refit cap (21).
3. Repeat vacuum setting verification and repeat adjustment if required.

INSTALLATION

The mating connection to the tank should be flat machined vertical flange (the Type 4410HV is designed for side mounting on tank outer wall) and should be thoroughly cleaned to remove all foreign matter which could lead to valve leakage if trapped between the valve seat and the pallet. The bore diameter of the tank connection nozzle should be at least equal to the bore of the valve connection. For correct valve operation there shall be no external loads applied to the valve body.

A gasket should be fitted to the mating flange ensuring it does not obstruct the flow path and install the valve. Ensure that the main axis of the valve is perpendicular. Flange bolting should be tightened uniformly to ensure a good seal.

For valves of aluminium construction, appropriate flat face flanges should be used and a full-face gasket fitted.

NOTE

Storage tank piping configurations should conform to recognised standards. Different configurations should be taken into consideration when sizing the valve for the application.

It is recommended that the external surfaces of carbon steel valves are painted immediately after installation.

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MAINTENANCE

Regular inspection should be carried out to ensure that the vacuum port is free from debris and that nothing preventing the correct operation of the valve is present. Maintenance should be performed at regular intervals and should be carried out by suitably qualified personnel in an appropriately equipped workshop.

Alternatively, the valve should be returned to the manufacturer or suitably authorised agent for service/repair. During transport to the workshop the valve should be kept vertical to prevent damage to the internals.

⚠ WARNING

The relief valve must be isolated from tank pressure before servicing or removing. All gas/vapour must be blocked and pressure safely vented. Wear appropriate protective clothing and breathing apparatus if hazardous gas/vapours are present.

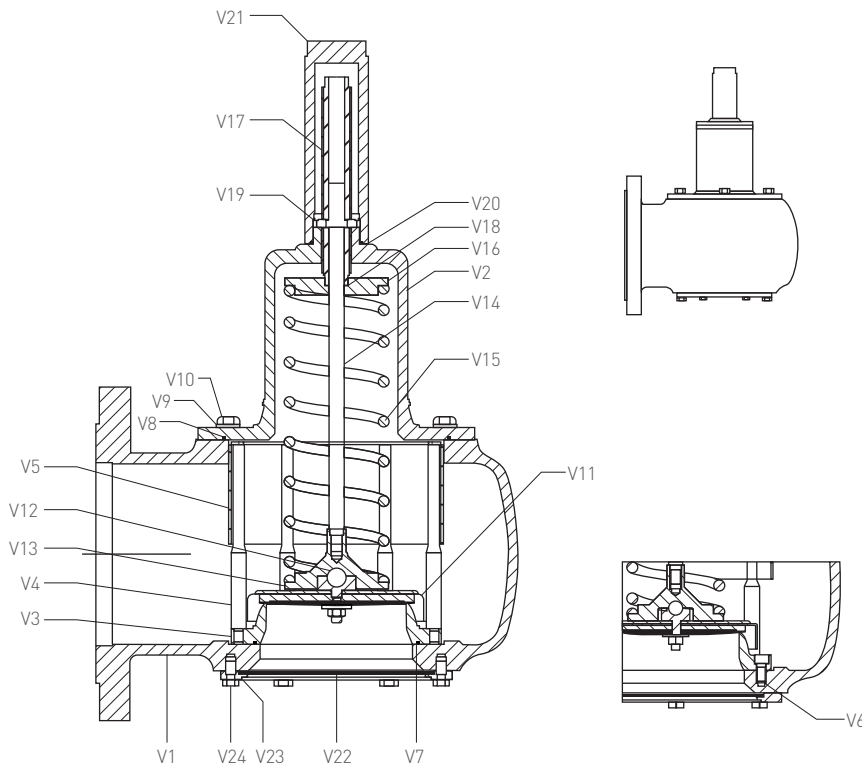
VALVE DISASSEMBLY (SEE FIGURE 1)

Before the valve is disassembled it should be thoroughly cleaned to remove potential hazards from process contamination.

General

1. Remove cap (V21), cap gasket (V20) and release locknut (V19). Remove all load from spring by removing adjusting screw (V17) complete with locknut. Remove hex set screws (V10), washers (V9), casing (V2) and casing O-ring (V8).
2. Remove upper spring plate (V16). For valves 6 in. and larger, recover skid ring (V18) which is fitted between the adjusting screw and upper spring plate. Remove spring (V15) and stem (V14) complete with lower spring plate (V13). Remove shroud (V5), ball (V12) then lift out vacuum pallet assembly (V11).
3. Remove seat (V3) complete with guide posts (V4) by removing cap screws (V6). Remove O-ring (V7). Identify pallet assembly and seat as vacuum side parts.
4. If required, unscrew hex set screws (V24), remove mesh plate (V23) and recover vacuum mesh (V22).

FIGURE 1
Valve General Assembly



Parts List

KEY	PART
V1	Body
V2	Casting
V3	Seat
V4	Guide post
V5	Shroud
V6	Cap screw
V7	Seat O-ring
V8	Casting O-ring
V9	Casting washer
V10	Casting hex set screw
V11	Pallet assembly
V12	Ball
V13	Lower spring plate
V14	Stem
V15	Compression spring
V16	Upper spring plate
V17	Adjusting screw
V18	Skid ring (6 in. and Larger)
V19	Locknut
V20	Cap gasket
V21	Cap
V22	Vacuum mesh
V23	Mesh plate
V24	Mesh plate hex set screw

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Pallet Assembly (See Figure 2)

Remove nut (8) and washer, where used (7) to release pivot point (9) from assembly. Separate pallet disc (6), diaphragm (5), diaphragm plate (4), disc (3), pallet (2) and support plate (1). Remove pivot point gasket (10).

VALVE REFURBISHMENT

With valve in component parts, thoroughly clean all surfaces with a suitable solvent and check for wear, corrosion or other forms of damage. Particular attention should be given to the sealing face of the valve seat.

Slight damage can be removed by lapping the seat face (removing vacuum posts); however, care should be taken not to increase the width of the seat face beyond those given in Table 1. If successive refurbishments or severe damage requires the seat to be re-machined, consult the factory for approved dimensions.

Discard and replace any damaged parts plus all soft goods including:

- O-rings
- Diaphragms
- Gaskets
- Skid ring (NPS 6 (DN 150) and above)

Also discard and replace the pallet disc.

VALVE REASSEMBLY

Pallet Assembly (See Figure 2)

1. Assemble pivot point gasket (10), support plate (1), pallet (2), disc (3), diaphragm plate (4), diaphragm (5) and pallet disc (6) to pivot point (9) and secure using washer if fitted (7) and nut (8).
2. If required, PTFE tape can be applied to stem threads and locking compound used to secure the nut.

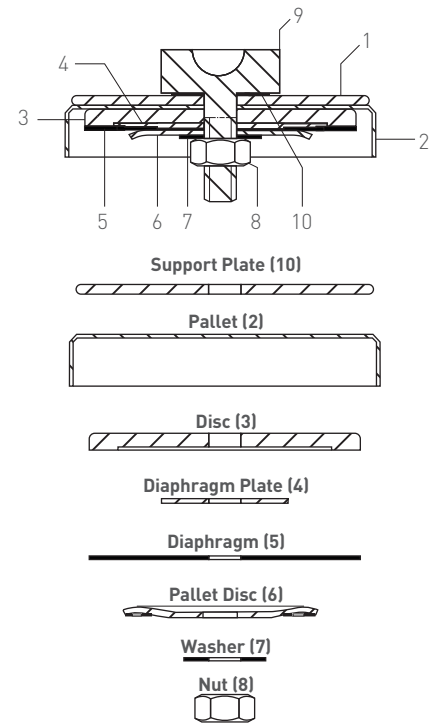
General (See Figure 1)

1. If previously removed, assemble vacuum mesh (V22), mesh plate (V23) and secure using hex set screws (V24).
2. Reassemble guide posts (V4) (if removed), and O-ring (V7) to seat (V3). Secure seat to body (V1) using cap screws (V6) ensuring that O-ring is not dislodged during assembly.
3. Reinstall vacuum pallet as identified during valve disassembly ensuring the pallet slides easily between the vacuum posts. Place ball (V12) in socket of pivot point (9, see Figure 2) and assemble shroud (V5) which should be installed over the vacuum posts (V4).
4. Assemble stem (V14) complete with bottom spring plate (V13) to locate on ball (V12). Assemble spring (V15), and top spring plate (V16). For valves 6 in. and larger, fit skid ring (V18) in recess of top spring plate.
5. Assemble casing O-ring (V8) to casing (V2) and assemble over stem (V14) securing with washers (V9) and hex set screws (V10). Assemble adjusting screw (V17) over stem and screw into casing (V2). Apply nominal load to spring and secure locknut (V19). Assemble cap gasket (V20) and cap (V21).

TESTING SET VACUUM

The vacuum setting should be checked and if necessary adjusted as described in Vacuum Setting section.

FIGURE 2
Pallet Assembly



NOTE

Washer Item (7) not fitted to NPS 2 and 3 (DN 50 and 80) sizes.

FIGURE 3

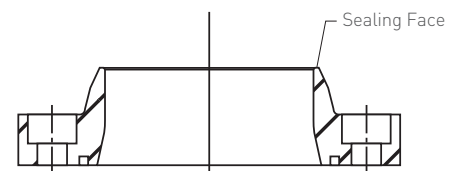


TABLE 1. SEAT LAP BAND WIDTH

VALVE SIZE, NPS (DN)	NOMINAL WIDTH, in. (mm)	MAXIMUM WIDTH, in. (mm)
2 (50)	0.039 (1.0)	0.059 (1.5)
3 (80)	0.039 (1.0)	0.059 (1.5)
4 (100)	0.047 (1.2)	0.071 (1.8)
6 (150)	0.059 (1.5)	0.071 (1.8)
8 (200)	0.059 (1.5)	0.087 (2.2)
10 (250)	0.079 (2.0)	0.118 (3.0)
12 (300)	0.079 (2.0)	0.118 (3.0)

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TABLE 2. REPLACEMENT PARTS

DESCRIPTION	REFERENCE	USAGE	MATERIAL	NOMINAL SIZE, NPS (DN)						
				2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
Pallet disc	Figure 2	Pallet assembly	SST	11182941	11182943	11182945	11182946	11183009	11183092	11183133
Diaphragm	Figure 2	<200 mbar	PTFE	11281485	11280622	11281490	11281493	11281496	11281498	11281500
		>200 mbar	PTFE	11281489	11280624	11281492	11281495	11281497	11280837	11281502
Gasket	Figure 2	Pivot point	General service gasket	11272778	11272778	11272778	11405355	11272733	11272733	11272733
	Figure 1	Cap	General service gasket	11411641	11411641	11411641	11411646	11411646	11411649	11411649
O-ring	Figure 1	Seat	Viton	11183351	11183354	11183320	11180110	11183326	11182024	11180089
			Nitrile (NBR)	11183350	11183353	11183319	11180109	11183325	11182023	11180088
			PTFE	11183349	11183352	11183318	11180108	11183324	11182022	11180087
		Cover	Viton	11183314	11183317	11183323	11183326	11183334	11183337	11183340
			Nitrile (NBR)	11183313	11183316	11183322	11183325	11183333	11183336	11183339
			PTFE	11183312	11183315	11183321	11183324	11183332	11183335	11183338
Skid ring	Figure 1	----	PTFE	-----			11405352	11272734	11275612	11275612

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