SUMMIT™

VV75

Installation, Operation, and Maintenance Manual

Model: VV75 Internal Gear Pump

Internal Gear Pump

SUMMIT™
PUMP, Inc

www.SUMMITPUMP.com

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Pumping units assembled by Summit Pump, Inc., Green Bay, WI are guaranteed to be free from defects in material and workmanship for one year from date of shipment from factory in Green Bay, WI. The obligation under this warranty, statutory or otherwise, is limited to replacement or repair at Green Bay, WI, of such part as shall appear to us upon inspection at such point, to have been defective in material or workmanship.

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2 INTRODUCTION

This installation, operation, and maintenance manual is designed to help you achieve the best performance and longest life from your Summit Pump.

This pump is a positive displacement internal gear type. The pump's drive shaft turns a rotor, with internal teeth, which rotates the idler with external teeth. The idler rotates on a pin and meshes its external teeth with the rotor's internal teeth.

The crescent is integrated with the pump head and spaced between the rotor and idler. As the gear teeth disengage at the intake port, liquid enters and is trapped in the space of each gear tooth. The liquid is carried to the discharge port. The meshing of the two gears and the space reduction, forces the liquid from the pump through the discharge port. Figure 2-1 below illustrates the internal gear pump design principle.

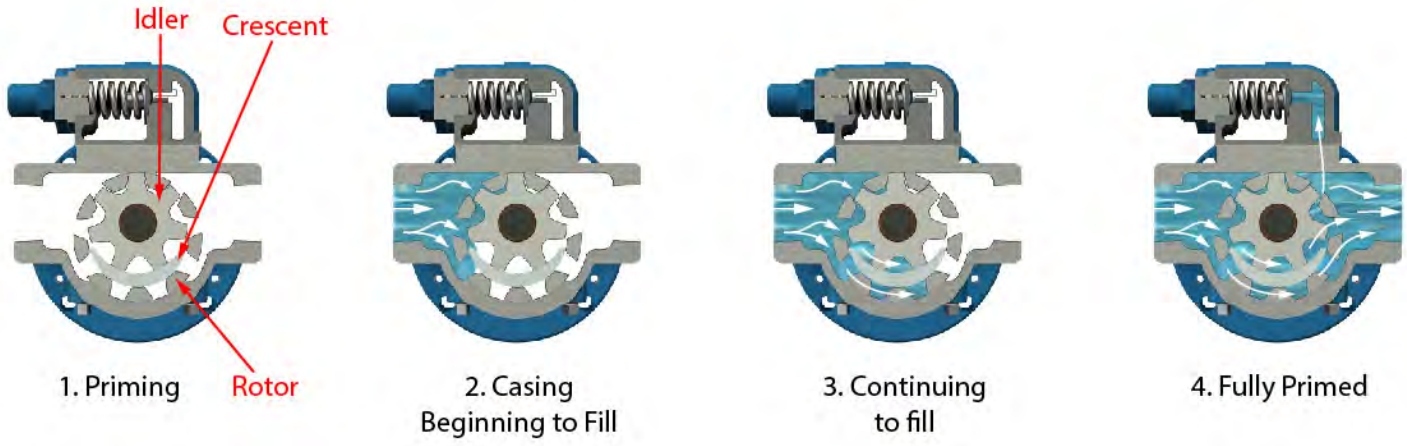


Figure 2-1: Priming cycle and gear pump design principle

If there are any questions regarding this pump or its application, which are not covered in this manual, please contact your local Summit Pump, Inc. Distributor.

For information or technical assistance on the driver service, contact the driver manufacturer's local dealer or representative.

3 SAFETY

The following message types are used in this manual to alert maintenance personnel to procedures that require special attention for the protection and safety of both personnel and equipment:

⚠ DANGER

Imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Includes Information on operation, maintenance, rules or directions. May indicate possible property damage.

3.1 PUMP SAFETY WARNINGS

The safety information below should be followed and observed to prevent damage to equipment or injury to operators:

⚠ DANGER

Ensure discharge line is open and free of clogs before operation. Negligent acts may result in serious injury or death.

⚠ CAUTION

Feeding very hot or very cold fluid into the pump at room temperature may result in fracture of pump wet end.

⚠ WARNING

Follow all auxiliary equipment (motors, drives, couplings etc.) manufacturer's manuals, instructions or procedures during installation, operation and maintenance of the pump.

NOTICE

Check all end clearances, drive to shaft alignments, fastener torques, equipment lubrication, gaskets and seals for leaks and all equipment is fastened into place before operation.

4 NOMENCLATURE

On page 38 of this manual, record the nameplate data from your pump. This will assist with any maintenance questions or pump identification in the future.

As where "sections" are stated in section 4, NOMENCLATURE, refer to Page 7 for clarification.

Summit internal gear pumps are identified by **Model Size** (sections 1 & 2, i.e. VV75HL). The remaining format consists of the **Seal Type & Material** (section 3, i.e. "21B"), **Materials of Construction** (sections 4 & 5, i.e. "CC"), **Rotor NEMA Motor Mount** (section 6, i.e. "A"), and finally **Special to Application** (section 7, if applicable, i.e. "X"). These items together represent the complete identification of the pump and should be stated when ordering repair parts.

4.1 Model Size

("VV75HL", Sections 1 & 2) The format consists of the pump model (section 1) and the pump size (section 2).

Section 1 specifies a specific group or style of gear pump. This value changes when the style of gear pump is altered. For this manual section 1 is "VV75".

Section 2 identifies a specific pump size within the gear pump model. Sizes are justified via the capacity (GPM) of the pump. *(i.e. "HL")*

4.2 Seal Type & Material

("21B", Section 3) Section 3 identifies how the pump is sealed and with what materials. Options are type 21 or type 9 mechanical seals, or lip seals.

4.3 Materials of Construction

("CC", Sections 4 & 5) Section 4 identifies the materials of the working internals and cast parts of the pump. Each letter represents a relationship with these components. See Figure 4-1: Materials of Construction; Reference Summit Pump VV75 nomenclature for specific item materials of construction.

Section 5 identifies the type of bushing used in the bracket and idler. Options are either carbon graphite or bronze.

MODEL VV75 MATERIALS OF CONSTRUCTION	
ITEM	SECTION "4" EXTERNAL COMPONENTS IN NOMENCLATURE
	(C) CAST IRON
CASING	CAST IRON
HEAD	CAST IRON
ROTOR	CAST IRON
IDLER	STEEL
IDLER PIN	HARDENED STEEL
IDLER BUSHING	BRONZE
INTERNAL PRESSURE RELIEF VALVE	CAST IRON

Figure 4-1: Materials of Construction; Reference Summit Pump VV75 nomenclature

4.4 Rotor NEMA Motor Mount

("A", Sections 6) This section defines the motor frame size and Rotor bore associated with it.

4.5 Special to Application

("X", Section 9) Section 9 may or may not be present. Usually, there will be no "X" following the pump identification. If there is an "X", you will need to contact your nearest Summit Pump, Inc. Distributor to determine exactly what makes this pump special. "X" refers to a place holder and could be any combination of letters or numbers.

See following page for nomenclature definitions and examples

Model Size

Model (1):

- VV75

Size (2):

- G (7 GPM)
- GG (10 GPM)
- H (15 GPM)
- HJ (20 GPM)
- HL (30 GPM)

Seal Type & Material

Seal Type/Material (3):

- 21B: Type 21 carbon Ni resist Buna
- 21F: Type 21 carbon Ni resist FKM
- 9G: Type 9 carbon Ni resist PTFE
- LS: Lip Seal Buna

Materials of Construction

Materials of Construction (4, 5):

External Components (4):

- C: Cast Iron

Bushing Material (5):

- C: Carbon graphite
- B: Bronze

Rotor NEMA Motor Mount

Rotor NEMA Motor Mount (6):

- A: 56C Size Motor—5/8" Rotor bore
- B: 143/145TC or 182/184TC Motor—7/8" Rotor bore

Special to Application

Special to Application (7) (If applicable):

If there is a "–X" ("X" representing any numbers or letters) at the end of a part number, it shows that something is unusual about that pump. For more information, contact your nearest Summit Pump, Inc. Distributor.

Example:

Summit Model Number: **VV75HL-21B-CB-A**

Viking® Model Number: **HL-475**

OEM MODEL NUMBERS AND/OR PART NUMBERS ARE FOR REFERENCE ONLY, AND IN NO WAY INDICATE THAT WE ARE SUPPLYING OEM PARTS OR REPRESENT THAT OEM IN ANY WAY.

5 RECEIPT AND STORAGE

5.1 RECEIVING THE PUMP

Immediately upon arrival, carefully inspect the pump for evidence of damage during transit. Immediately report any damage to your local Summit Pump, Inc. Distributor.

5.2 STORING THE PUMP

5.2.1 Temporary

Temporary storage: less than six months.

1. Flush the pump with clean water. If pumped product is water reactive, remove the pump head, and with compressed air blow all liquid from cavity. Lightly cover all internal metal parts with oil and replace the head.
2. Store pump in a clean, dry place, free from extreme swings in temperature and humidity.
3. Cover with a protective covering to reduce dust contamination.
4. Rotate the shaft once a week to protect the bearings from brinelling the raceway and/or balls.

5.2.2 Long Term

Long Term Storage: more than six months.

1. Follow temporary storage guidelines 1-5.
2. Coat all unpainted and machined surfaces with a rust inhibitor, such as LPS-3.

5.3 HANDLING

Pump unit boxes and crates may be unloaded using a forklift or slings depending on size and package construction.

⚠ WARNING

Pump and assemblies are heavy, improper handling could result in serious injury.

5.4 LIFTING

To avoid damage to pump and/or motor use a nylon, chain, or a wire rope sling. The slings should be placed so lift is equally supported at four or more points.

⚠ WARNING

Be sure all components are securely fastened to baseplate before lifting.

6 INSTALLATION

6.1 GENERAL

Summit Pumps are assembled at the factory. The pumps are ready to be installed and put into service. Follow all instruction tags on the pump. Ensure all fluid properties and application requirements have been considered and relayed to manufacture and/or distributor. Suction piping should be as short and direct as possible.

6.2 LOCATION

If the pump is going to have a water flush, it should be located as close as possible to the supply of water. Other location considerations are: easy access for inspection, maintenance and ample overhead space for lifting with crane or hoist.

6.3 BASE PLATE

Each pump unit should be mounted on a fabricated steel base plate. The base plate should be mounted on a concrete sub base 4” to 8” longer and wider than the fabricated base plate.

6.4 FOUNDATION

Use a foundation that is sufficient enough to support all points of the pump base-plate. Level and grout the base-plate per standard construction practices.

6.5 ORIENTATION AND ROTATION

There are two different valve configurations for the VV75 pump. Refer to Figure 6-1 for the different configurations. The configurations are dependent on shaft rotation. The shaft rotation is important to understand when installing the internal relief valve onto the casing. The internal relief valve must be positioned correctly or the valve will not work properly, potentially damaging equipment, cause server injury or potentially cause death to personnel.

⚠ DANGER

Install pressure relief valve correctly to avoid equipment failure, severe injury or death.

6.5.1 Valve Orientation

To change the valve orientation, unbolt the valve from the casing and rotate the valve 180 degrees. The adjustment knob should point toward the suction port. Ensure the valve gasket is not damaged prior to reinstallation of the valve.

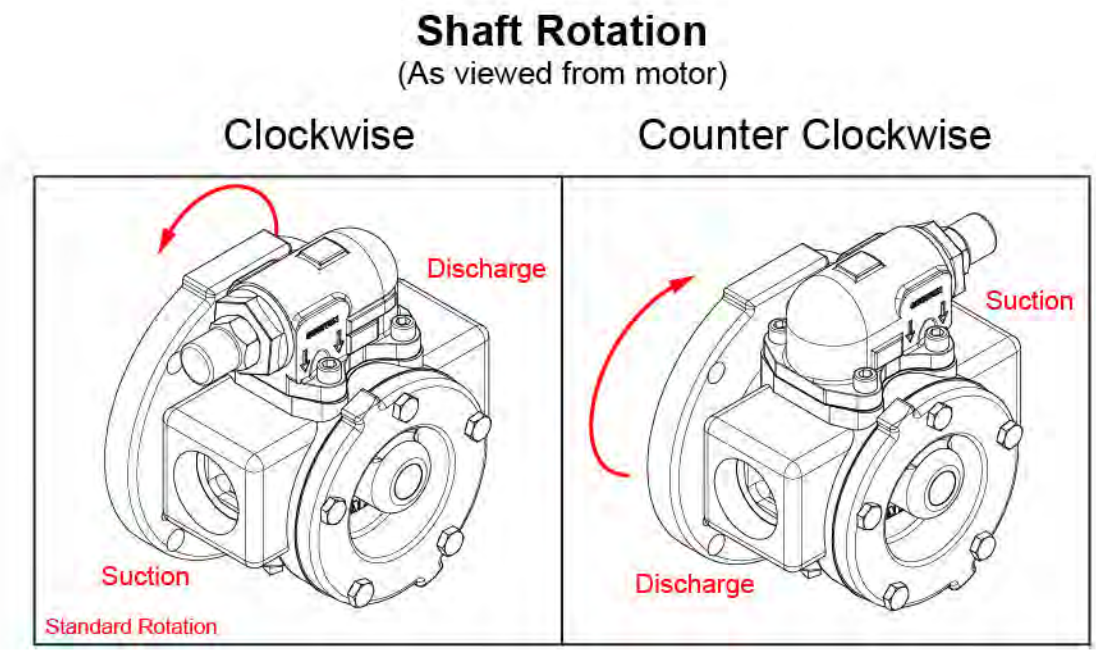


Figure 6-1: Valve configurations

6.6 PIPING CONNECTION – SUCTION / DISCHARGE

⚠ DANGER

Lock out driver power before beginning to work on pump.

Connect piping in a manner that is as short and direct as possible. Independent pipe supports, and anchors must be used in all installations. **Never support piping with threaded connections on the pump.** Ideally, you should place a short length of flexible or bellows type spool directly adjacent to the pump threaded connection.

⚠ CAUTION

Never use force to align piping to the pump threaded connections.

6.6.1 Suction Piping

The piping used should be as short as possible from suction source. Piping line size should be the same diameter as the suction nozzle. Although, this may not always be the case, as high viscosity, fluid velocity or system constraints may cause a change in size. All elbows 90° or 45° should be a long-sweep. Any piping that causes air to become trapped should be avoided.

6.6.2 Discharge Piping

Generally, the diameter of the discharge piping should be the same diameter as the discharge nozzle. In certain circumstances, this will not be the case, as the fluid being pumped will cause the use of a different pipe size. In these circumstances, the use of a threaded reducer/expansion fitting is needed.

It is recommended to install an isolation discharge valve to isolate the pump from the system when down for maintenance.

7 OPERATION

7.1 CHECKING ROTATION

The pump can operate equally well in a clockwise or counterclockwise rotation. The desired port to be suction determines shaft rotation. Port closest to where pumping elements (gear teeth) come out of mesh is suction port. If fitted with a pressure relief valve, ensure the adjustment knob is nearest the suction port. See Figure 6-1 and Figure 2-1 for illustration.

⚠ DANGER

Lock out power to avoid personal injury or death.

1. Lockout power to drive.
2. Remove the pump from the motor.
3. Unlock power to motor.
4. Clear personnel from immediate area, jog motor just enough to determine direction of rotation.
5. If the motor is rotating in the wrong direction the electrical wiring will need to be adjusted by qualified personnel. Then repeat Step 4 and 5.
6. Once rotation is in the desired direction, lockout motor and reattach pump to motor.
7. Check clearances and connect piping to pump.
8. Unlock motor, pump is ready to run.

7.2 FIRST RUN CHECK

Several items need to be checked before you put your pump into service. Each of the following items needs to be addressed to make certain that your equipment is correctly installed.

1. Proper alignment of pump.
2. All electrical connections.
3. All instruments and gauges should be in working order.
4. Suck back screws (if applicable).
5. Ensure end clearance is properly set for the application.
6. Correct pump rotation as desired, see Figure 6-1 on page 10.
7. Open the valves on the suction and discharge.

⚠ DANGER

This is a positive displacement pump. NEVER operate it against a closed valve or clogged discharge.

NOTICE
Do not operate pump dry. Dry operation can cause premature damage to pump internals.

7.2.1 Start Up

1. Before operating the pump, it must be filled with liquid. This can be done by removing the relief valve, or piping and fill with the pumping liquid or water. (Only use water if it will not contaminate the pumping liquid.)
2. Ensure the motor rotation coincides with desired pump rotation. Refer to Section 6.5 on page 10 for specific shaft rotation direction.
3. If an internal relief valve is installed, make sure the threaded adjustment side is closest to the suction side of the pump. See Figure 6-1 on page 10 for illustration.
4. Check end clearance is set properly.
5. Start the pump.

7.2.2 Shut Down

1. If possible, flush the pump with clean water. (Only use water if it will not contaminate the pumping liquid.)
2. Shut down the pump.
3. Close both the discharge and suction valves.

8 MAINTENANCE TIMETABLE

8.1 DAILY MAINTENANCE

1. Check the lip seals (04, 10) or the mechanical seal (03, 09) in the pump for damage or leakage. Check flow, pressure and noise levels.

8.2 SIX MONTH MAINTENANCE

1. Daily maintenance and the following.
2. Check the suck back screws (11, 04) for clogs, and wear.
3. Check rotor (12, 11) for wear. The suction and discharge piping spool pieces should be inspected internally for their condition.

8.3 YEARLY MAINTENANCE

1. All the above and the following:
2. Depending on the fluid pumped and pump operating hours, check pump performance with published performance curve. These inspections can range from once a year, to once every three to five years.

9 TROUBLESHOOTING

9.1 PUMP PROBLEMS

Pump turns, no flow.	1,2,3,9,10,11,12,13,14,15,16,21
Pump flow rate below expected capacity.	1,2,3,5,7,9,10,11,12,13,15,16,17,18,21
Pump will not produce rated pressure.	1,2,3,4,5,6,10,11,13,15,16,17,18,19,21,26
Pump develops too much pressure.	4,5,6,7,9,12,13,15,17
Pump no longer self-primes.	1,2,3,4,5,7,10,11,12,13,14,15,16,17,18,19,21,23
Pump won't turn/motor overloads.	2,4,5,6,7,9,12,13,14,15,16,17,18,20,23,24,26
Pump is very noisy/excessive vibration.	1,2,3,4,5,6,7,9,10,11,12,13,14,15,16,17,18,19,20,21,23,24,25
Pump runs hot.	2,4,5,6,7,9,10,11,12,13,14,16,17,18,19,20,21,23,24,26
Pump seals short life.	1,2,3,4,5,6,7,9,10,11,12,13,14,17,18,19,20,23,24,25
Excessive internal wear.	1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,17,18,19,20,21,22,23,24,25

9.2 PROBABLE CAUSE AND REMEDY.

NPSHA not sufficient.	1
Pump has run dry.	2
Air leaking into the pump.	3
Liquid temperature higher than stated.	4
Viscosity higher than stated.	5
Pump running too fast for application.	6
Abrasives in liquid.	7
Parts not hardened.	8
Suction or differential pressure too high.	9
Suction valve not open.	10
Suction valve partially open.	11
Discharge valve not open or partially open.	12
Clogged strainer.	13
Supply vessel empty.	14
Pump rotation wrong.	15
Incorrect head placement.	16
Wrong clearance setting for application.	17
Worn pump internals.	18
Improper seal installed.	19
Inadequate lubrication.	20
Relief valve improper pressure setting.	21
Relief valve reversed.	22
Material compatibility.	23
Drive misalignment	24
Base plate loose	25
Drive not sized for horsepower required.	26

10 EXPLODED VIEWS

Use below figures and tables with respect to Section 11 and Section 12.

10.1 VV75G & VV75GG Cast Iron

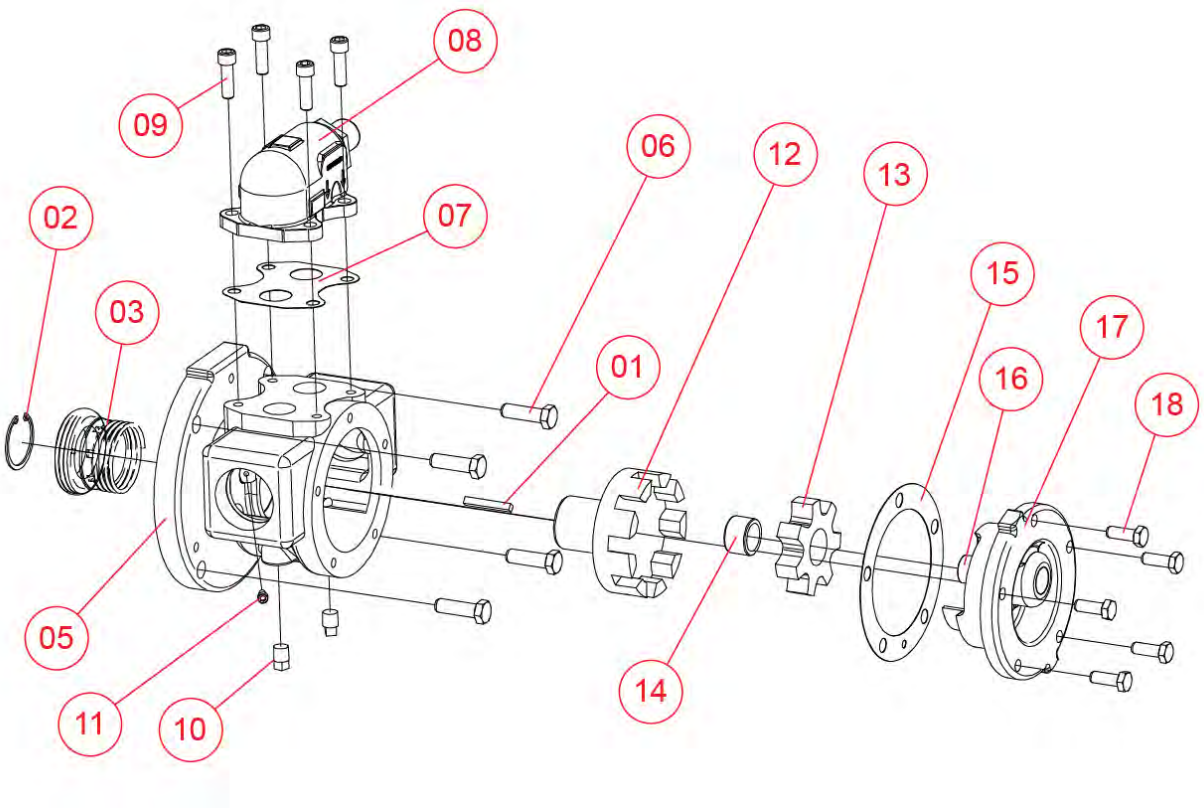


Figure 10-1: VV745G & VV75GG Exploded View - Cast Iron

Table 10-1: Itemized Parts

BEHIND ROTOR SEAL: VV75G & VV75GG INTERNAL GEAR PUMP			
01	Key for Motor Shaft	10	Pipe Plug
02	Snap Ring	11	Suck Back Screw (2-Mech. Seal, 1-Lip Seal)
03	Mechanical Seal	12	Rotor
04	Lip Seal*	13	Idler
05	Casing	14	Idler Bushing
06	Cap Screw	15	Head Gasket Set
07	Gasket for RV	16	Idler Pin, Plain
08	Relief Valve	17	Head, Plain with Plain Pin
09	Cap Screw	18	Cap Screw for Head

* Not Depicted.

10.2 VV75H, VV75HJ, & VV75HL Cast Iron

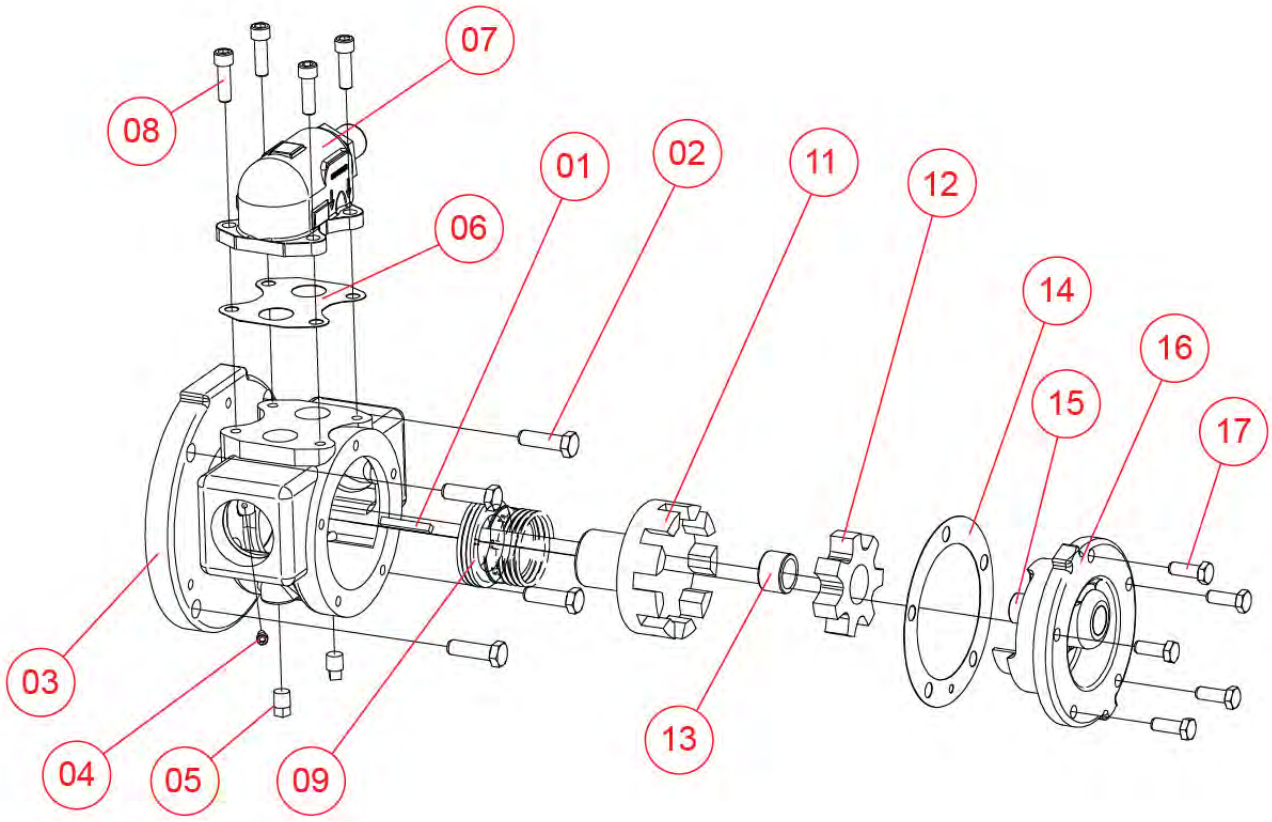


Figure 10-2: VV75H, VV75HJ & VV75HL

BEHIND ROTOR SEAL: VV75H, VV75HJ & VV75HL INTERNAL GEAR PUMP			
Table 10-2: Itemized Parts			
01	Key for Motor Shaft	10	Lip Seal*
02	Cap Screw	11	Rotor
03	Casing	12	Idler
04	Suck back Screw (2-Mech. Seal, 1-Lip Seal)	13	Idler Bushing
05	Pipe Plug	14	Head Gasket Set
06	Gasket for RV	15	Idler Pin, Plain
07	Relief Valve	16	Head, Plain with Plain Pin
08	Cap Screw for Relief Valve	17	Cap Screw for Head
09	Mechanical Seal		

* Not Depicted.

11 DISASSEMBLY MODEL VV75

This section will cover sizes: G, GG, H, HJ, and HL. It must be noted that although there are slight differences within these sizes, the disassembly and assembly procedures follow the same progression. Use the following steps as a general guideline, as it is impractical to cover every situation.

Refer to section 10 EXPLODED VIEWS, on pages 16 and 17 for part item numbers and images.

When item numbers are called out in this manual with two item numbers (i.e.(17,16)), the first number references G and GG pump sizes. The second number references H, HJ, and HL pump sizes.

Notes:

- Sizes G and GG, are cast iron externals, have a 1” NPT suction and discharge ports.
- Sizes G and GG utilize a snap ring accessible from the motor side of the pump for mechanical seal and lip seal retention.
- Sizes H, HJ, and HL, have cast iron externals, and 1.5” NPT suction and discharge ports.

⚠ DANGER

Lock out power to avoid personal injury or death when working on packing.

⚠ DANGER

Properly vent any pressure in pump, fittings and connecting lines.

⚠ WARNING

Understand material being pumped. Obtain MSDS information for product. Take all necessary precautions.

⚠ WARNING

Wear eye protection and proper personal protective equipment.

NOTICE

Secure pump before disassembly to avoid damage. Pump’s center of gravity changes when removing parts.

11.1 REMOVING HEAD

1. Remove pipe plug (10, 05) in lower section of casing (05, 03) to drain fluid from casing and piping.

2. Mark head (17, 16) and casing (05, 03) alignment using a permanent marker before disassembly. It is critical to keep head (17, 16) and casing (05, 03) orientation correct for proper performance.

3. Remove cap screws (18, 17) and head (17, 16). Take care not to damage the head gasket (15, 14), idler (13, 12), and idler bushing (14, 13). When removing, tilt the head (17, 16) away from the casing to avoid the idler (13, 12) and bushing (14, 13) from falling off the idler pin (16, 15).

4. Remove idler (13, 12) and idler bushing (14, 13) assembly. Visually check for wear and damage, replace if needed. If idler bushing (14, 13) is damaged or worn, remove idler bushing (14, 13) using a press. Carbon graphite is very brittle, take care when pressing bushing in or out.

5. Separate head gasket (15, 14) from head (17, 16) and set aside, replace if damaged or as needed. Press out idler pin (16, 15) if damaged or worn.

11.2 REMOVING SEALS

NOTICE
The seal removal procedures vary between pump sizes, ensure the correct procedure is followed.

NOTICE
It is recommended that seals be replaced if removed to ensure best sealing possible.

11.2.1 Removal of Lip Seal VV75G & VV75GG

1. Unbolt the four cap screws (06) securing the pump to the motor.

2. Remove the shaft key (01) from the rotor (12) or motor shaft. Inspect motor key (01), replace if damaged or worn.

3. Remove the snap ring (02) on the motor end of the pump. Inspect snap ring (02), replace if damaged or worn.

4. Remove the rotor (12) by applying pressure to the rotor's (12) shaft end located on the motor end of the pump. Inspect rotor (12), replace if worn or damaged.

5. Remove the lip seals (04) by applying pressure through the wet end of the pump. Assistance of an arbor press with a $2\frac{3}{16}$ inch arbor may be necessary for removal of the lip seals (04).

11.2.2 Removal of Lip Seal VV75H, VV75HJ, & VV75HL

1. Unbolt the four cap screws (02) securing the pump to the motor.

2. Remove the shaft key (01) from the rotor (11) or motor shaft. Inspect motor key (01), replace if damaged or worn.

3. Remove the rotor (11) by applying pressure to the rotor's (11) shaft end located on the motor end of the pump. Inspect the rotor (11) replace if damaged or worn.

4. Remove the lip seals (10) by applying pressure through the bore on the motor end of the pump. Assistance of an arbor press with a $2\frac{3}{16}$ inch arbor may be necessary for removal of the lip seals (10). Replace seals upon installation.

11.2.3 Removal of Mechanical VV75G & VV75GG

1. Unbolt the four cap screws securing the pump to the motor.

2. Remove the shaft key (01) from the rotor (12) or motor shaft. Inspect motor key (01), replace if damaged or worn.

3. Remove the rotor (12) by applying pressure to the rotor's (12) shaft end located on the motor end of the pump. Inspect rotor (12), replace if worn or damaged.

4. Remove the snap ring (02) on the motor end of the pump. Inspect snap ring (02), replace if damaged or worn.

5. Remove the mechanical seal (09) stationary seat from the stuffing box of the pump through the bore on the motor end of the pump. Pressure should be applied from the wet end of the pump until seal seat is no longer in the casing (05). Use caution and uniform pressure as not to damage seal faces when pressing out of the casing (05).

6. Remove the rotary element of the seal (03) from the rotor (12).

11.2.4 Removal of Component Mechanical Seal VV75H, VV75HJ, & VV75HL

1. Unbolt the four cap screws (06) securing the pump to the motor.

2. Remove the shaft key (01) from the rotor (11) or motor shaft. Inspect motor key (01), replace if damaged or worn.

3. Remove the rotor (11) by applying pressure to the rotor's (11) shaft end located on the motor end of the pump. Inspect rotor (11), replace if worn or damaged.

4. Remove the rotary element of the seal (09) from the rotor (11).

5. Remove the stationary seal (09) seat from the stuffing box of the pump through the wet end of the pump. Uniform pressure should be applied from the motor end of the pump until seal seat is no longer in the casing (03).

11.3 REMOVAL OF INTERNAL RELIEF VALVE

1. Mark the orientation of the internal relieve valve (08, 07) with the casing (05, 03). Note the side with the adjustment screw is always nearest the suction port. If installed improperly the valve will act as a plug and will not bypass fluid when pressure limit is reached.

⚠ DANGER

Mark valve orientation. Improper installment may result in equipment loss, serious injury or death.

2. Remove cap screws (09, 08) and separate internal relief valve (08, 07) from casing (05, 03). Replace relief valve gasket (07, 06) as necessary or if damaged.

12 ASSEMBLY MODEL VV75G & VV75GG

This section will cover sizes: G and GG. It must be noted that although there are slight difference between these sizes the disassembly and assembly procedures follow the same progression. Use the following steps as a general guideline as it is impractical to cover every situation.

In this section, item numbers appear after the item name. However, they only refer to parts listed under VV75G & VV75GG exploded views and parts list (Figure 10-1 and Table 10-1 on page 16).

It is vital during assembly to ensure cleanliness. Especially for rotor (12), idler (13), casing (05) mechanical seal and lip seals. Check all parts for damage, nicks and wear. Inspect all tapped holes; chase threads as needed. If damage or wear is found, replace parts to avoid premature failure.

Notes:

- Sizes G and GG have cast iron externals, and 1” NPT suction and discharge ports.
- Sizes G and GG utilize a snap ring accessible from the motor side of the pump for mechanical seal and lip seal retention.

⚠ DANGER

Lock out power to avoid personal injury or death.

NOTICE

Secure pump before assembly to avoid damage. Pump’s center of gravity changes when adding parts.

⚠ DANGER

Operation of any positive displacement pump with a clogged discharge or closed discharge valve generates a pressure vessel. Ensure a safety valve is fitted correctly in system.

There are two primary ways to seal the VV75 pumps; component mechanical seal or lip seals. For third party mechanical seal assembly and disassembly, refer to seal manufacturer’s installation and operation manual.

In the VV75G-LS and VV75GG-LS pumps, the lip seals (04) are installed first while pumps with mechanical seals (03), are installed later in the pump assembly (Section 12.4 on page 25). Skip to section 12.2 if installing a mechanical seal (03).

12.1 Installing Lip Seals (VV75G-LS & VV75GG-LS ONLY)

The lip seal (04) is an optional sealing method to mechanical seals (03).

In both the VV75G-LS and VV75GG-LS the lip seals (04) must be installed into the casing (05) prior to installing any other components.

1. Inspect the casing (05) and lip seals (04) for debris or damage. Clean the casing (05) thoroughly to avoid sealing issues, if necessary, replace damaged parts. It is recommended that lip seals (04) be replaced each time the pump is rebuilt.

2. Apply a light coating of compatible grease between lip seals to keep them lubricated during operation.

3. Insert the lip seals (04) into the casing (05) from the motor end, one at a time with the spring's open end away from each other, reference Figure 12-1. Use an arbor press with a $2\frac{3}{16}$ inch arbor to press, the lip seals (04) until completely inserted. Be careful to recognize when the lip seal (04) hits its resting position. Over pressing will damage the lip seal (04).

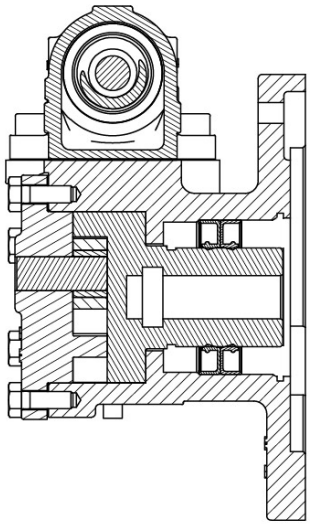


Figure 12-1 VV75G & VV75GG Lip Seal Installation

4. Clean the shaft and rotor (12). Closely inspect for wear or damage paying attention to where the shaft meets the lip seals (04), and outer diameter of rotor (12).

5. Carefully slide the shaft and rotor (12) through the lip seals (04) paying particular attention not to fold either lips of the seals or knocking out the springs.

12.2 INSTALLING IDLER BUSHING

The following steps are written in terms of the idler (13) and the idler bushing (14). These instructions are written for bronze and carbon graphite bushings. Special care should be taken when installing carbon bushings as they are very brittle and can easily crack.

1. Inspect the idler (13) for cleanliness, damage, or wear to avoid damage of the idler bushing (14).

2. Chamfer the leading edge of the idler bushing (14) and the idler (13), if not already done. This will assist with lining up both parts. Lubricate idler bushing's (14) outer diameter and the idler's (13) inner diameter with compatible lubricant.

3. Use a press to install the idler bushing (14), ensure both parts are square to each other prior to pressing.

   Once pressing has begun, do not stop until idler bushing (14) is in the proper position; which is even with the idler's (13) machined surface. Starting and stopping will crack the idler bushing (14) and cause premature failure.

   Check for cracks in the idler bushing (14). Any cracks will reduce bushing life and increase idler (13) and idler pin (16) ware. It is recommended to remove and replace bushing if cracks are detected.

12.3 INSTALLING HEAD

1. Press idler pin (16) into the head (17). If idler pin (16) is lube type, ensure the end with the threaded hole is facing outward away from the casing (05).

2. Fit a new head gasket set (15) with shims onto the head (17). Add a small amount of grease or oil to keep head gasket set (15) in place.

3. Slide idler (13) and idler bushing (14) assembly over idler pin (16). If idler bushing (14) is not installed in idler (13) refer to section 12.2 on page 24 for installation of idler bushing (14).

4. For **VV75G and VV75GG with mechanical seals**: Clean shaft and rotor (12). Closely inspect for wear and damage paying attention to where the shaft meets the elastomer of the mechanical seal (03) slide rotor (12) into casing.

5. Identify orientation marks that were made during disassembly in Section 11.1 on page 19. It is critical to get head (17) orientation correct for proper pump performance. As rule-of-thumb, the crescent shape on the head (17) should be about 90 degrees away from discharge and suction ports.

6. Once head (17) is in the correct orientation, mate head (17) with the casing (05) lining up the cap screw (18) holes. Hold head (17) in place and hand tighten cap screws (18). Torque the cap screws (18) in proper sequence to torque values shown in Table 17-1 on page 34.

7. Check end clearance as described in section 14 on page 30. If desired end clearance is not met, return to step 2 and change the number of shims (15) which are installed. More shims (15) will increase the end clearance, less will decrease the end clearance.

12.4 Installing Mechanical Seal (VV75G & VV75GG WITH MECHANICAL SEAL)

The component mechanical seal (03), a type 21 or type 9, is an alternative to lip seals.

1. Inspect casing (05) for debris or damage. Clean casing (05) and shaft (12) thoroughly to avoid any sealing issues, if necessary, replace damaged or worn parts. It is recommended that component seals be replaced each time pump is rebuilt.

2. Lubricate the shaft (12) outer diameter, and rotating members of the mechanical seal's (03) inner diameter with compatible lubricant. Slide the spring and rotating members over the shaft (12) until the spring and rotating members are fully inserted. Ensure the notched portions of the rotating face are aligned with the tabs in the end piece. This ensures the proper rotation of the rotating members on stationary piece.

3. Lubricate the outer diameter of the stationary seat with compatible lubricant. Using two fingers in the ID of the stationary seat, begin to push the seat into the casing (05) both sides of the stationary seat look similar. Be sure the sealing face is installed against the sealing face of the rotary member. If unable to push entirely into the casing (05), with a clean piece of cardboard, gently tap in the stationary seat with a flat brass or wooden bar. Ensure the seat is inserted past the groove for the snap ring.

4. Install the snap ring (02) into the casing (05). Ensure snap ring (02) is completely installed in the notch in the casing (05)

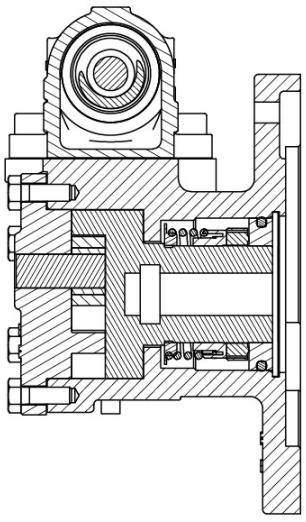


Figure 12-2: VV75G & VV75GG Mechanical Seal Installation

13 ASSEMBLY MODEL VV75H, VV75HJ, AND, VV75HL

This section will cover sizes: H, HJ, and HL. It must be noted that although there are slight difference between these sizes the disassembly and assembly procedures follow the same progression. Use the following steps as a general guideline as it is impractical to cover every situation.

In this section, item numbers appear after the item name. However, they only refer to parts listed under VV75H, VV75HJ & VV75HL exploded views and parts list (Figure 10-2 and Table 10-2: Itemized Parts on page **Error! Bookmark not defined.**).

It is vital during assembly to ensure cleanliness. Especially for rotor (11)/idler (12), casing (03), mechanical seal (09), and lip seals (10). Check all parts for damage, nicks and wear. Inspect all tapped holes; chase threads as needed. If damage or wear is found, replace parts to avoid premature failure.

Notes:

- Sizes H, HJ, and HL have cast iron externals, and 1.5” NPT suction and discharge ports.
- Rotor and shaft (11) is one piece. This may be referenced as “shaft (11)”, “rotor (11)” or “rotor and shaft (11)”.

⚠ DANGER

Lock out power to avoid personal injury or death.

NOTICE

Secure pump before assembly to avoid damage. Pump’s center of gravity changes when adding parts.

⚠ DANGER

Operation of any positive displacement pump with a clogged discharge or closed discharge valve generates a pressure vessel. Ensure a safety valve is fitted correctly in system.

13.1 INSTALLING SEALS

There are two primary ways to seal the VV75 pumps; component mechanical seal (09) or lip seals (10). For third party mechanical seal assembly and disassembly, refer to seal manufacturer’s installation and operation manual.

13.1.1 Installing Lip Seals (VV75H-LS, VV75HJ-LS, & VV75HL-LS ONLY)

The lip seal (10) is an alternative sealing method to mechanical seals (09). For VV75H, VV75HJ, and VV75HL proceed to section 13.1.2.

1. Inspect stuffing box for debris or damage. Clean stuffing box and shaft (11) thoroughly to avoid any sealing issues, if necessary, replace damaged or worn parts. It is recommended that lip seals (10) be replaced each time pump is rebuilt.

2. Apply a light coating of compatible grease between lips.

3. Insert the lip seals (10) into the stuffing box, from the wet end of the pump, one at a time with the lip seal springs (open ends) away from each other, reference Figure 13-1. Use an arbor press with a $2\frac{3}{16}$ inch arbor to press in the lip seals (10) until completely inserted.

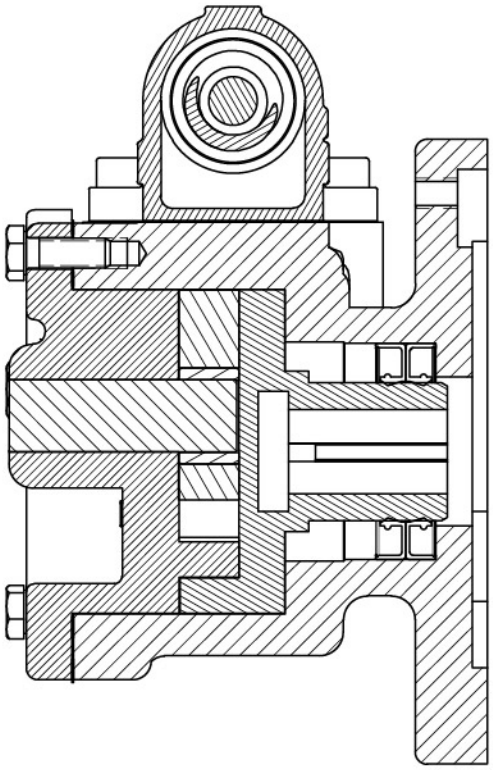


Figure 13-1: VV75H, VV75HJ, & VV75HL Lip Seal Installation

4. Ensure that the suck back screw (04) on the suction side of the pump is removed for pumps with lip seals.

5. Clean the shaft and rotor (11). Closely inspect for wear or damage paying attention to where the shaft meets the lip seals (10) and the outer diameter of the rotor (11).

6. Carefully slide the shaft and rotor (11) through the lip seals (10) paying attention not fold either lips of the seals or dislodge the springs.

13.1.2 Installing Mechanical Seal (VV75H, VV75HJ, & VV75HL WITH MECHANICAL SEAL)

The component mechanical seal (09), a type 21 or type 9, is an alternative to lip seals.

1. Inspect casing (03) for debris or damage. Clean casing (03) and shaft (11) thoroughly to avoid any sealing issues, if necessary, replace damaged or worn parts. It is recommended that component seals be replaced each time pump is rebuilt.

2. Lubricate the outer diameter of the stationary seat. Using two fingers in the ID of the stationary seat, begin to push the seat into the casing (03). If unable to push entirely into the bore, cover the lapped surface with a clean piece of cardboard and gently tap in the stationary seat with a flat brass or wooden bar measuring close to the same diameter of the stationary seat. Ensure the seat is set square against the bottom of the bore.

3. Lubricate the shaft (11) and inner diameter of the rotating members of the mechanical seal (09) with compatible lubricant. Slide the spring and rotating members over the shaft (11), spring washer first, until the spring and rotating members are set against the shoulder of the rotor (11). Ensure the notched portions of the rotating face are aligned with the tabs in the end piece. This ensures the proper rotation of the rotating members on the stationary piece.

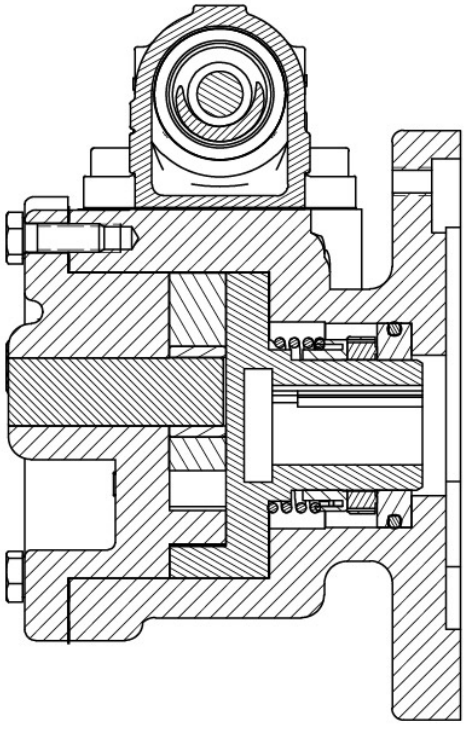


Figure 13-2: VV75H, VV75HJ, & VV75HL Mechanical Seal Installation

13.2 INSTALLING IDLER BUSHING

The following steps are written in terms of the idler (12) and the idler bushing (13). These instructions are written for bronze and carbon graphite bushings. Special care should be taken when installing carbon bushings as they are very brittle and can easily crack.

1. Inspect the idler (12) for wear or damage and clean to avoid contamination of the idler bushing (13).

2. Chamfer the leading edge of the idler bushing (13) and the idler (12), if not already done. This will assist with lining up both parts. Lubricate idler bushing's (13) outer diameter and the idler's (12) inner diameter.

3. Use a press to install the idler bushing (13). Ensure both parts are square to each other prior to pressing.

   Once pressing has begun, do not stop until idler bushing (13) is in the proper position; which is even with the idler's (12) machined surface. Starting and stopping will crack the idler bushing (13) and cause premature failure.

   Check for cracks in the idler bushing (13). Any cracks will reduce bushing life and increase shaft ware. It is recommended to remove and replace bushing if cracks are detected.

13.3 INSTALLING HEAD

1. Press idler pin (15) into the head (16). If idler pin (15) is lube type, ensure the end with the threaded hole is facing outward away from the casing (03).

2. Fit a new head gasket set (14) with shims onto the head (16). Add a small amount of grease or oil to keep head gasket set (14) in place.

3. Slide idler (12) and bushing (13) assembly over idler pin (15). If idler bushing (13) is not installed in idler (12) refer to section 13.2 on page 29 for installation of idler bushing (13).

4. Identify orientation marks that were made during disassembly in Section 11.1 on page 19. It is critical to get head (16) orientation correct for proper pump performance. As rule-of-thumb, the crescent shape on the head (16) should be about 90 degrees away from discharge and suction ports.

5. Once head (16) is in the correct orientation, mate the head (16) with the casing (03) lining up the cap screw (17) holes. Hold head (16) in place and hand tighten cap screws (17). Torque the cap screws (17) in proper sequence to torque values shown in Table 17-1 on page 34.

6. Check end clearance as described in section 14 on page 30. If desired end clearance is not met, return to step 2 and change the number of shims (14) installed. More shims will increase end clearance, less will decrease end clearance.

14 CHECK END CLEARANCE

Standard end clearance is set at the factory. End clearance adjustment is needed to provide proper pump performance and spacing between the rotor (12, 11), idler (13, 12), and head (17, 16). The end clearance is set by the gasket kit (15, 14) installed between the head (17, 16) and pump casing (05, 03).

Extra end clearance is needed in specific applications.

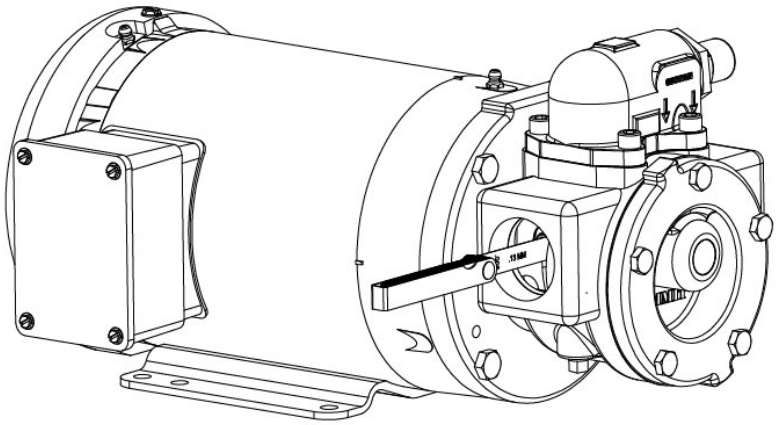


Figure 14-1: Measuring End Clearance

NOTICE
End clearance must be set for proper performance. Incorrect settings could damage pump internals.

14.1 CHECK END CLEARANCE WITH A FEELER GAUGE

Measure the pump end clearance from the back of the rotor (12, 11) to the machined surface of the casing (05, 03) with a feeler gauge as shown in Figure 14-2. The normal amount of clearance that should be obtained is 0.003” to 0.005”. Add or remove shims between the head gasket (15, 14) and head (17, 16) to obtain desired amount of clearance.

For applications above 225°F an EXTRA 0.002” needed. The total end clearance in this case will be 0.005” to 0.007”.

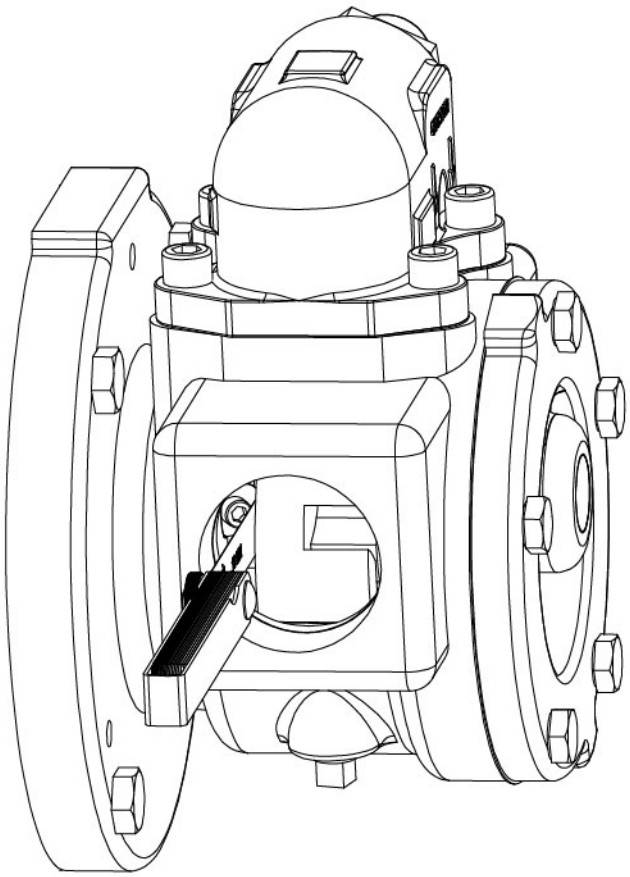


Figure 14-2: Measuring End Clearance with a Feeler Gauge

15 INTERNAL RELIEF VALVE

There are two sets of instructions for internal relief valve (08, 07) assembly. One is to adjust the pressure setting of the valve and the other is attaching the internal relief valve (08, 07) to the casing (05, 03).

If pump is not equipped with an internal relief valve, there must be other means of system pressure release. All positive displacement pumps operate at the pressure required of the system with a constant flow rate. If there is a clog or closed valve in the system, the pump will keep building pressure until a way of pressure release is found.

⚠ WARNING

Install pressure relief outlet. Negligent acts may result in equipment loss, serious injury or death.

15.1 Mounting valve on casing

It is critical to mount the internal relief valve (08, 07) in the correct orientation on the casing (05, 03). Align marks created in section 11.3 on page 21. If installed incorrectly, the valve will not work properly. The system can exceed valve set pressure setting, causing damage to equipment, serious injury or death.

⚠ WARNING

Align alignment marks for valve orientation. Improper installment may result in equipment loss, serious injury or death.

If no alignment marks have been made, the adjusting screw of the internal relief valve (08, 07) should always be closest to the suction port. See Figure 6-1 on page 10 for illustration.

1. Inspect internal relief valve (08, 07) for damage or debris. Check mating parts for damage, replace if needed.

2. Place relief valve gasket (07, 06) on internal relief valve (08, 07) flange. Applying a light coating of grease or oil may be necessary to hold relief valve gasket (07, 06) in place.

3. Secure internal relief valve (08, 07) using cap screws (09, 08) and tighten by hand. Torque cap screws (09, 08) in a tightening sequence to torque values show in Table 17-1: General bolt torque values on page 34.

15.2 Setting pressure

The internal pressure relief valve (08, 07) pressure setting is set at the factory to a standard 50 psi when the valve is fully open all flow is circulating through the valve. Relief valve pressures are only set differently if stated on customer's purchase order.

The valve will begin to open at a lower pressure than the pressure setting; this is called the "cracking pressure". A percentage of pump capacity will be lost from the discharge line once the cracking pressure is reached.

For example, the internal relief valve (08, 07) is set to 150 psi. Observe the differential pressure (between suction and discharge) and the system flow meter while slowly closing a valve beyond the discharge pressure gauge. Figure 15-1 shows the pressure and flow rate relationship when increasing the pressure in the piping system (i.e. closing the discharge valve).

Note: Figure 15-1 *shows a general relationship and not actual tested data.*

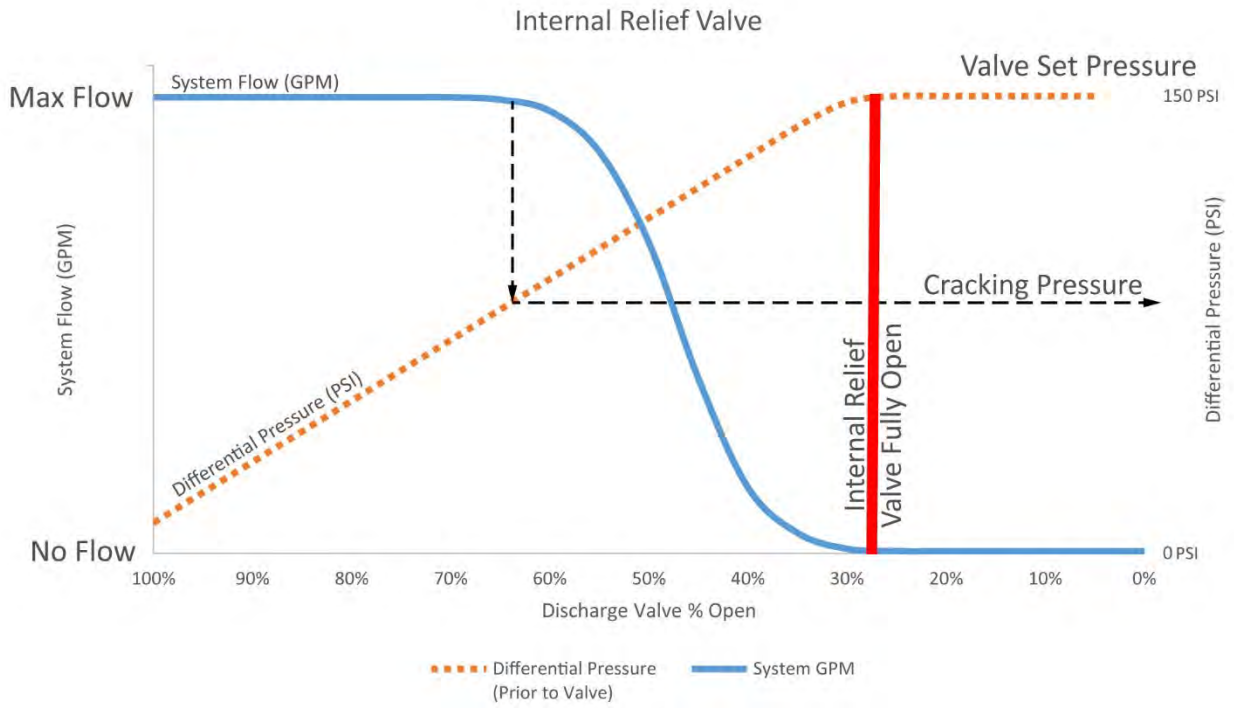


Figure 15-1: Internal relief valve (08, 07) effects on system flow when differential pressure approaches internal relief valve (08, 07) set pressure.

When setting pressure, consult your company's procedure for adjusting pressure relief valves. Figure 15-2 is an exploded view of an Internal Relief Valve (08, 07). To adjust the pressure setting, release locknut and turn adjustment bolt clockwise for higher set pressure and counter clockwise for lower set pressure.

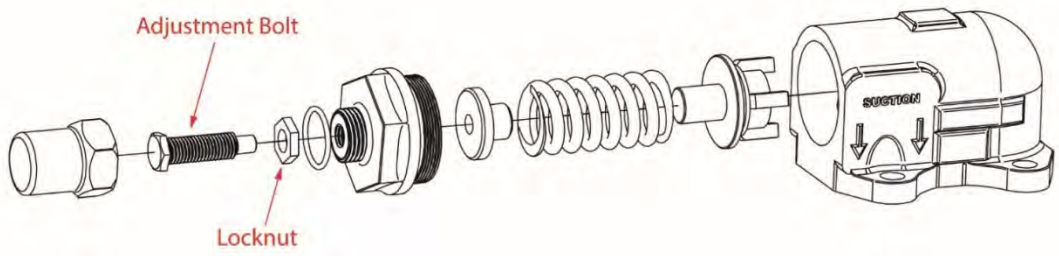


Figure 15-2: Internal relief Valve Components

17 APPENDIX E – Reference Tables

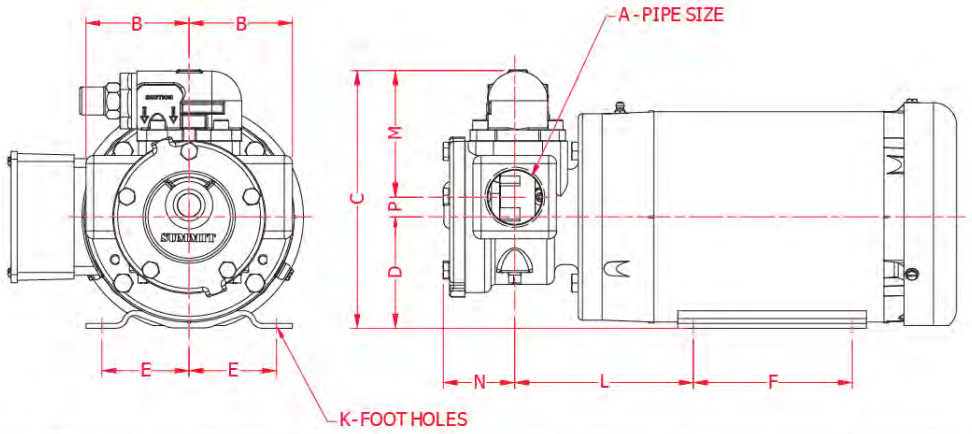
17.1 TORQUE GUIDELINES

17.1.1 Bolt Torques

Table 17-1: General Max bolt torque values

Bolt Size	Stainless Steel Bolts ASTM F593	Carbon Steel Bolts SAE J429 Grade 5/ ASTM A449
Size	**Max. Torque**	**Max. Torque**
10-24	24 inlb	-
10-32	33 inlb	-
1/4-20	45 inlb	100 inlb
5/16-18	92 inlb	17 ftlb
3/8-16	14 ftlb	30 ftlb
7/16-14	22 ftlb	49 ftlb
1/2-13	33 ftlb	75 ftlb
9/16-12	48 ftlb	110 ftlb
5/8-11	66 ftlb	150 ftlb
3/4-10	120 ftlb	265 ftlb
7/8-9	190 ftlb	429 ftlb
1-8	280 ftlb	644 ftlb

18 APPENDIX F – PUMP CROSS SECTIONS



Nomenclature Fields					Motor Frame Size	Reference Dimensions (inches)								
1 & 2	3	4	5	6		A	B	C	D	E	F	G	H	J
VV75G VV75GG	21B, 21F, 9G, LS	C	C,B	A	56C	1.0" NPT	2.5	7.69	3.5	2.44	3	2.81	6.5	4.5
				B	143TC					2.75	4			
					145TC						5			
VV75H VV75HJ VV75HL	21B, 21F, 9G, LS	C	C,B	A	56C	1.5" NPT	3.25	8.56	3.5	2.44	3	2.75	6.5	4.5
				B	143TC					2.75	4			
					145TC						5.00			
					182C			9.56	4.5	3.75	4.50			
					184C						5.50			

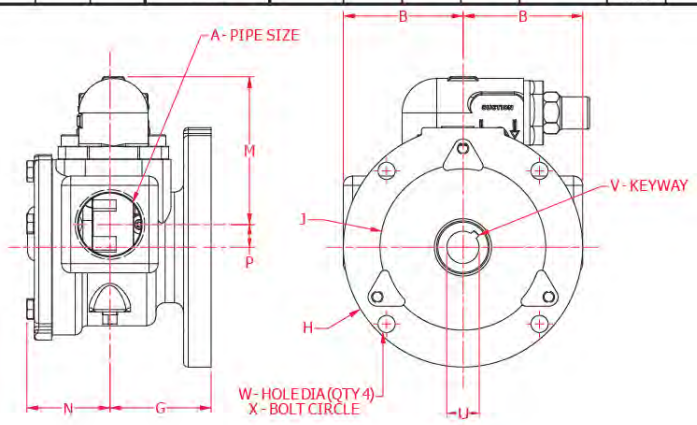


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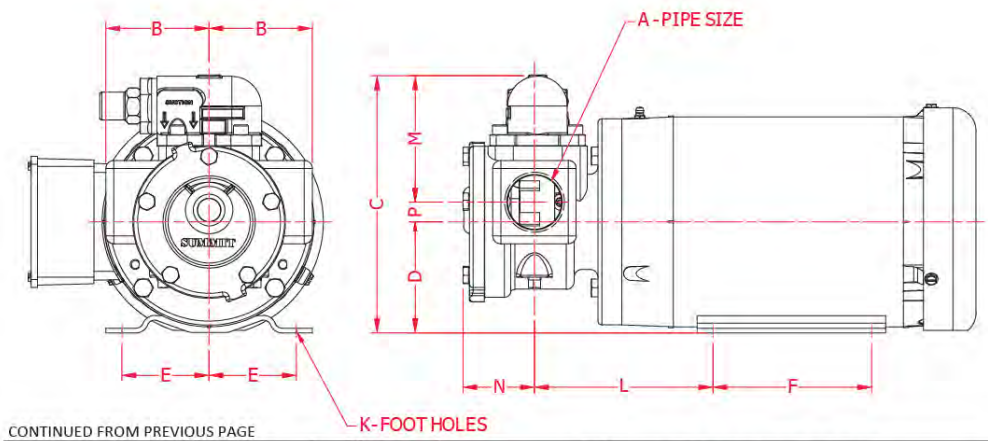
Figure 18-1:Pump Cross Sections



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Nomenclature Fields					Motor Frame Size	Reference Dimensions (inches)								
1 & 2	3	4	5	6		K	L	M	N	P	U	V	W	X
VV75G VV75GG	21B, 21F, 9G, LS	C	C,B	A	56C	.34 SLOT	5.38	3.56	1.56	0.63	0.63	0.18	0.47	5.88
				B	143TC	0.34	5.69				0.88			
					145TC									
VV75H VV75HJ VV75HL	21B, 21F, 9G, LS	C	C,B	A	56C	.34 SLOT	5.31	4.44	2.18	0.63	0.63	0.18	0.47	5.88
				B	143TC	0.34	5.63				0.88			
					145TC									
					182C	0.41								
					184C									

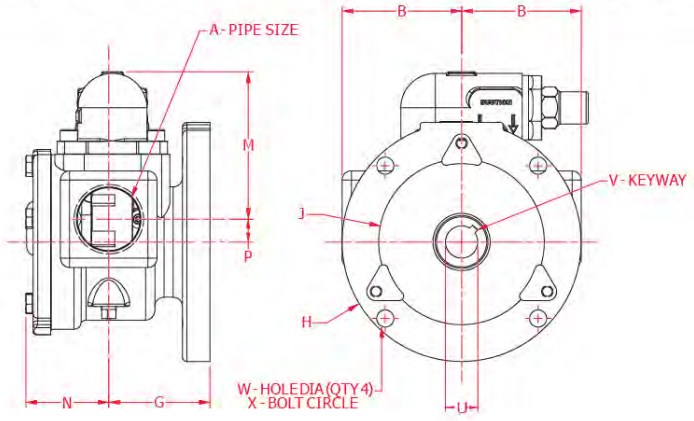

Figure 18-2: Pump Cross Sections Continued

19 APPENDIX G – MOTOR COMPATIBILITY

BALDOR
A MEMBER OF THE ABB GROUP

Three Phase, totally enclosed, C-Face, foot Mounted

Features:

- Locked DE bearing to allow mounting in any configuration
- 60 Hz designs with 50 Hz information on 2, 4, 6 pole 1-125HP ratings
- Suitable for inverter use per NEMA MG1 Part 31.4.4.2

Specifically, selected list for the VV75 Summit Pump model

Cast Iron Frame

HP	RPM	NEMA Frame	Enclosure	Catalog Number	Full Load Efficiency (%)	Voltage	Approximate Weight (lb)
1/3	1800	56C	TEFC	CM3534	68	230/460	21
1/2	1800	56C	TEFC	CM3538	74	230/460	23
			TENV	CNM3538/35	80	230/460	28
	1200		TEFC	CM3539	72	230/460	23
			TENV	CNM3539	78.5	230/460	40
3/4	1800	56C	TEFC	CM3542	75.5	208-230/460	26
			TENV	CNM3542	78.5	230/460	31
	1200		TEFC	CM3543	77	208-230/460	23
1	1800	56C	TEFC	CEM3546	85.5	230/460	36
			TENV	CENM3546	85.5	230/460	38
		143TC	TEFC	CEM3546T	85.5	230/460	36
			TEFC	CEM3581T	85.5	230/460	54
	1200	56C	TEFC	CEM3556	82.5	230/460	41
		143TC	TEFC	CEM3556T	82.5	230/460	43
1-1/2	1800	145TC	TEFC	CEM3554T	86.5	230/460	42
			TEFC	CEM3584T	86.5	230/460	60
2	1800	56C	TEFC	CEM3558	86.5	230/460	46
		145TC	TEFC	CEM3558T	86.5	230/460	46
			TEFC	CEM3587T	86.5	230/460	62
	1200	184TC	TEFC	CEM3614T	88.5	230/460	97
			TEFC	CEM3664T	88.5	230/460	115
3	1800	182TC	TEFC	CEM3611T	89.5	230/460	75
		182TC	TEFC	CEM3661T	89.5	230/460	104
5	1800	182TC	TEFC	CEM3615T	89.5	230/460	93
		182TC	TEFC	CEM3665T	89.5	230/460	114

20 PUMP INFORMATION

Purchase Date: _____

Purchase Order#: _____

Serial Number: _____

Equipment Number: _____

PO Box 12145 Green Bay, WI 54307
www.summitpump.com

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