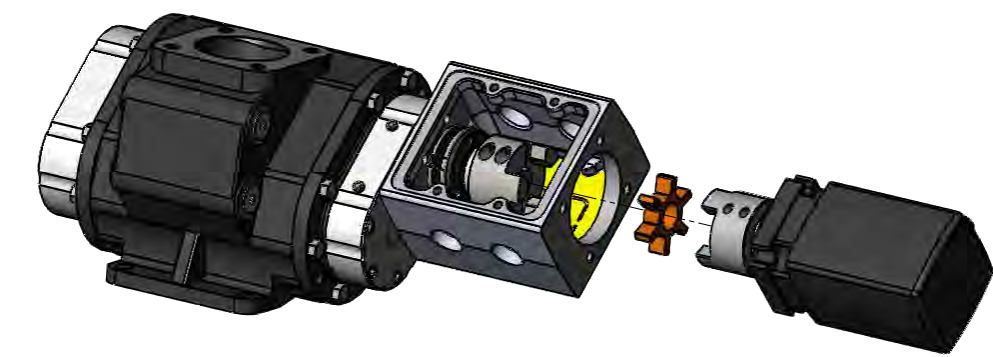


# BearCat Pumps

## 300,450,600 and 900 Pump and Gear Meter Manual



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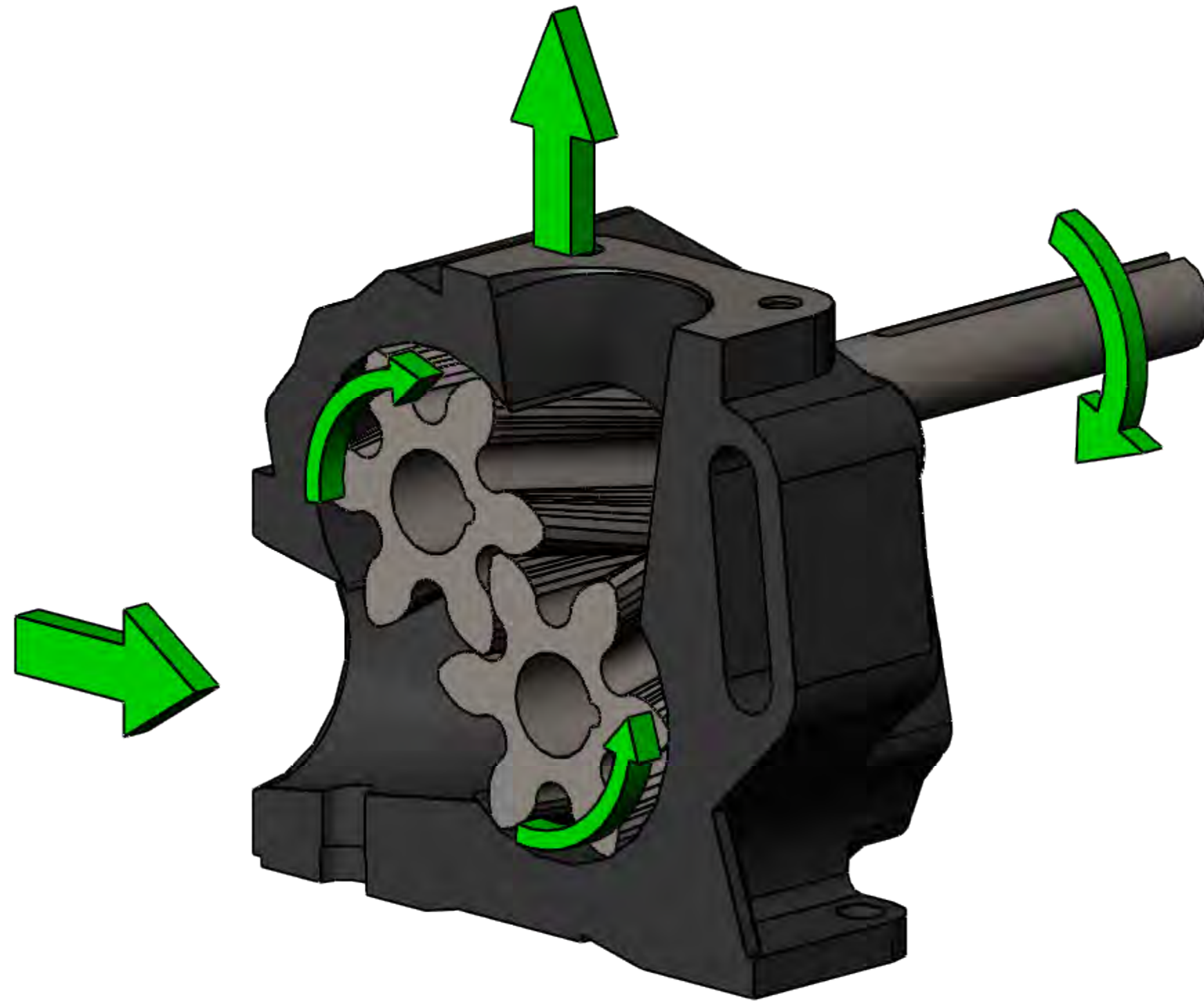
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[\(Click links for quick access\)](#)

# General Safety Precautions

- This manual should be read entirely prior to the commencement of installation and operation.
- Only qualified personnel should install, operate and maintain this pump and associated equipment.
- Check pump for specific safety warnings/labels.
- Prior to start-up, ensure complete cleanliness and integrity of the system in which the pump is installed.
- In most cases the relief valve is factory set during performance test. In cases where the type of duty is not known (such as distributors or stock orders) or where the components containing the relief valve come from pre-tested stock batches, it is not possible to factory set the relief valve. In this case it is the installer's responsibility to set the relief valve in accordance with the specific application.
- Pumps with heat tracing or jacketing necessary to prevent solidification of the product should be brought up to working temperature prior to start-up.
- All electrical work must be done in accordance with the manufacturers recommended procedures by qualified personnel.
- Ensure all guards are securely in place before operating the equipment. Do not remove guards at any time during operation.
- For pumps operating under 'flooded' suction, when venting the pump through a plug or valve, care should be taken not to completely remove vent plugs or completely open any vent as this could result in liquid being discharged from the openings under pressure.
- Prior to start-up, ensure that the system valves and associated equipment are correctly set.
- Wear appropriate safety attire including long sleeves, face shield, and gloves, whenever starting or operating the pump.

# Start-up Procedure



**Rotation and Flow**

## Start-Up Procedure

1. Pump should turn freely by hand. Ensure all guards are in place.
2. Heat if necessary.
3. Gradually open valves, and check for signs of leakage before starting pump.
4. If possible, add some of the liquid directly to the pump. This helps lubricate and prime during the first start-up.
5. Check the rotation by flicking starter 'ON' then 'OFF'. (Correct rotation shown in diagram)
6. Start pump slowly - check for leaks - gradually increase speed.

## Re-Torque Bolts

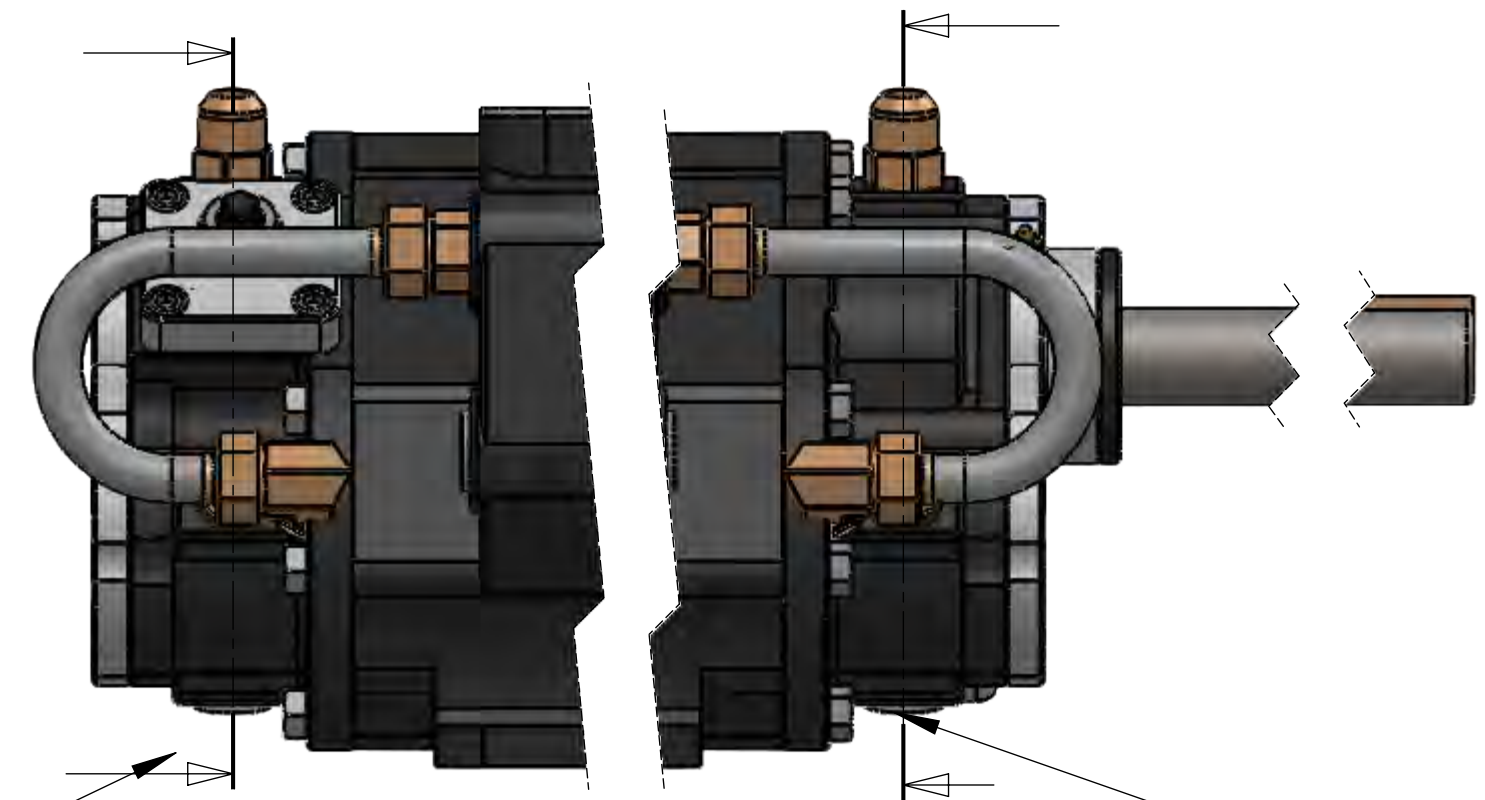
Thermal expansion can loosen bolt connections. It is advised that all bolt connections get checked and re-tightened after initial heat-up, and during routine maintenance.



# Relief Valve

## Relief Valve Operation:

Each endplate can relieve pressure in one flow direction only. As such, if the valves are set in opposite directions, each can be adjusted to independent pressures. It is possible to pressure relieve at 80 PSI in one direction, while 30 PSI in reverse.

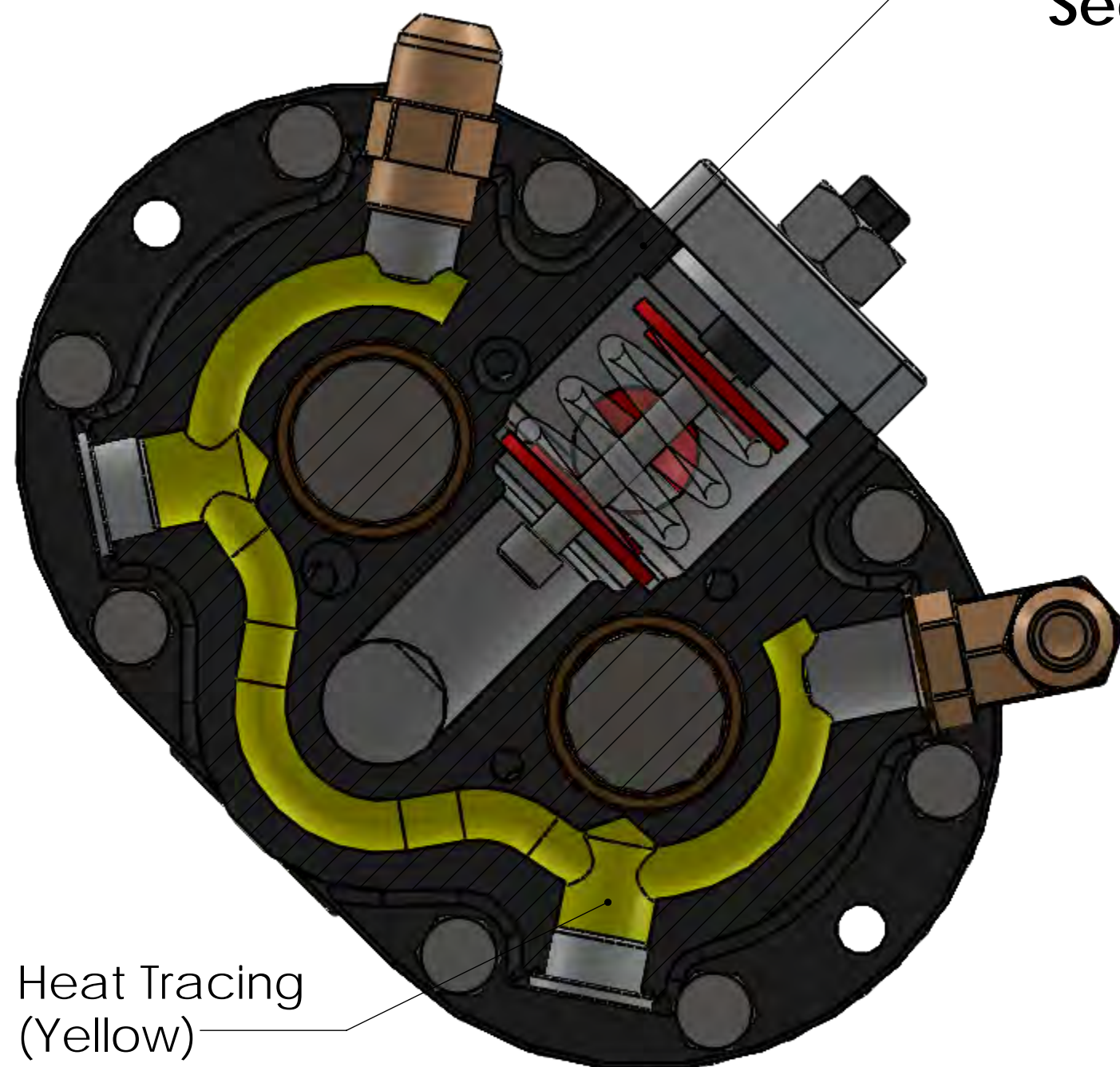


**Rear Valve Section**

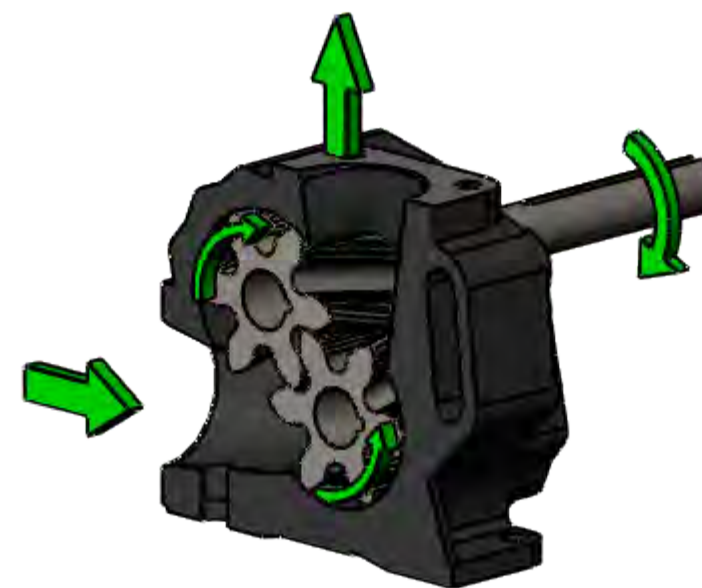
**Front Valve Section**

Relief Valve Poppet and Spring

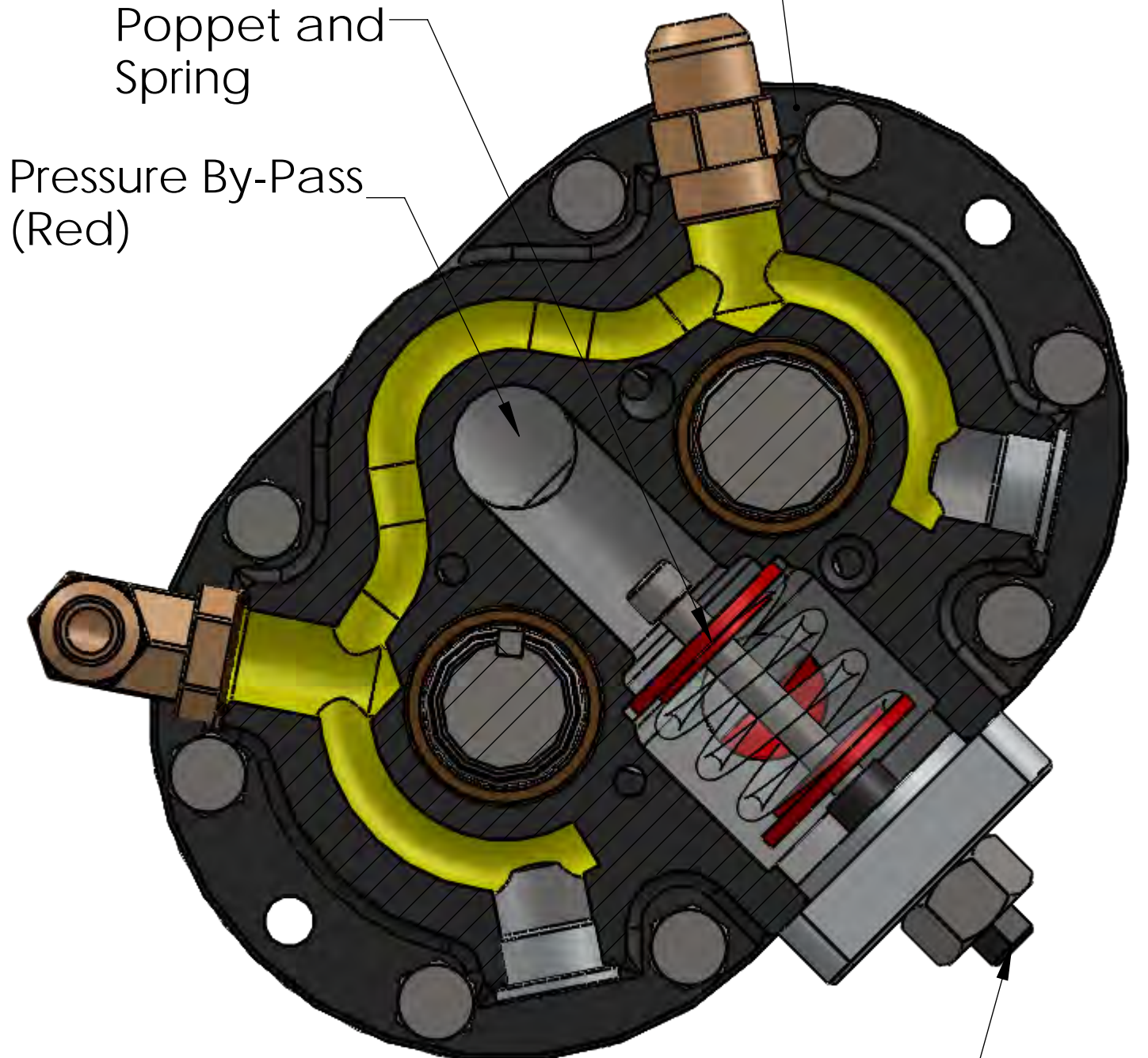
Pressure By-Pass (Red)



Heat Tracing (Yellow)



If the pump is turning as shown view above, the Front valve is controlling pressure. The rear valve can not open in this condition, as the fluid pressure is pushing against it.

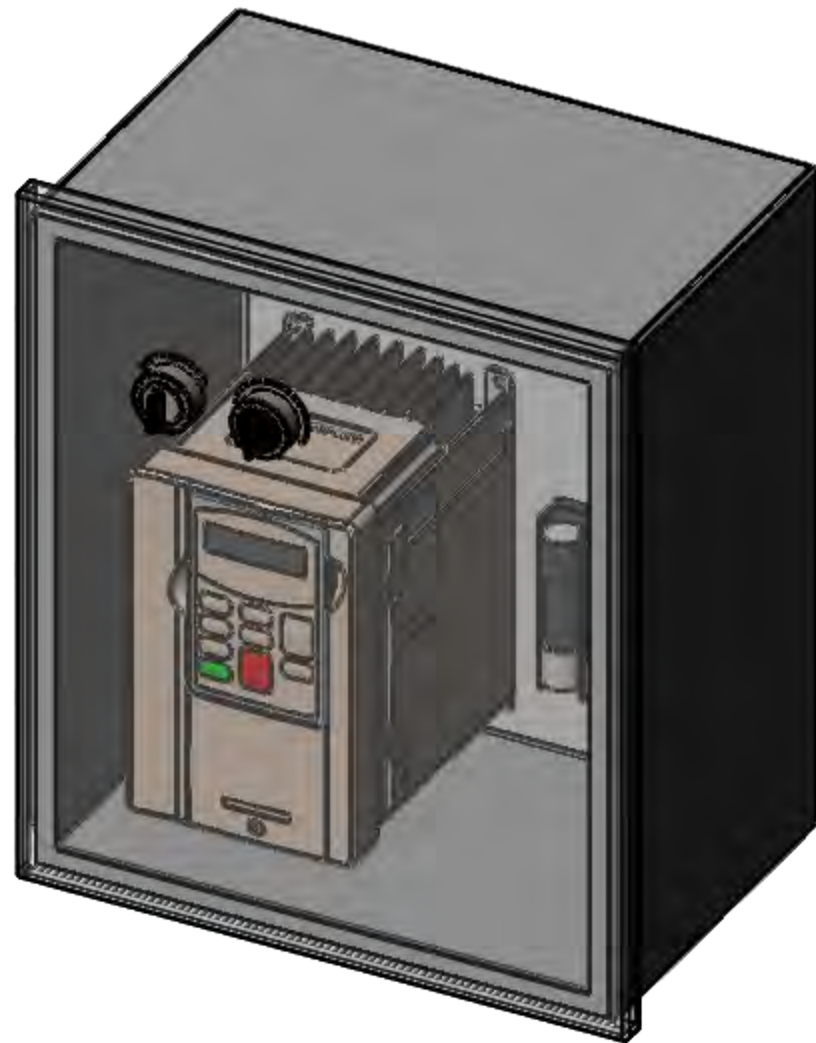


### Adjuster Bolt

- Flush (80 PSI @ 100GPM)
- Backing off the bolt, each full thread exposed subtracts approximately 5PSI



# Flow Speed Control

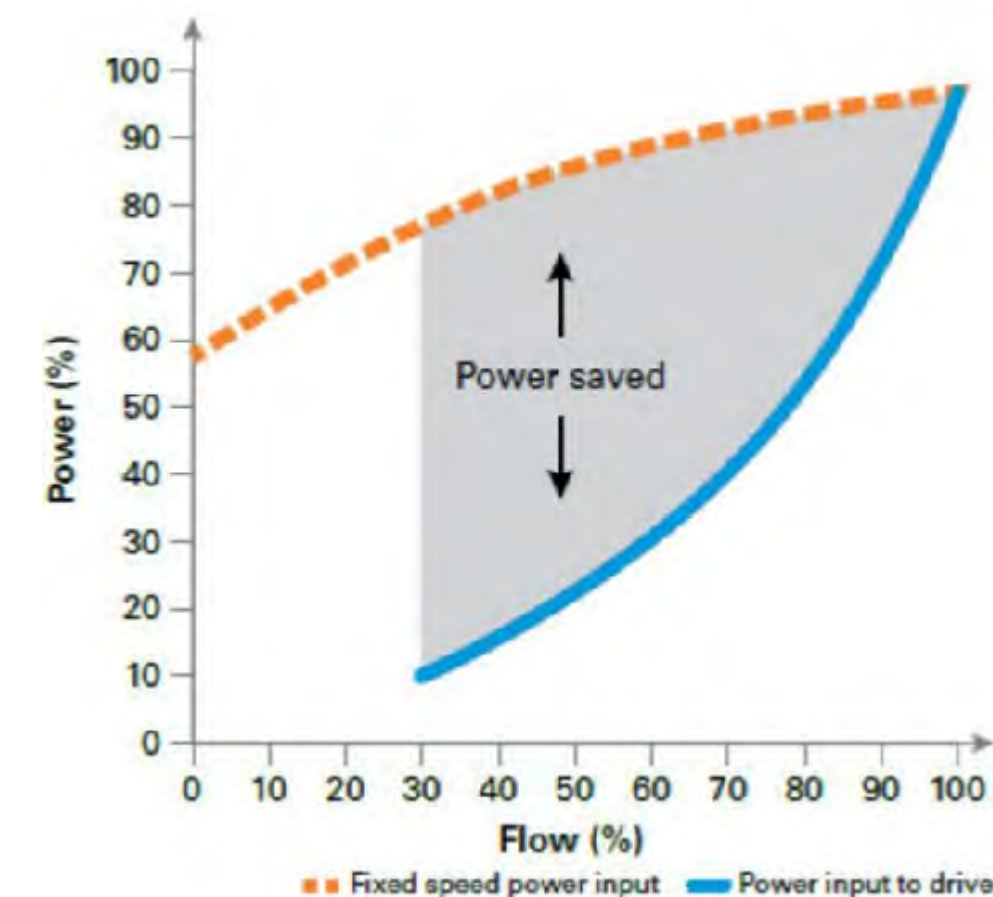


## Flow Speed Control:

Pump speed control, either in the form of a Variable Frequency Drive (VFD) or hydraulic control valve is a valuable feature. Many factors can contribute to a situation where pump speed would need to be decreased for cautionary reason, or increased for efficiency gains. These controls have other built in features such as motor protection and pressure control. They also provide valuable information when trouble shooting. Without control, one is left with limited options when problems occur. This can lead to damage, shortened life, or compromised safety.

## Energy Savings from a VFD

The graph to the right shows the energy comparison of *Fixed Speed\** with a VFD. Initially, fixed speed would certainly be the least expensive. However, energy savings should be considered during the cost analysis. At some point this alone would cover the cost.



\*Fixed Speed; Not everyone will choose some type of speed control. As a cautionary measure, we advise all fixed drive systems start at a reduced speed. This should be as much as 50% below the pumps maximum. At initial start-up, this slower speed is more forgiving. When conditions are not as expected. Once the issues are corrected, the motor pulley can be replaced with a larger pulley to increase speed as conditions allow.

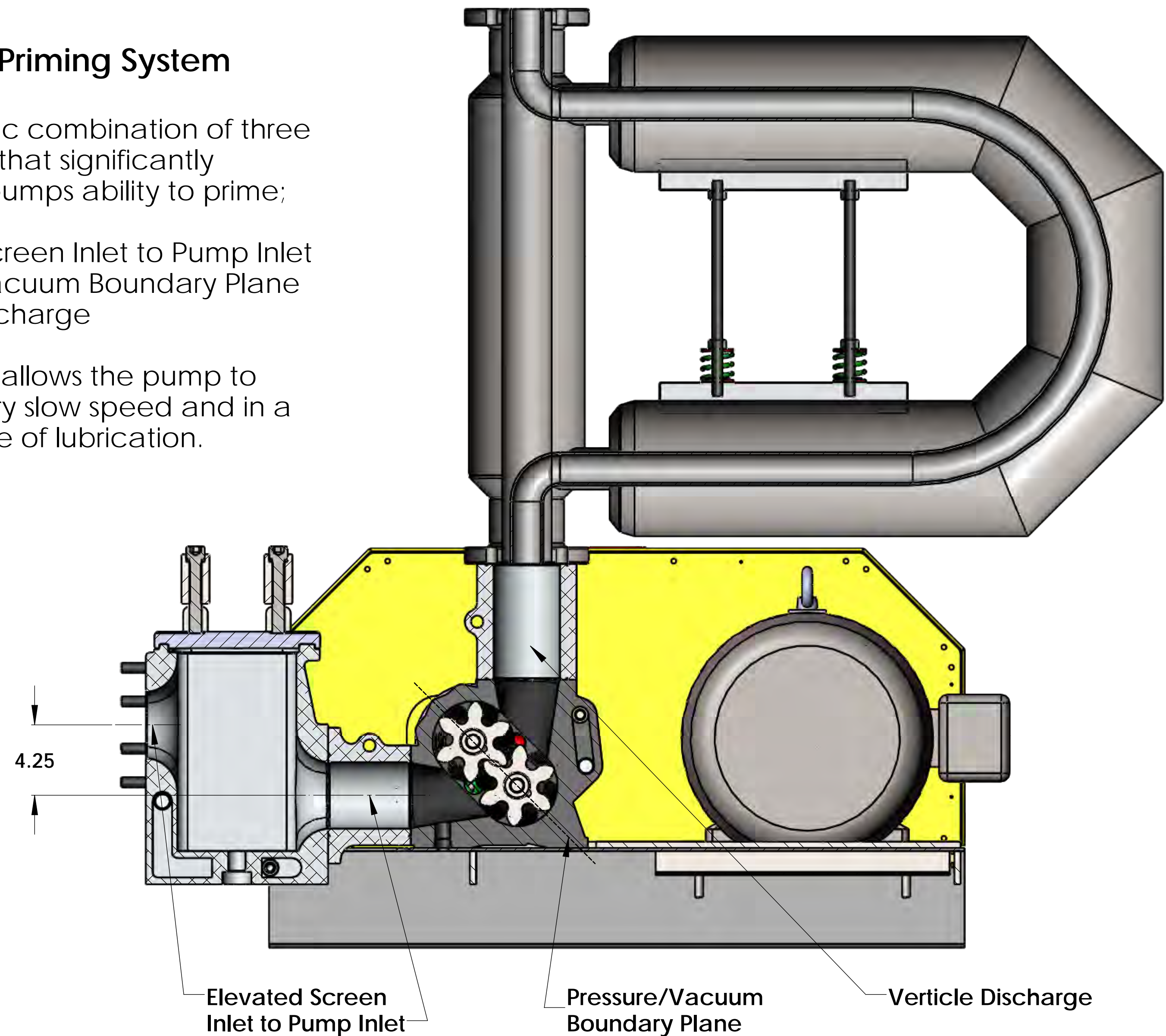
# Liquid Lock Priming Diagram

## Liquid Lock Priming System

This is a specific combination of three key elements that significantly improve the pumps ability to prime;

1. Elevated Screen Inlet to Pump Inlet
2. Pressure/Vacuum Boundary Plane
3. Verticle Discharge

This condition allows the pump to prime at a very slow speed and in a continual state of lubrication.





# Building a Model Number

**600 R C X - R H - A A - P B - . 0 4 5**

## Displacement

- 300 = 0.30 Gal/Rev
- 450 = 0.45 Gal/Rev
- 600 = 0.60 Gal/Rev
- 900 = 0.90 Gal/Rev

## Pump or Meter Style

- C = Bushed, No RV
- B = Bushed, RV, Non Heated
- V = Bushed, RV, Heated
- T = Bushed, Heated Meter
- K = Bearing, RV, No Heat
- N = Bearing, No RV
- W = Bearing, No RV, No Heat
- S = Sealed Bearing, RV, No Heat
- R = Bearing, RV, Heated
- U = Bearing, Heated Meter

## Shaft Seal

- M = Modified Seal (Single - Obsolete)
- N = Cooling Spacer - Narrow (Double)
- C = Cooling Spacer - Wide (Double)
- B = Bearing Spacer (Double)
- P = Packed Seal (Obsolete)
- H = Packed Seal (Heated)
- J = Packed Seal (Non-Heated)

## Drive Shaft Type

- X = Extended
- C = Cut to Custom Length
- H = Hydraulic Mount Shaft
- S = Short

## Configuration

- RH = Right High (standard)
- RL = Right Low
- LH = Left High
- LL = Left Low

## Combined Gasket Clearance

- .030 = 2 x 0.15" End Plate Gaskets
- .045 = 1 x 0.15" + 1 x 0.3" End Plate Gaskets
- .060 = 2 x 0.30" End Plate Gaskets

## Option Items

- OB = Outboard Bearing
- PB = Pillow Block
- EH = Electric Heat Cavities
- EA = Encoder Guard and Coupler
- Multiple options can be stacked  
ex. -OB-EH

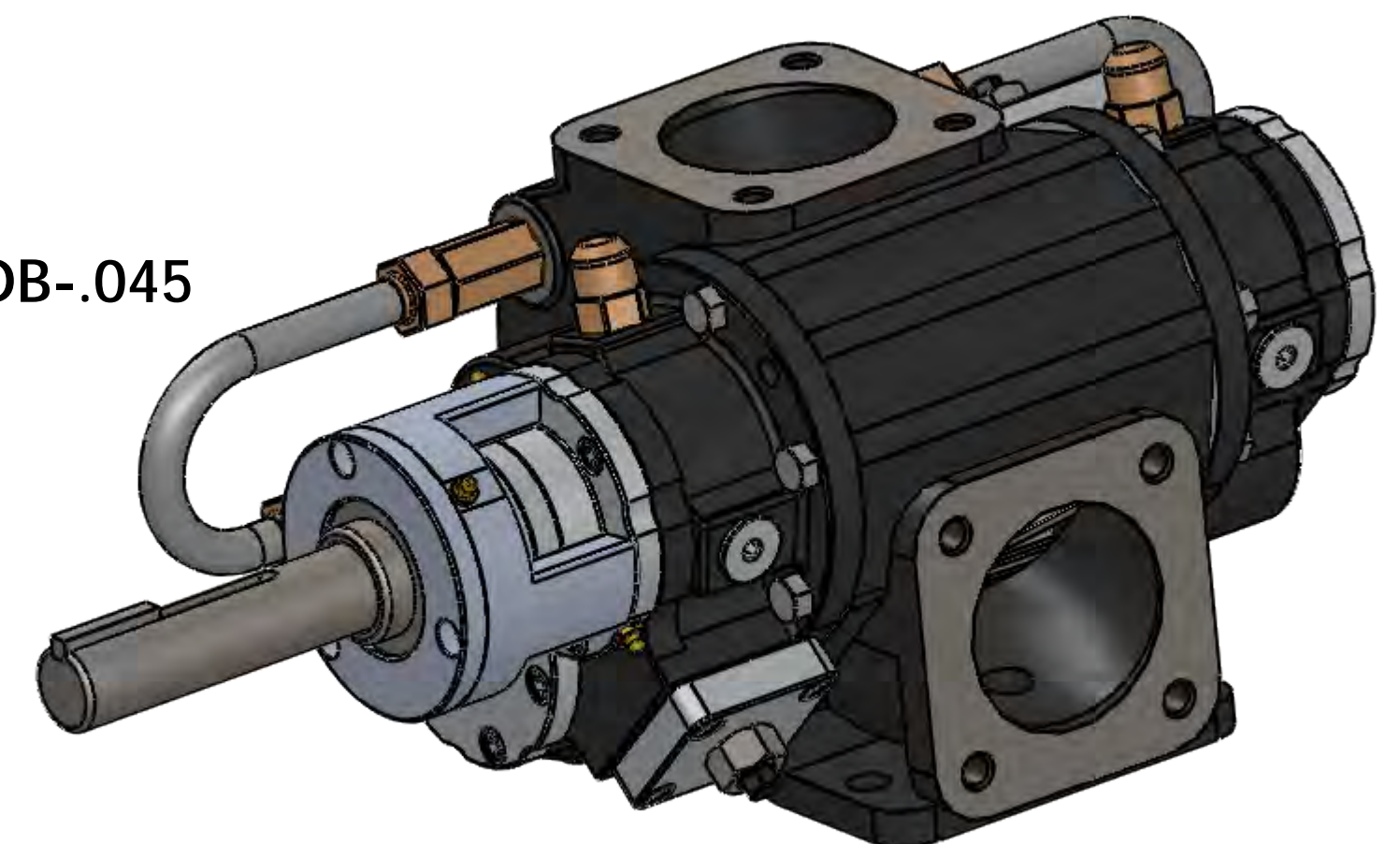
## Side Outlet Relief

- 4 = Fixed: 40psi @100gpm (standard on bushing pumps)
- 8 = Fixed: 80psi @100gpm
- A = Adjustable (standard on bearing pumps)
- B = Blocked

## Top Outlet Relief

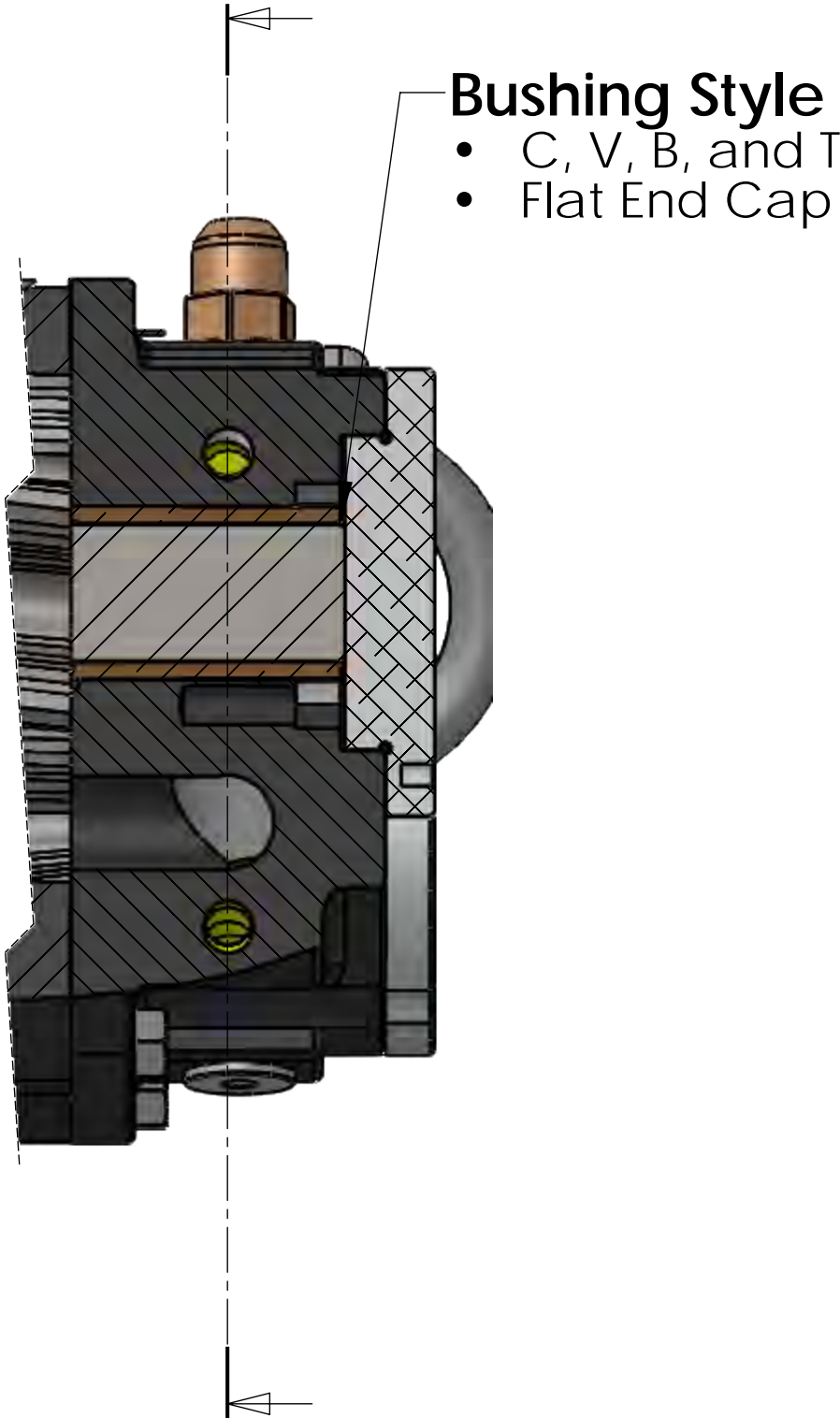
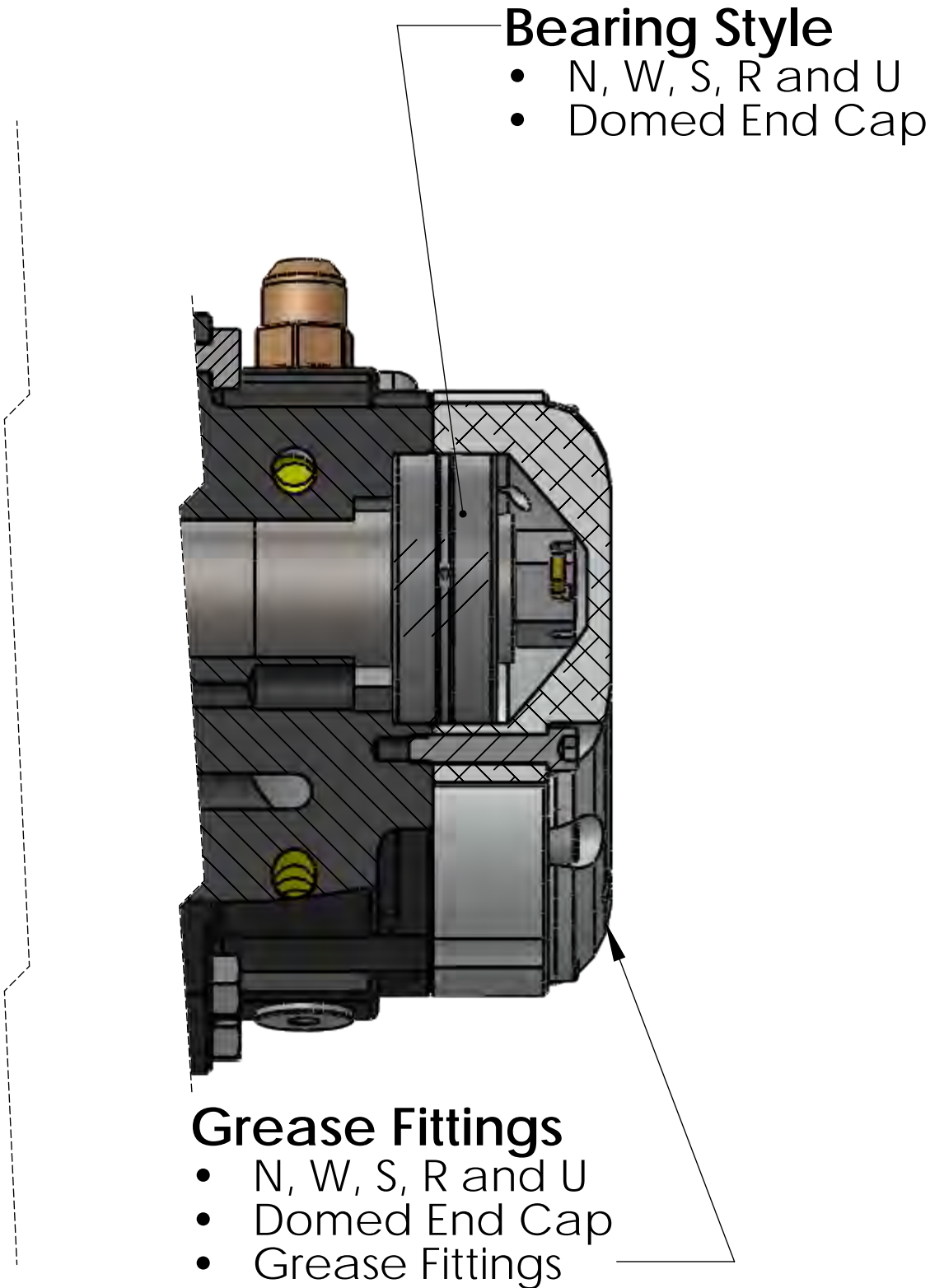
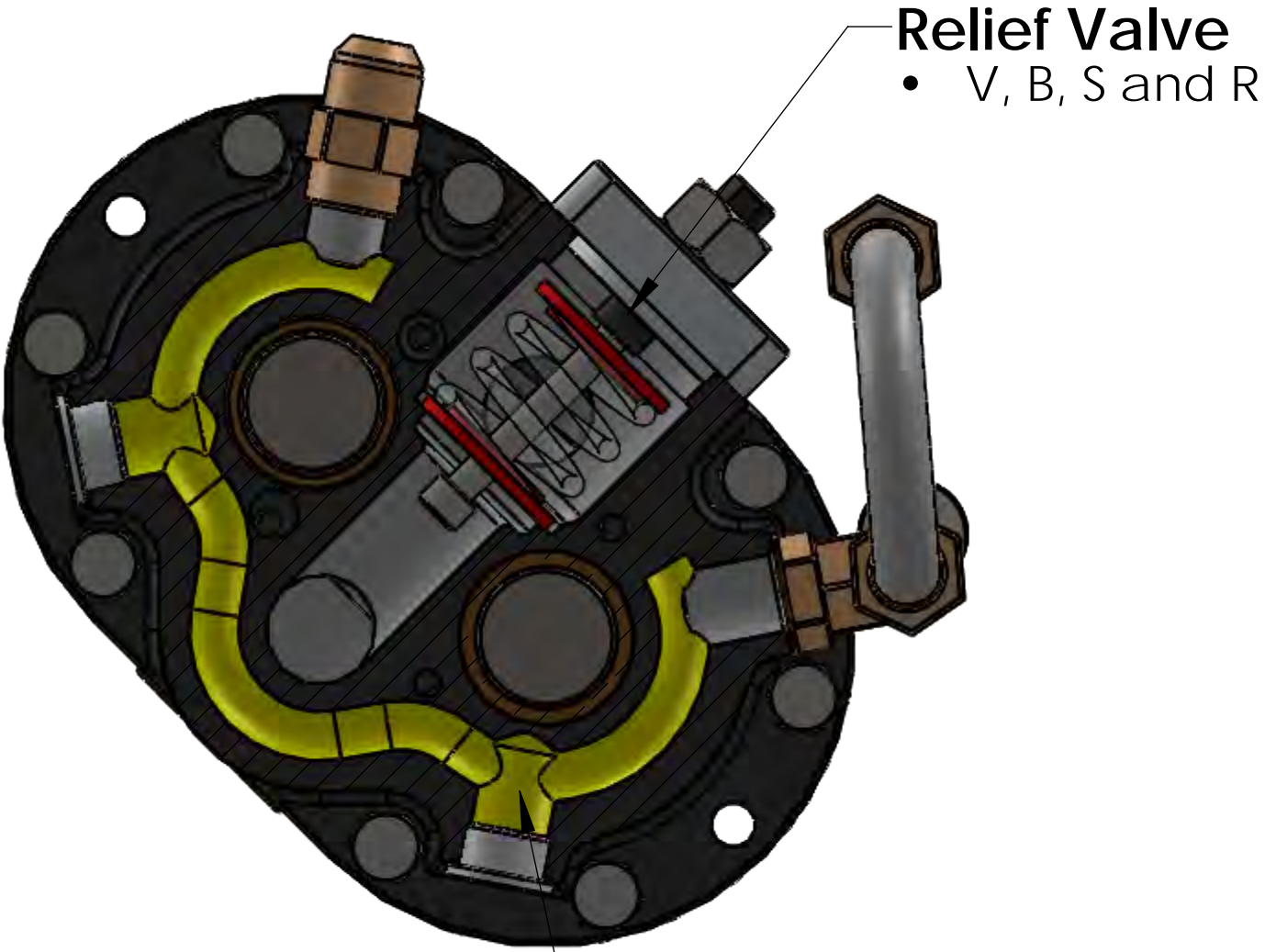
- 4 = Fixed: 40psi @100gpm
- 8 = Fixed: 80psi @100gpm (standard on bushing pumps)
- A = Adjustable (standard on bearing pumps)
- B = Blocked

Example shown:  
450VNX-RH-AA-OB-.045



End Plate Style

Style	Relief	Heat	Bearing	Bushing	Viton	Buna-N	Grease
C				X	X		
B	X			X		X	
V	X	X		X	X		
T		X		X	X		
N			X		X		X
W			X			X	X
R	X	X	X		X		X
S	x		x			x	x
U		X	X		X		X



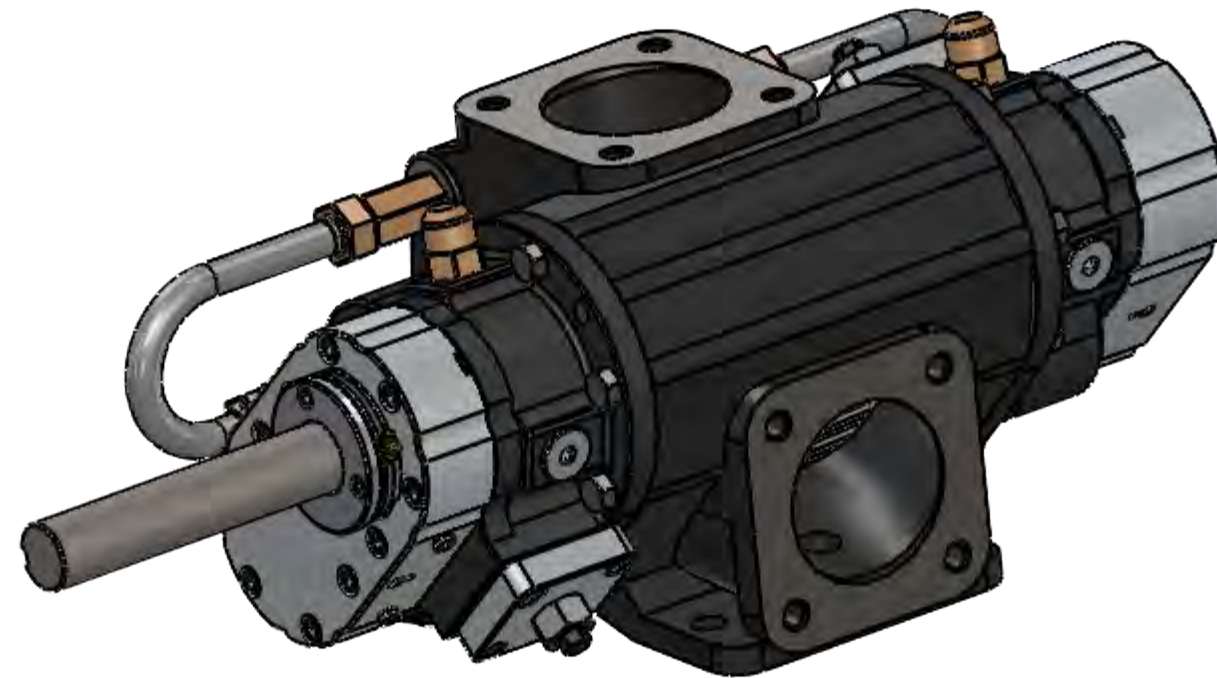
- Heat Tracing**
- V, T, R and U
  - Passage shown in yellow
  - Fittings included

Material	Style	Seal Type	Notes
Rubberized Asphalt	R U	C P	Use oversized displacement
Modified Asphalt	V T R U	M N C P	
Emulsified Asphalt	C V T	M N C	
Crude Oil	B W S	M D	
Condensate	S	B	Use oversized displacement
Dust Control	W S	B	
Abrasive	N W S R U	C B	Use oversized displacement
Corrosive	W S	B	
Hot	V T R U	C	

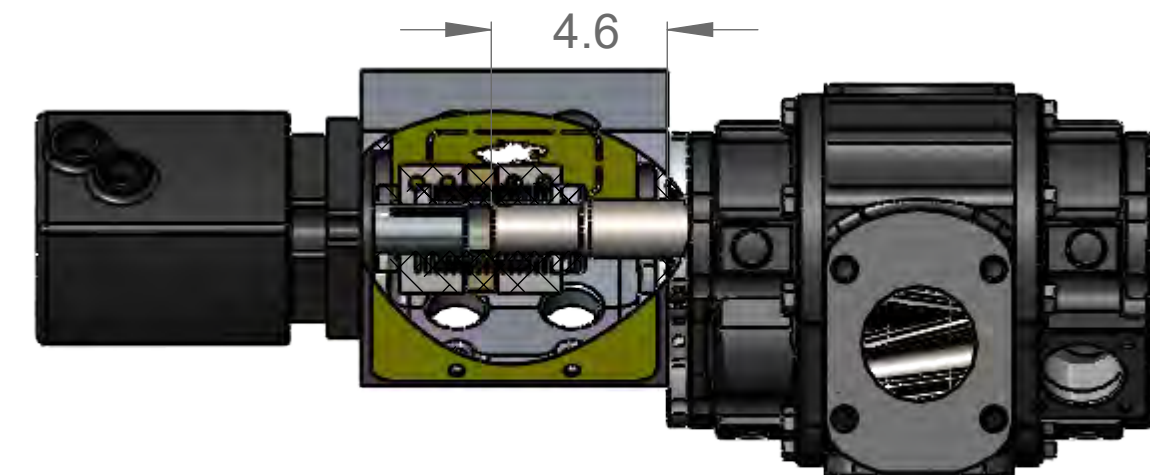


# Shaft Type

**X: Extended Shaft**



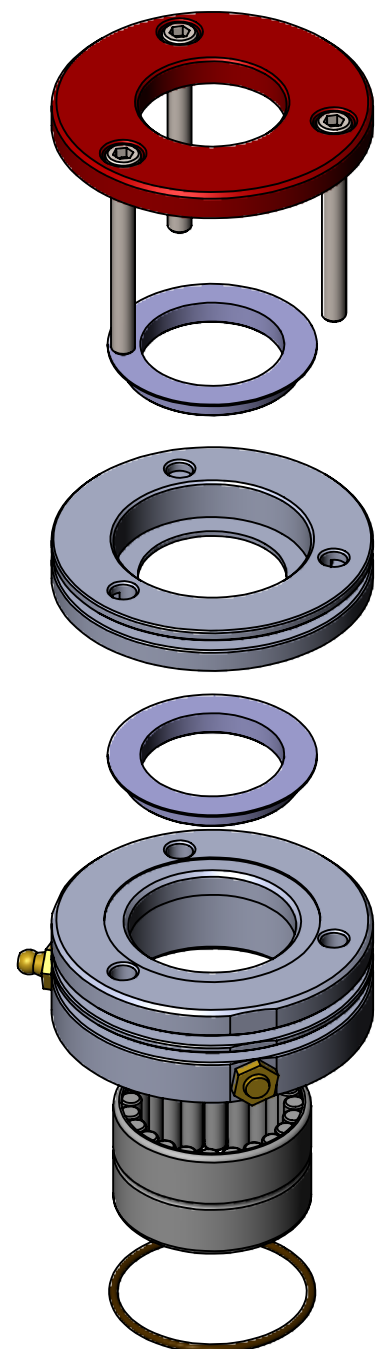
**H: Hydraulic Shaft**



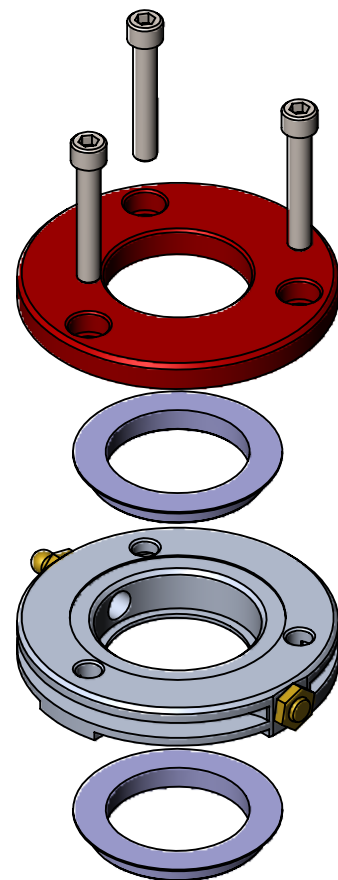
Set distance from mount face. Used for Hydraulic motors and Gear Meters.

# Seal Type

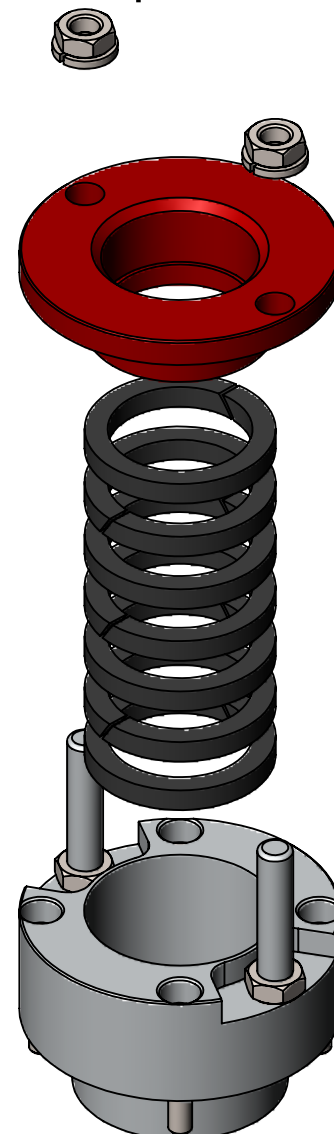
**N: Cooling Double**  
(bushing pumps)



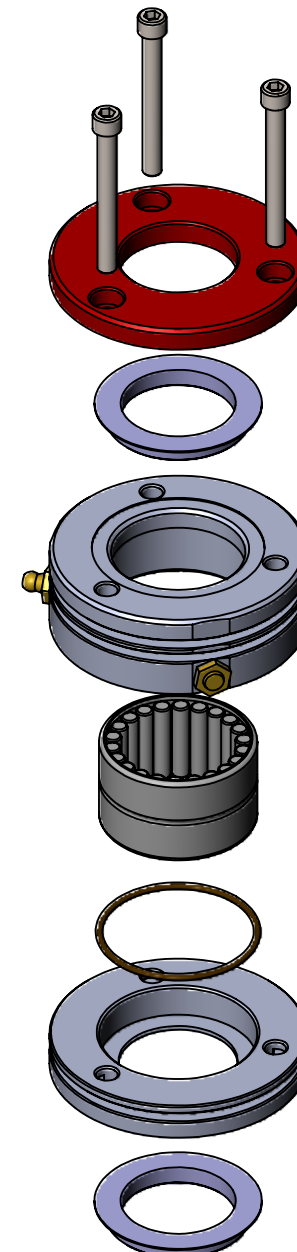
**C: Cooling Double**  
(bearing pumps)



**J: Packing**  
(1/4" packing)

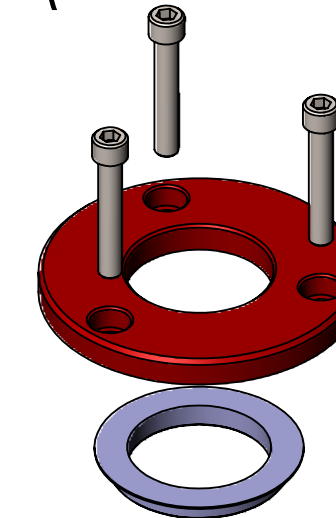


**B: Bearing Double**  
(bushing pumps)

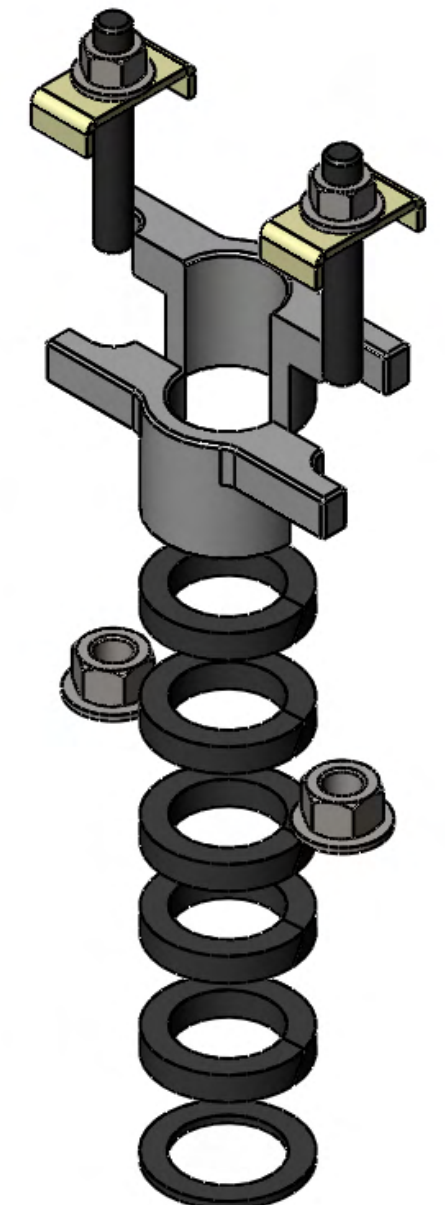


## OBSOLETE SEALS

**M: Single Lip Seal**  
(obsolete)



**P: Packing**  
(3/8", obsolete)



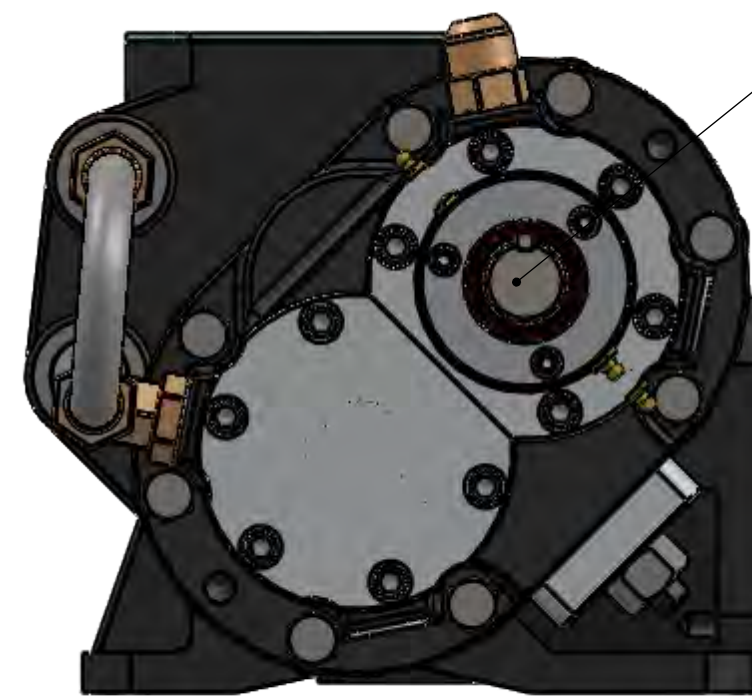


# Configuration

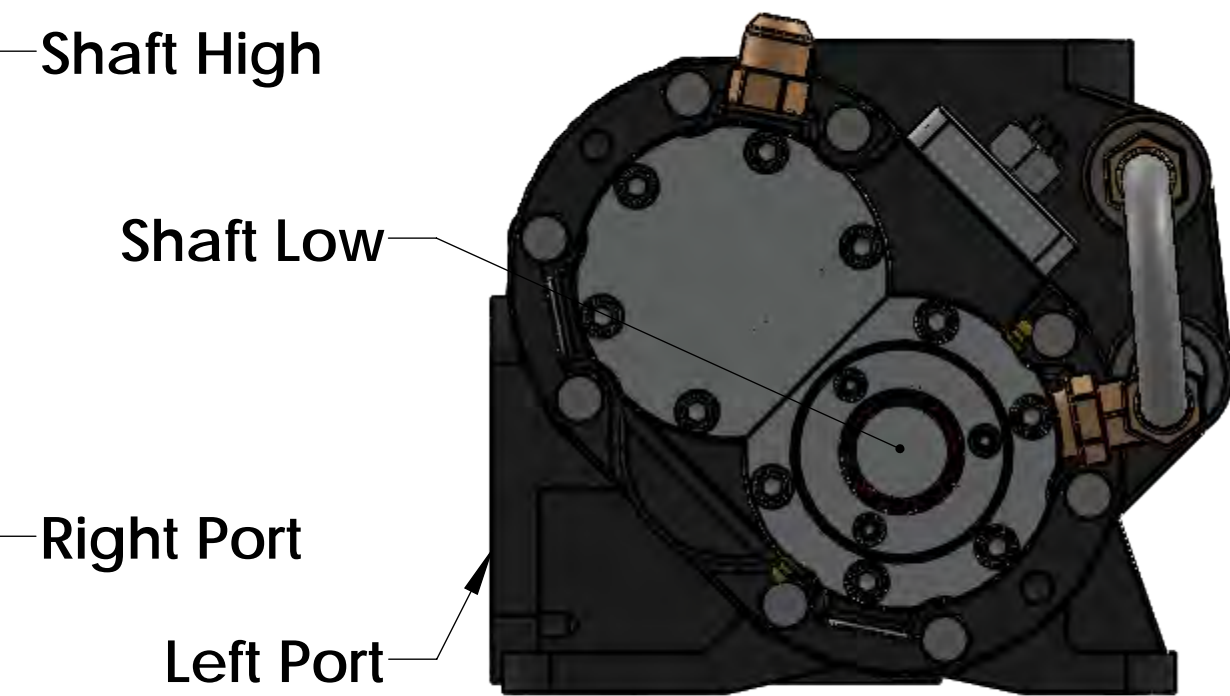
## Configuration Examples

The configuration is determined by side port position and drive shaft location. Looking down the drive shaft, is the side port on the left or right. Is the drive shaft in the high or low position. See examples to left.

**RH Example**  
Right High



**LL Example**  
Left Low



Shaft High

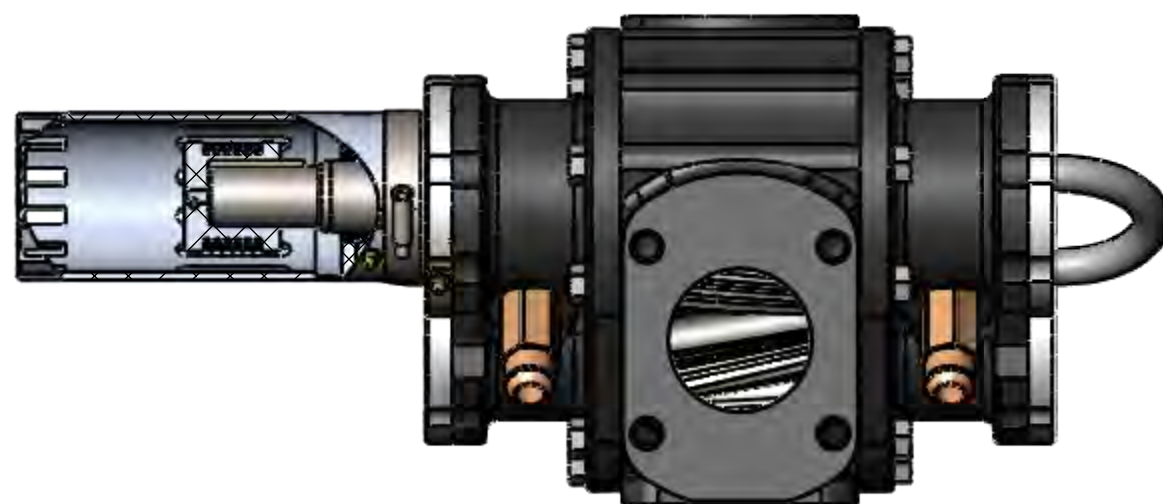
Shaft Low

Right Port

Left Port

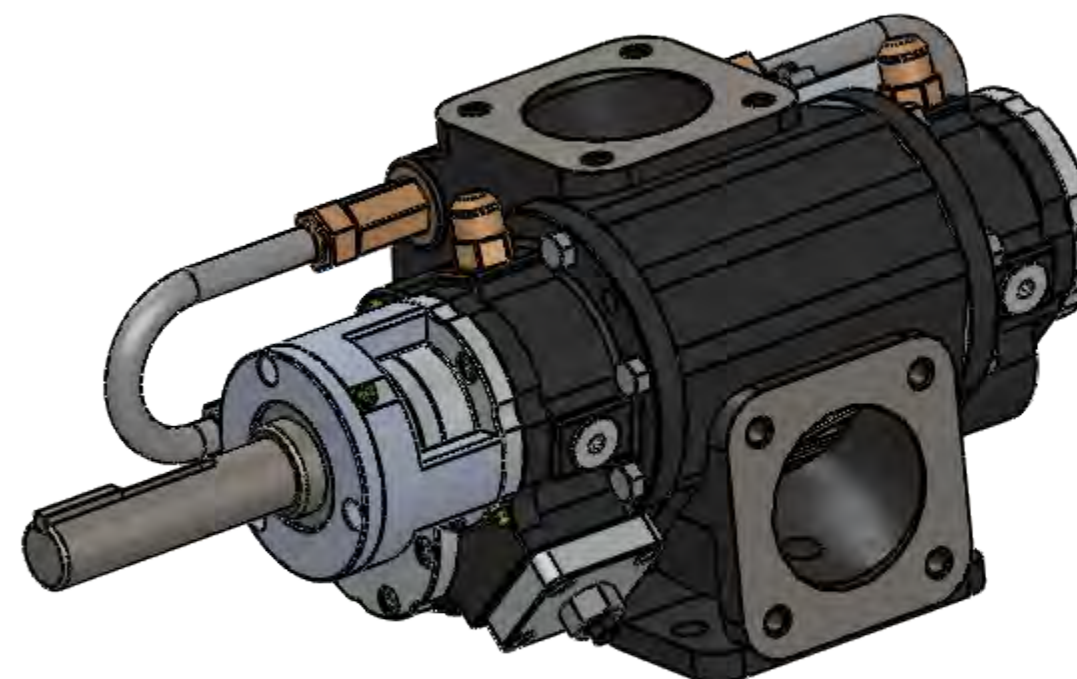
## Option Items

**EA: Encoder Mount**

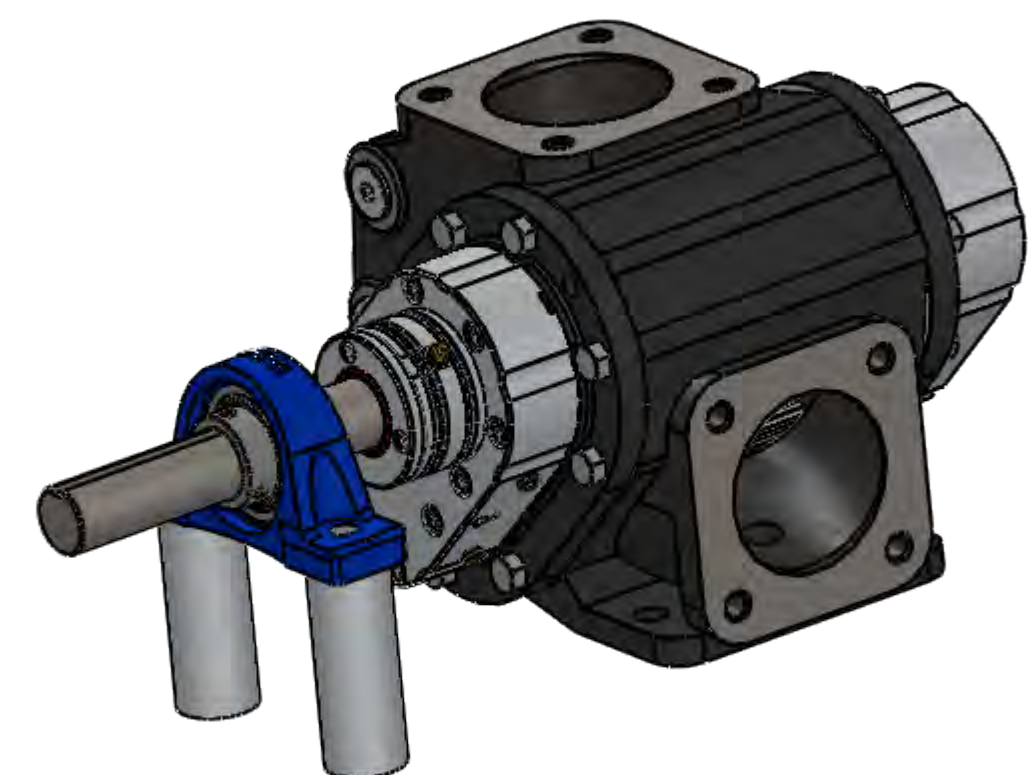


Encoder coupler and guard  
(encoder not included)

**OB: Outboard Bearing**

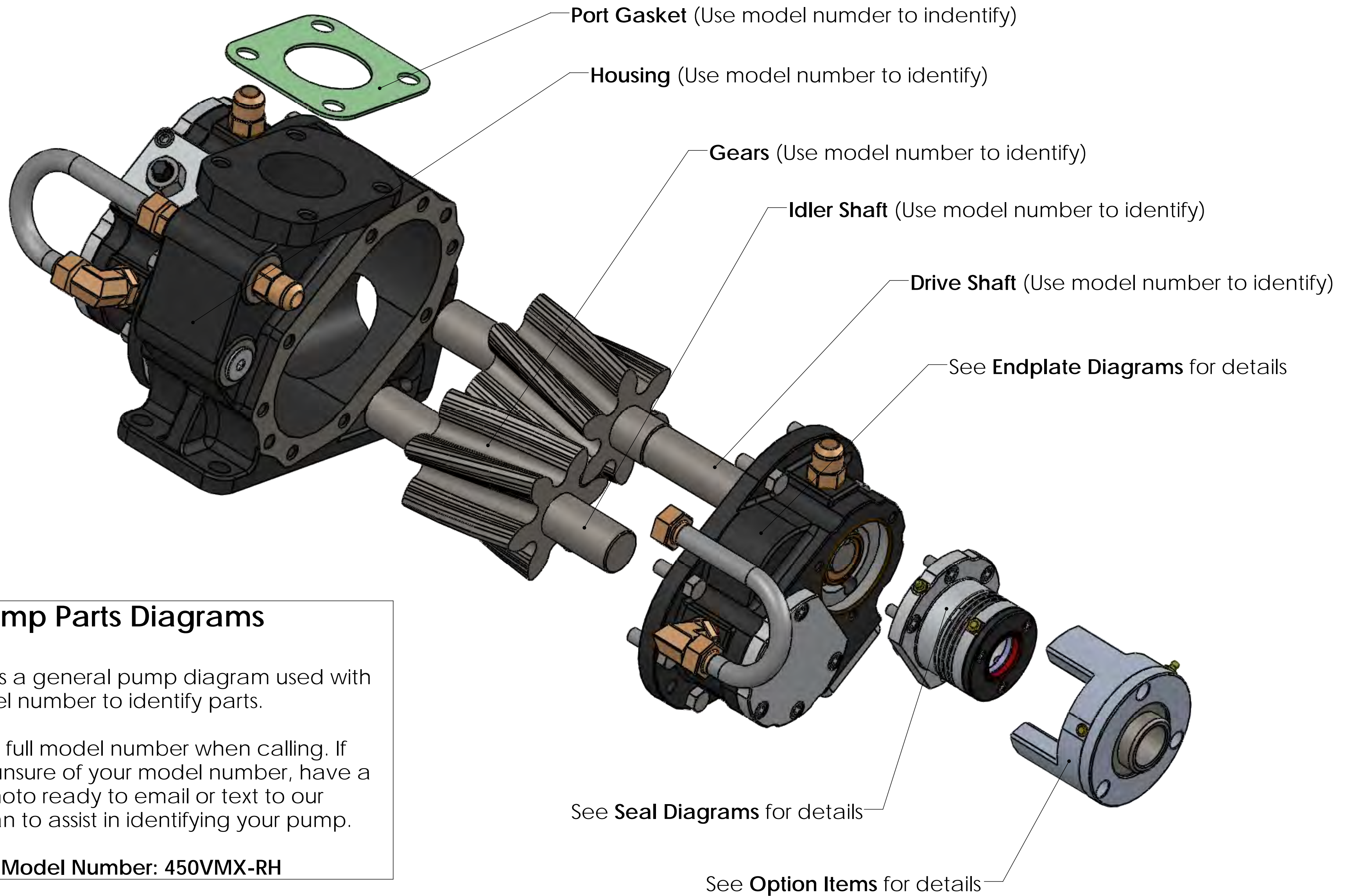


**PB: Pillow Block Bearing**





# Base Component Diagram



## Pump Parts Diagrams

This shows a general pump diagram used with the model number to identify parts.

Have the full model number when calling. If you are unsure of your model number, have a digital photo ready to email or text to our technician to assist in identifying your pump.

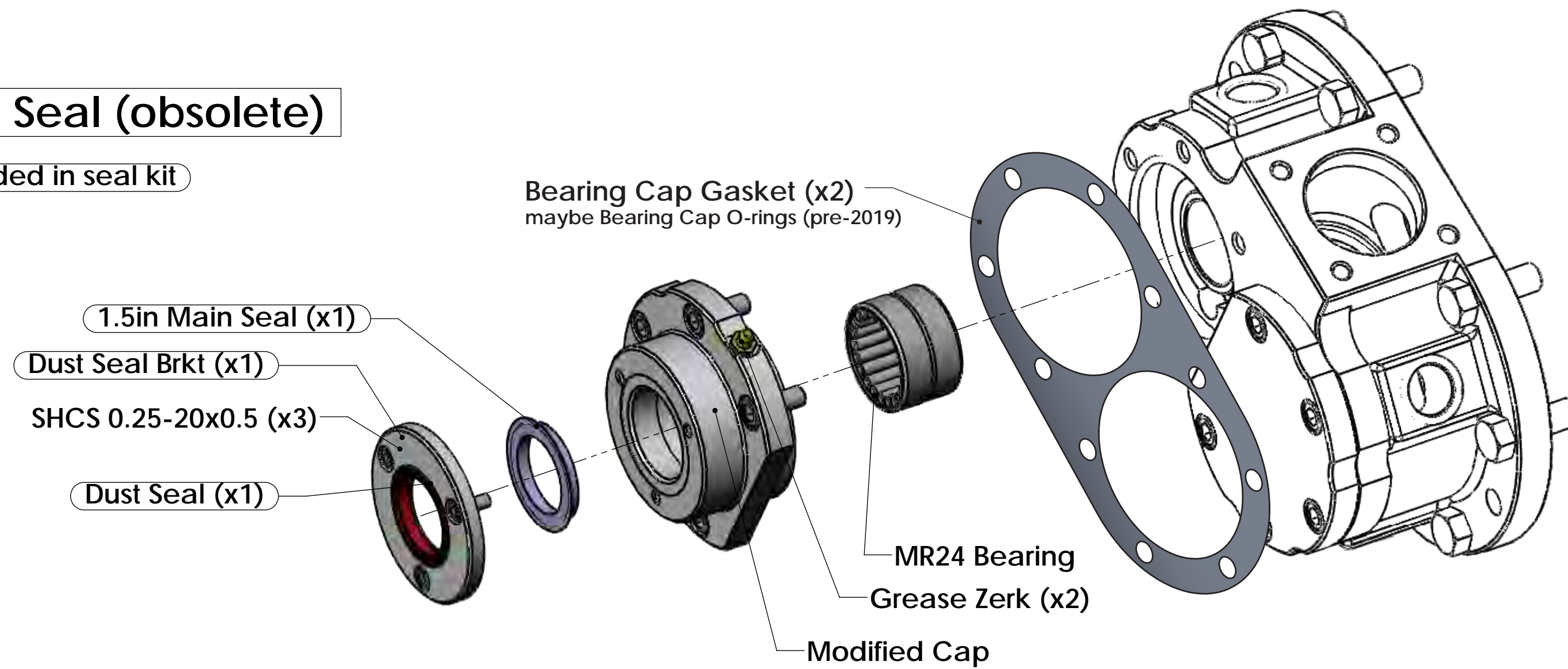
**Example Model Number: 450VMX-RH**



# Seal Diagrams (1 of 3)

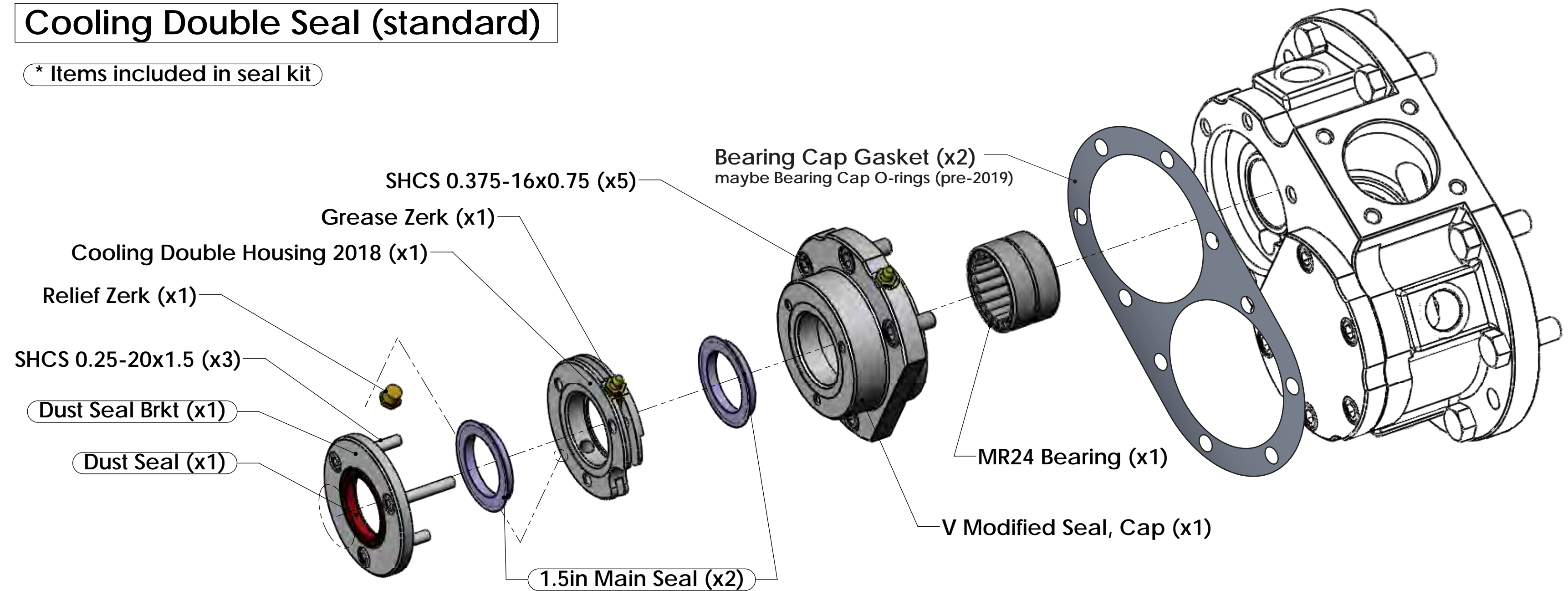
## Modified Seal (obsolete)

\* Items included in seal kit



## Cooling Double Seal (standard)

\* Items included in seal kit



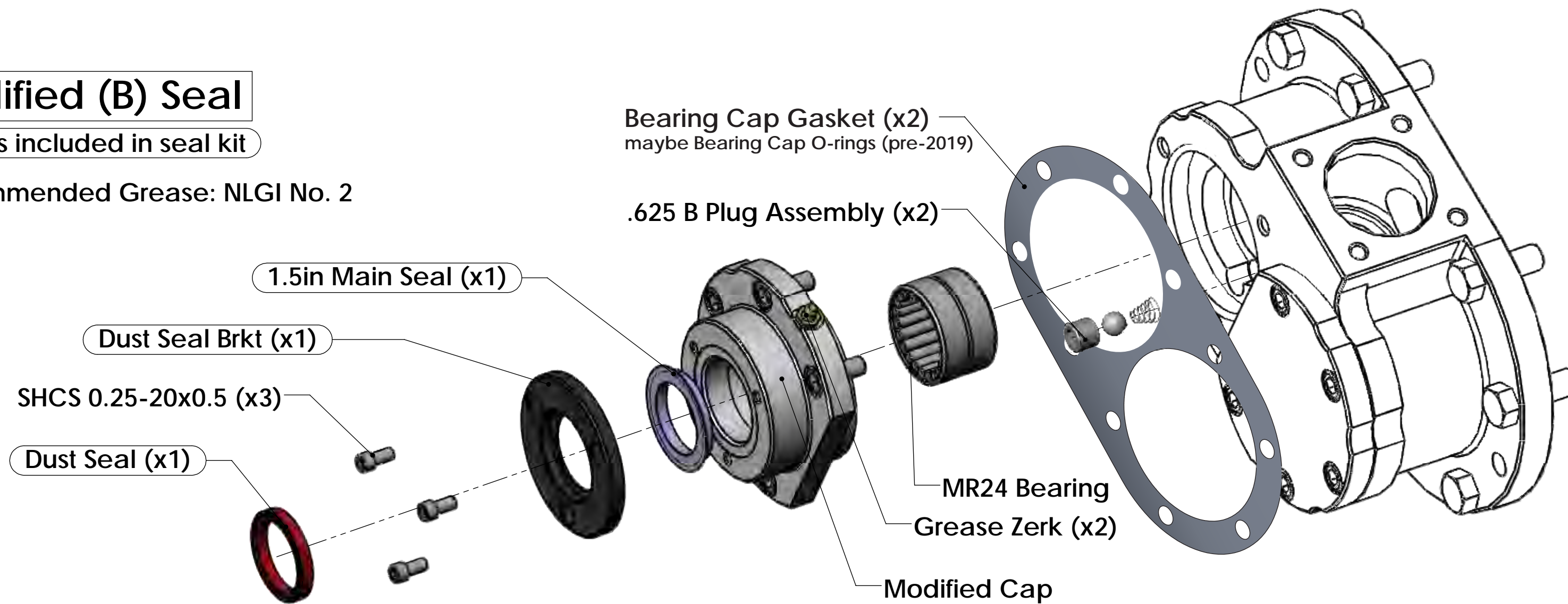


# Seal Diagrams (2 of 3)

## Modified (B) Seal

\* Items included in seal kit

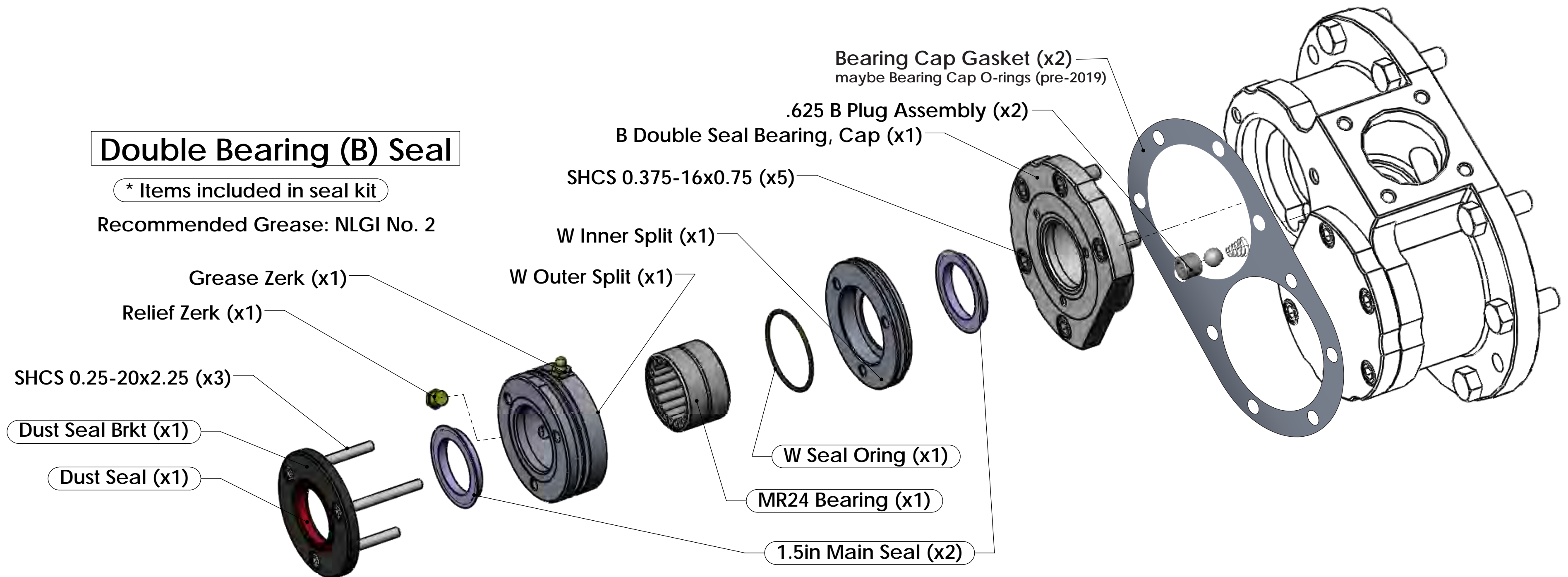
Recommended Grease: NLGI No. 2



## Double Bearing (B) Seal

\* Items included in seal kit

Recommended Grease: NLGI No. 2

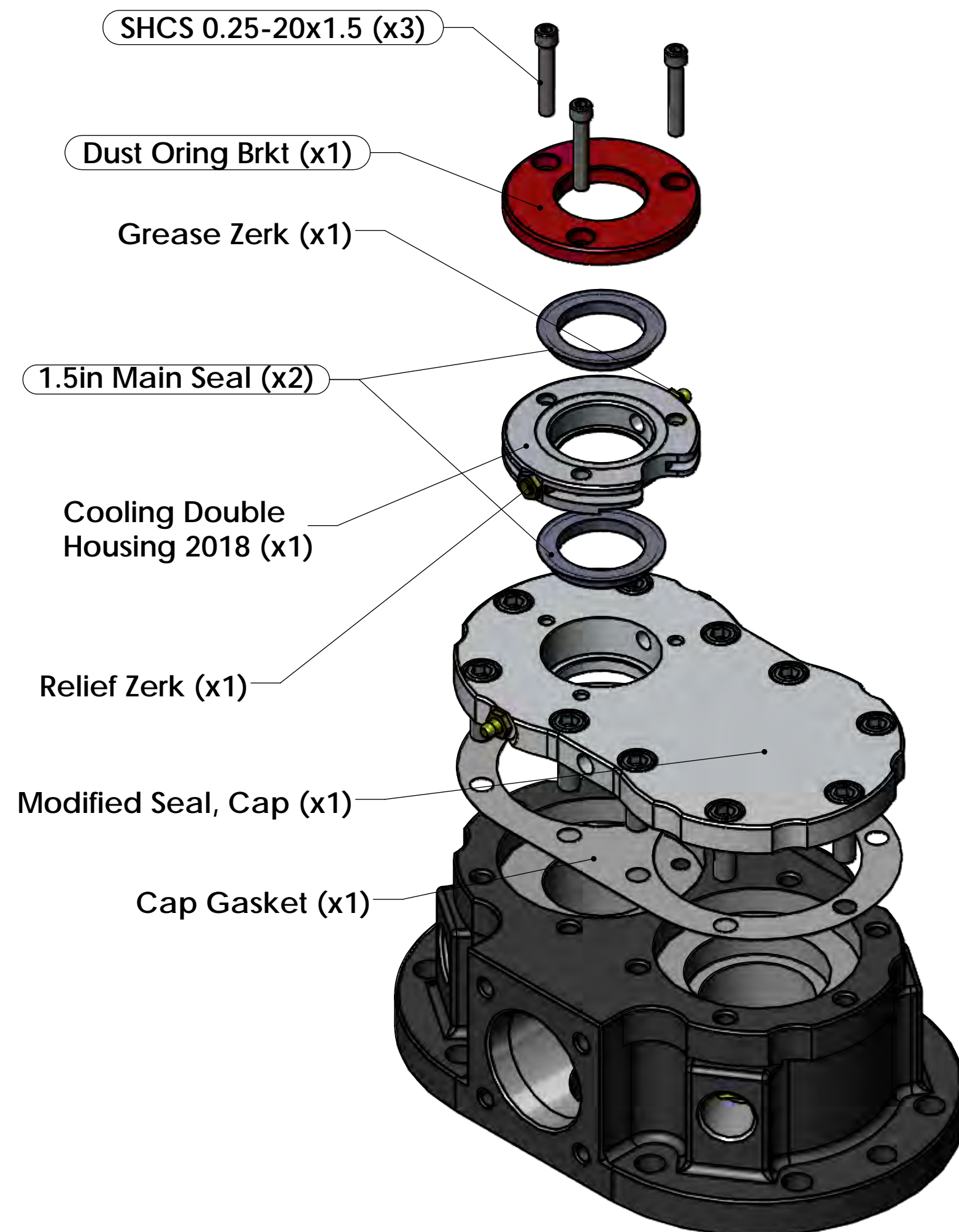




# Seal Diagrams (3 of 3)

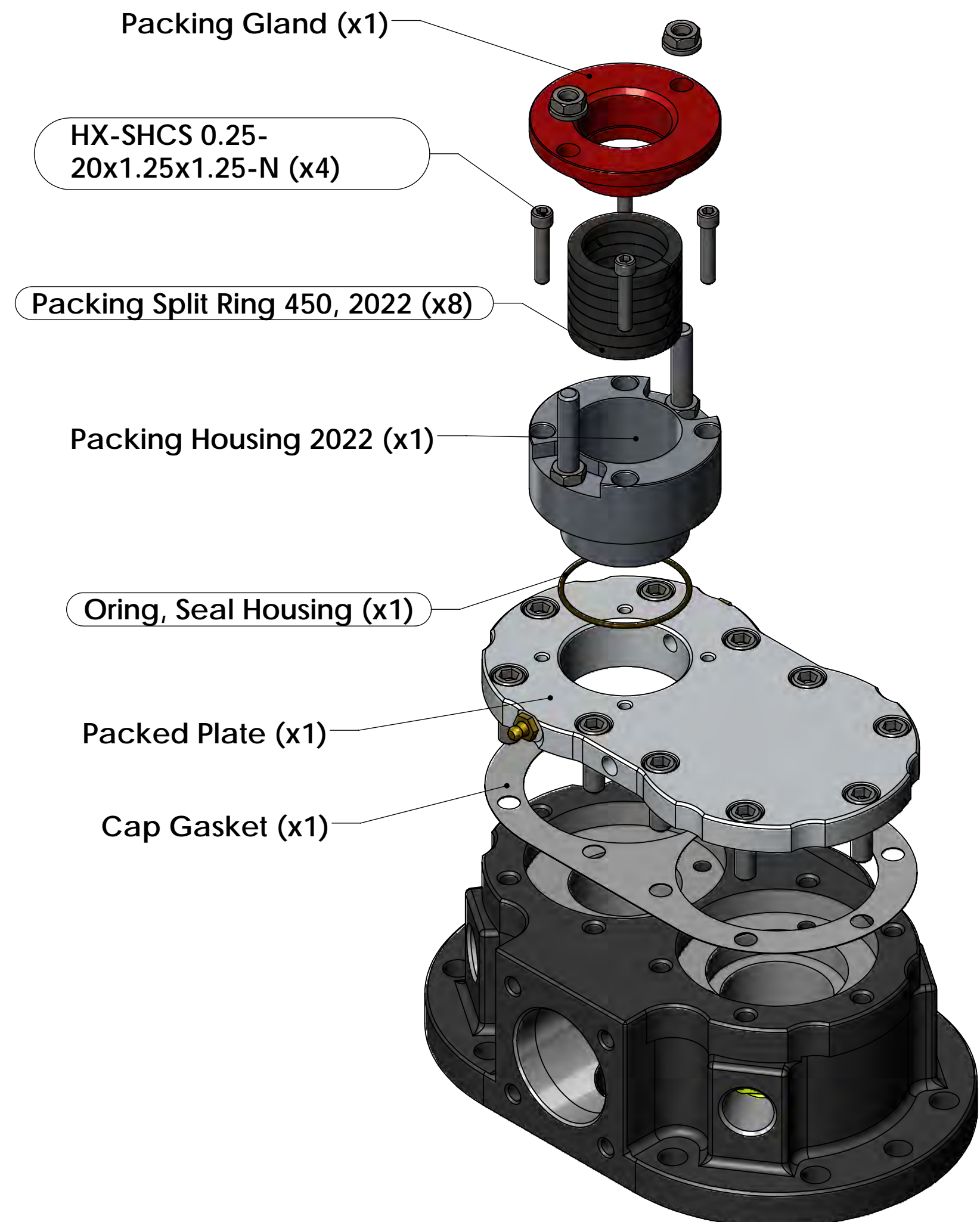
## Cooling Double 2020

\* Items included in seal kit



## Packed Seal 2022

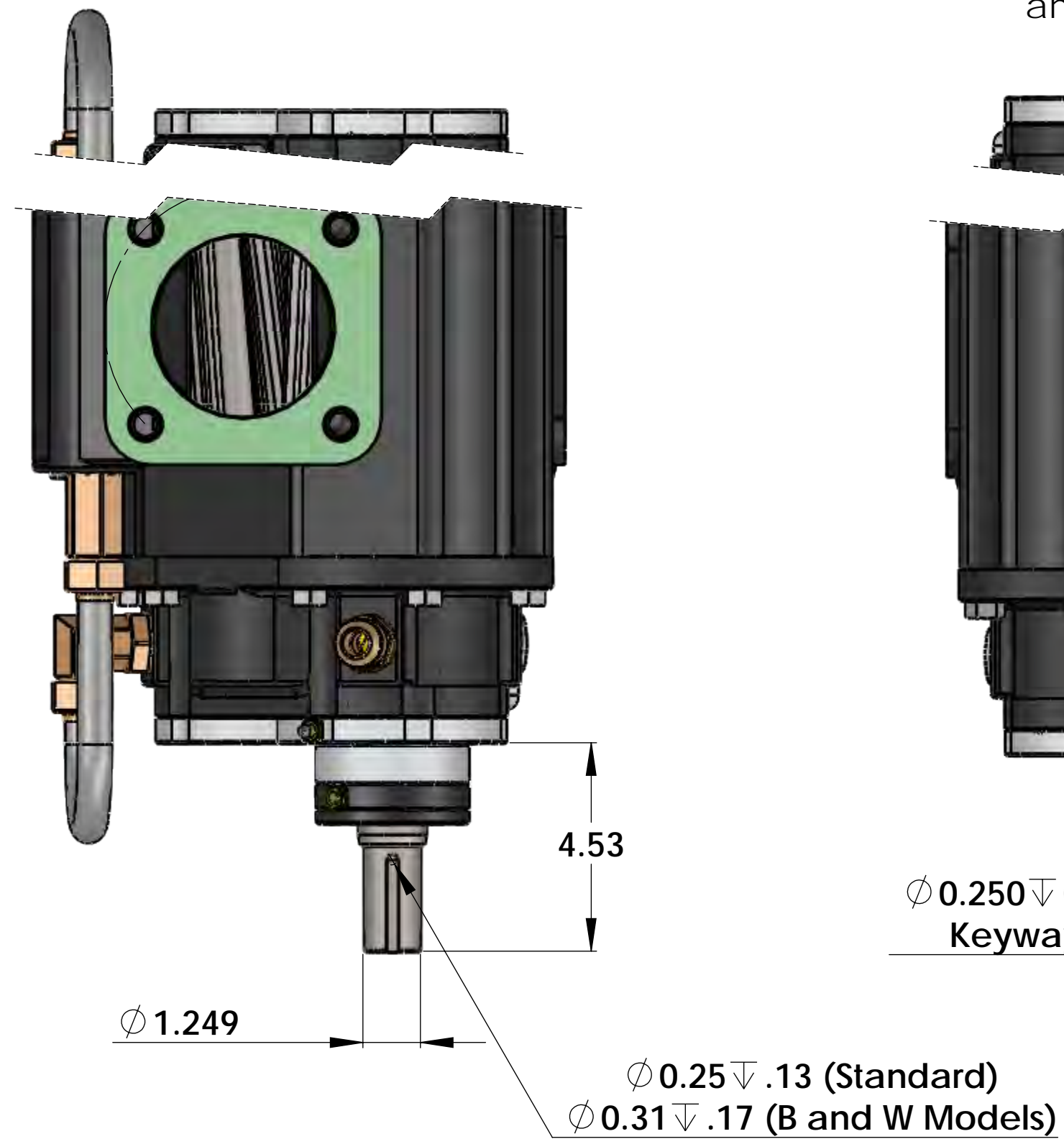
\* Items included in seal kit





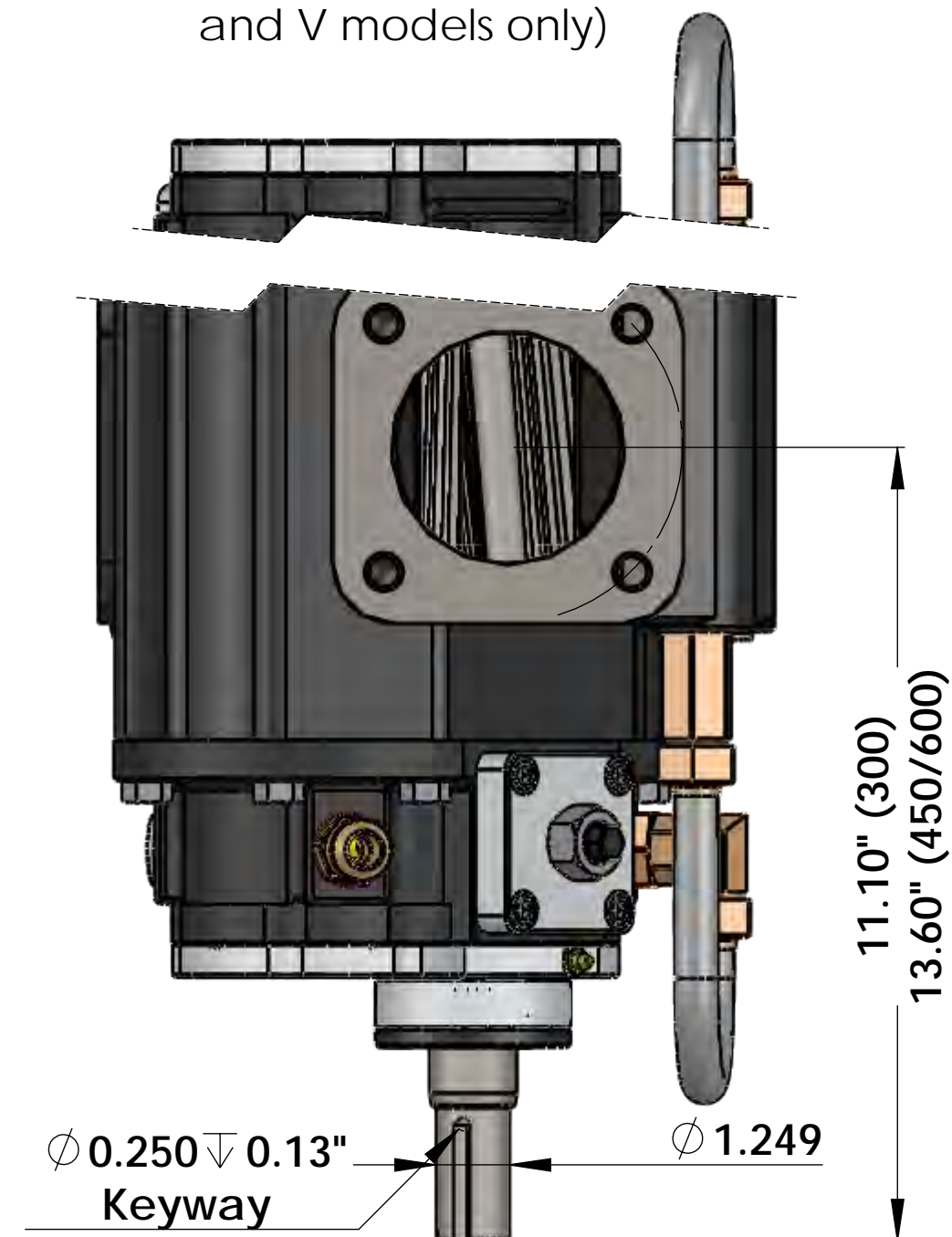
# Shaft Style Diagrams

**H - Hydraulic Shaft**

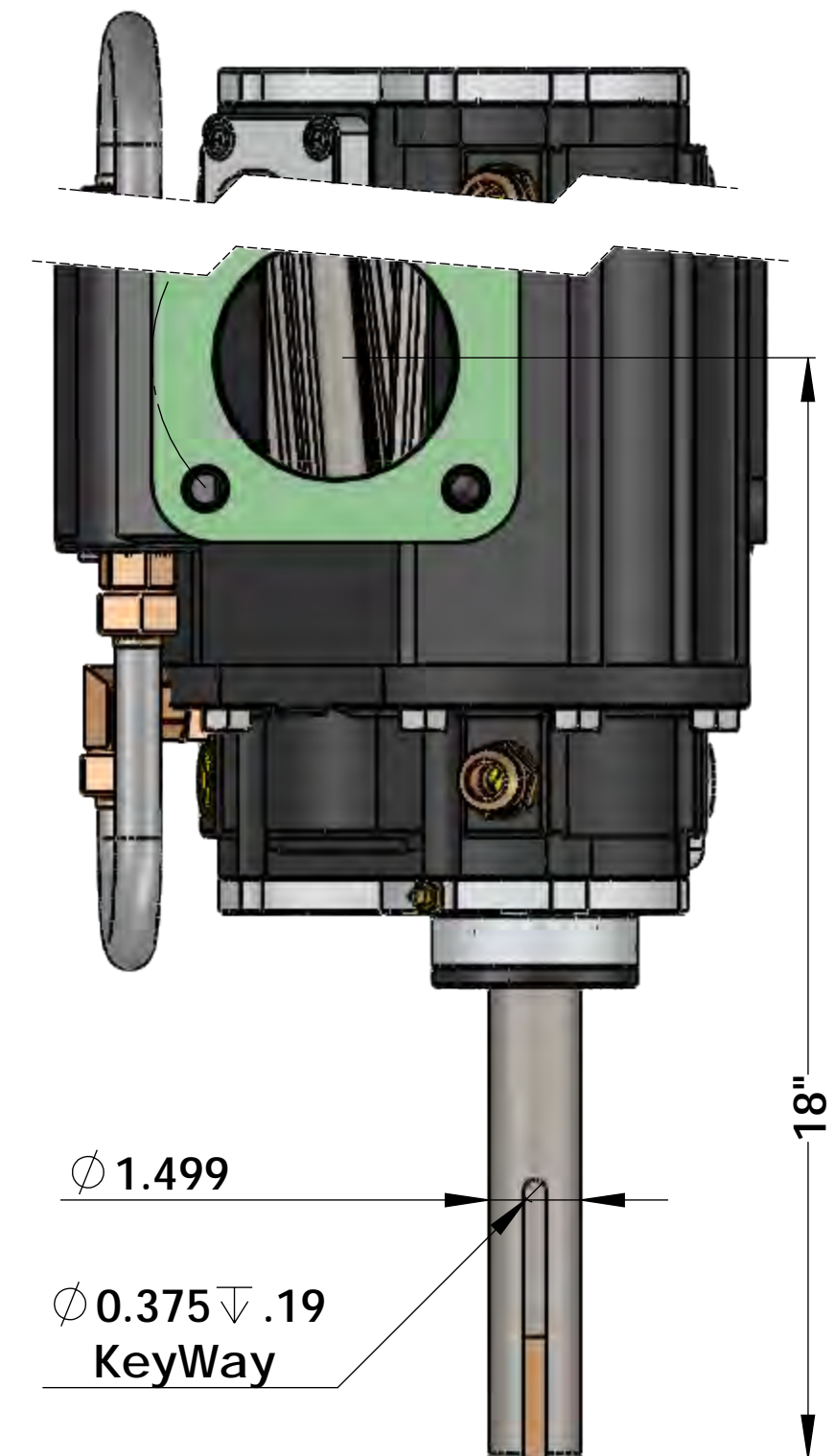


**S - Short Shaft**

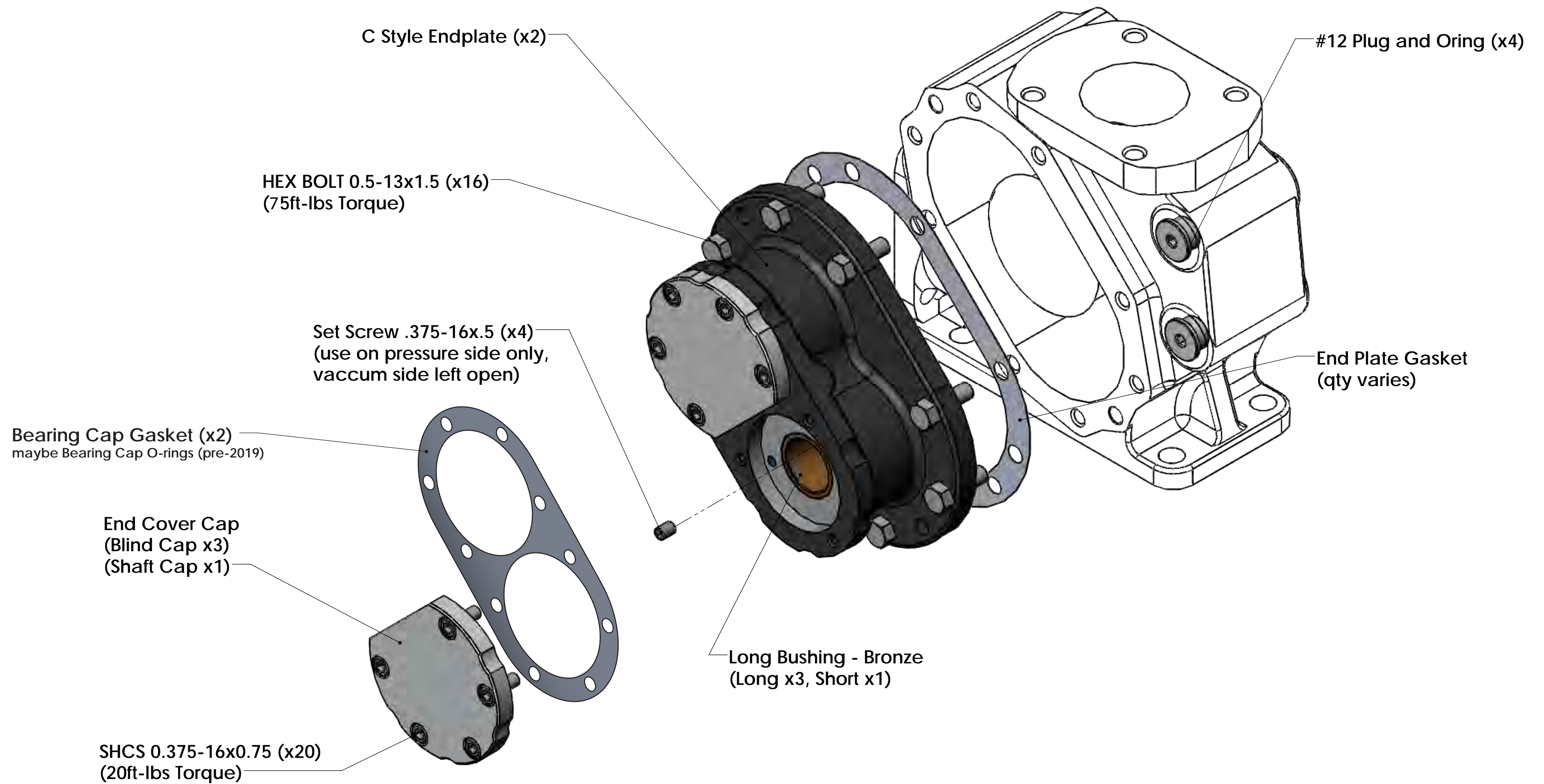
(Available in B,C,  
and V models only)



**X - Extended Shaft**

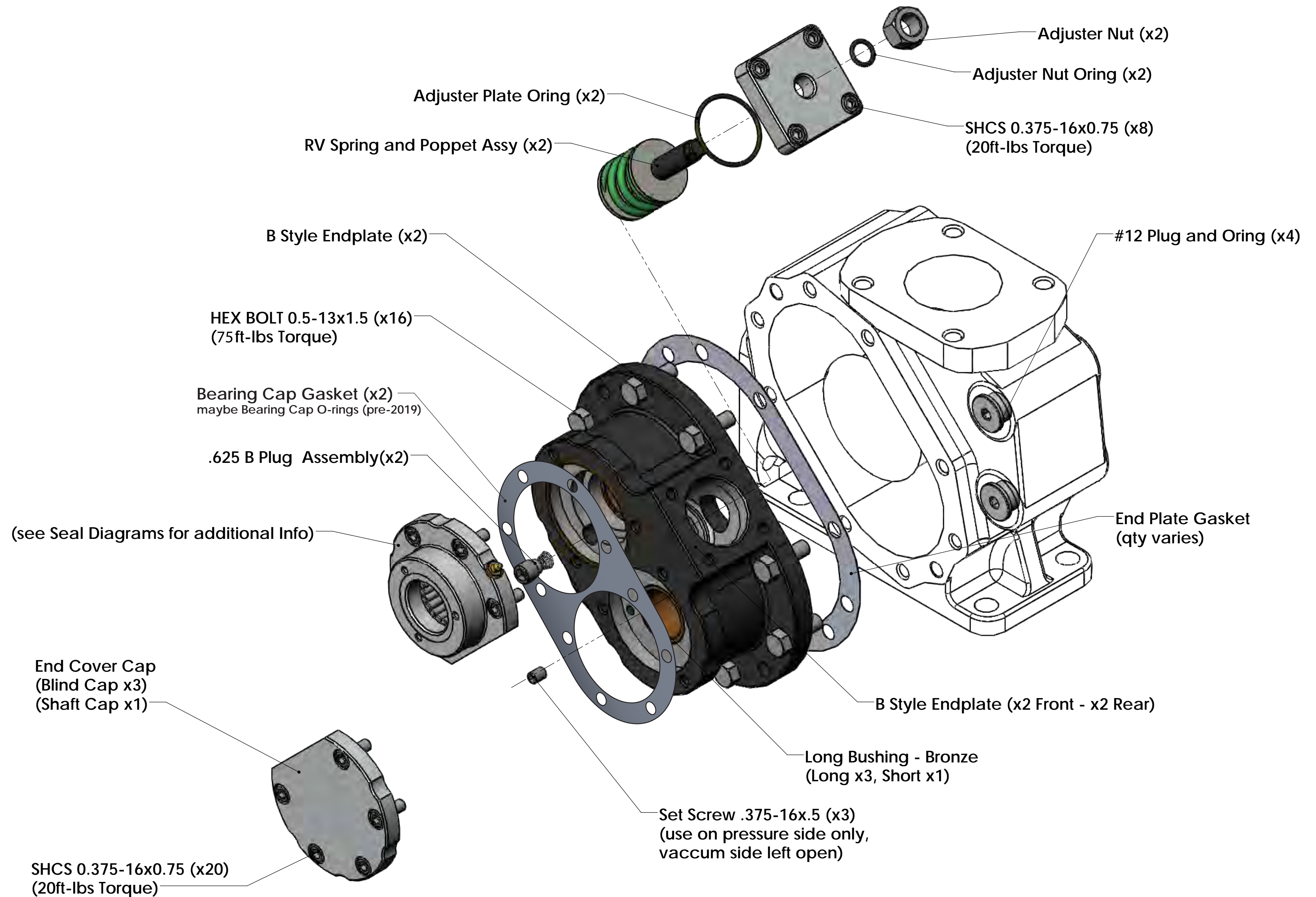


# C Style Diagram



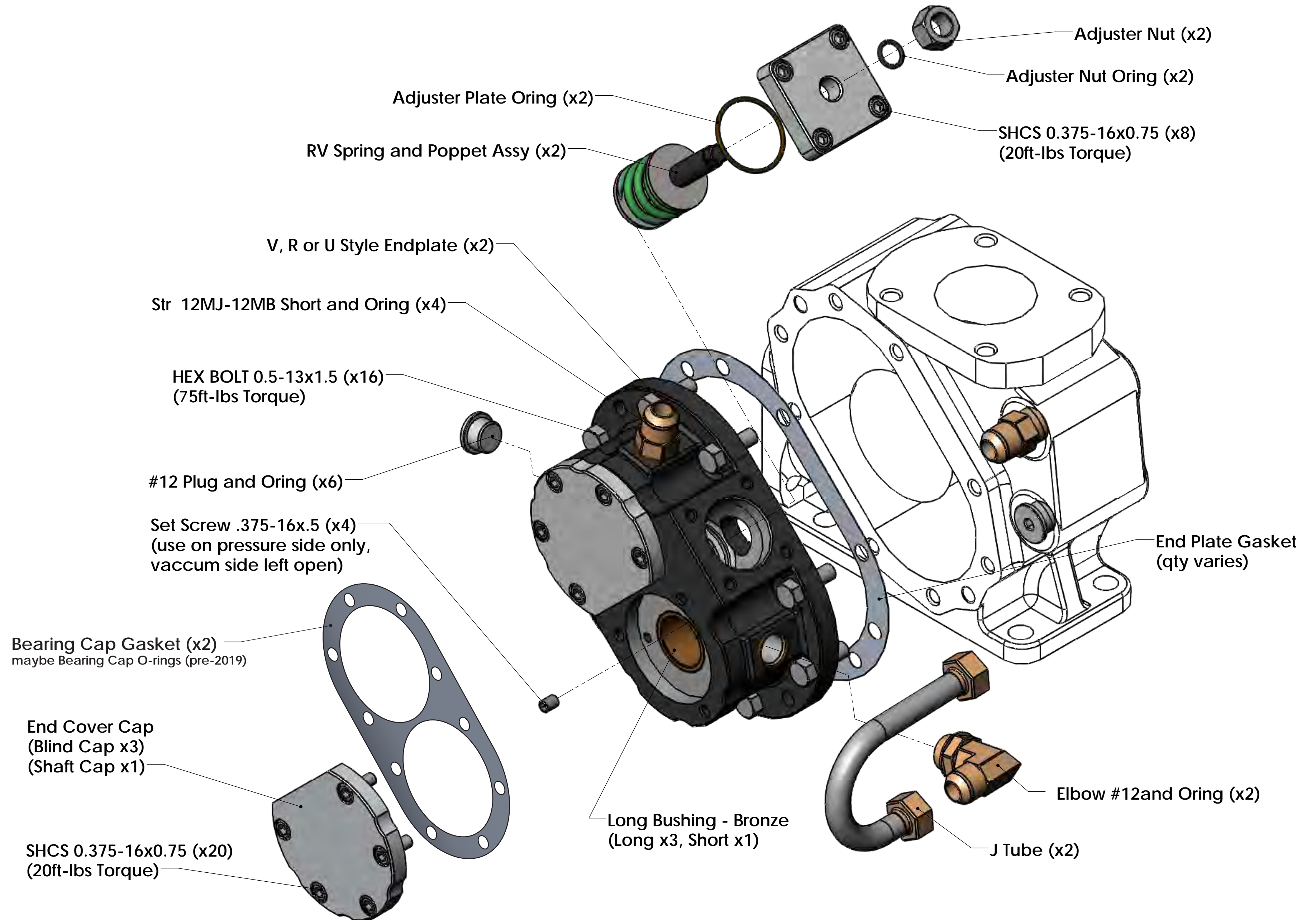


# B Style Diagram



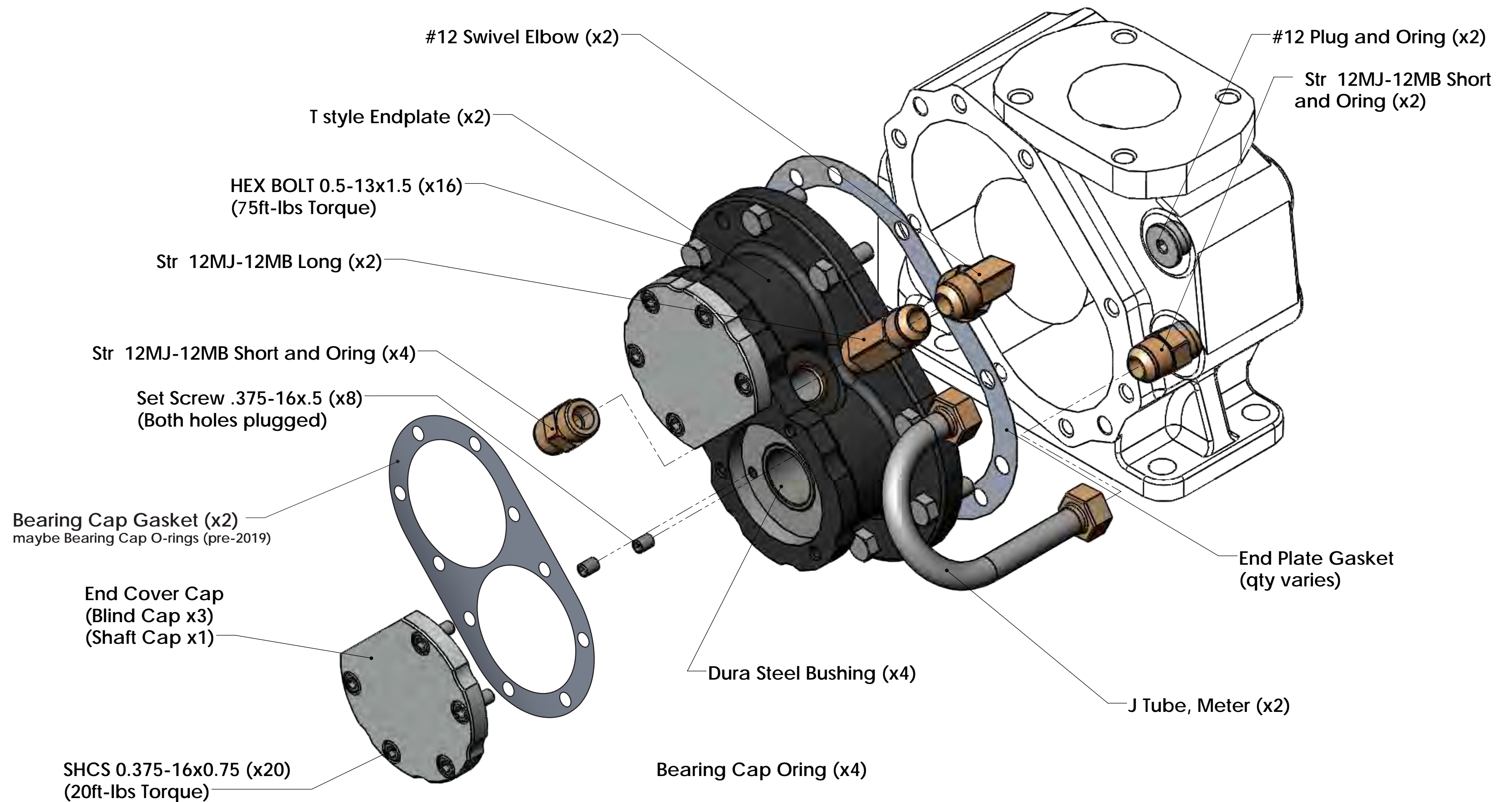


# V Style Diagram



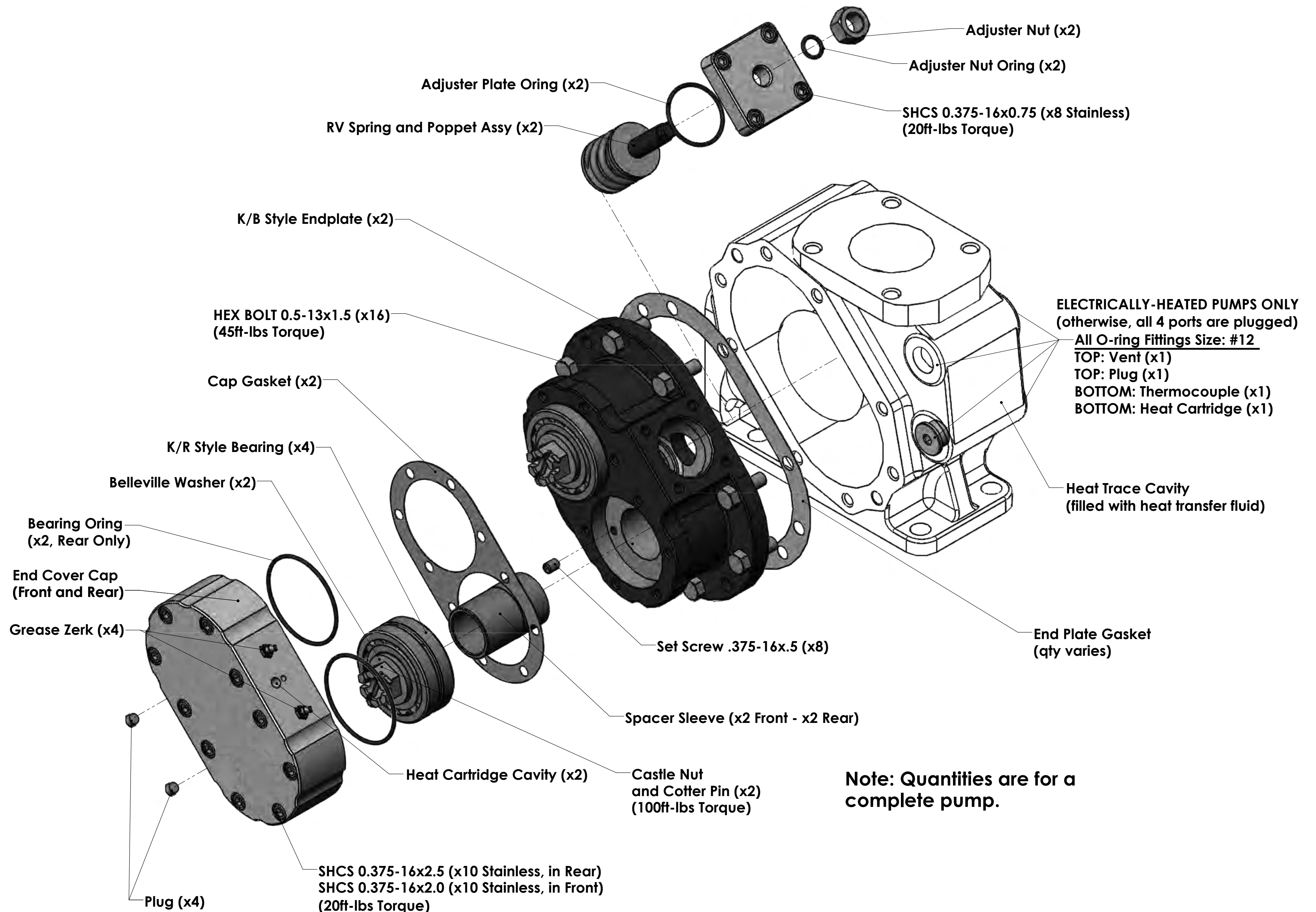


# T Style Diagram



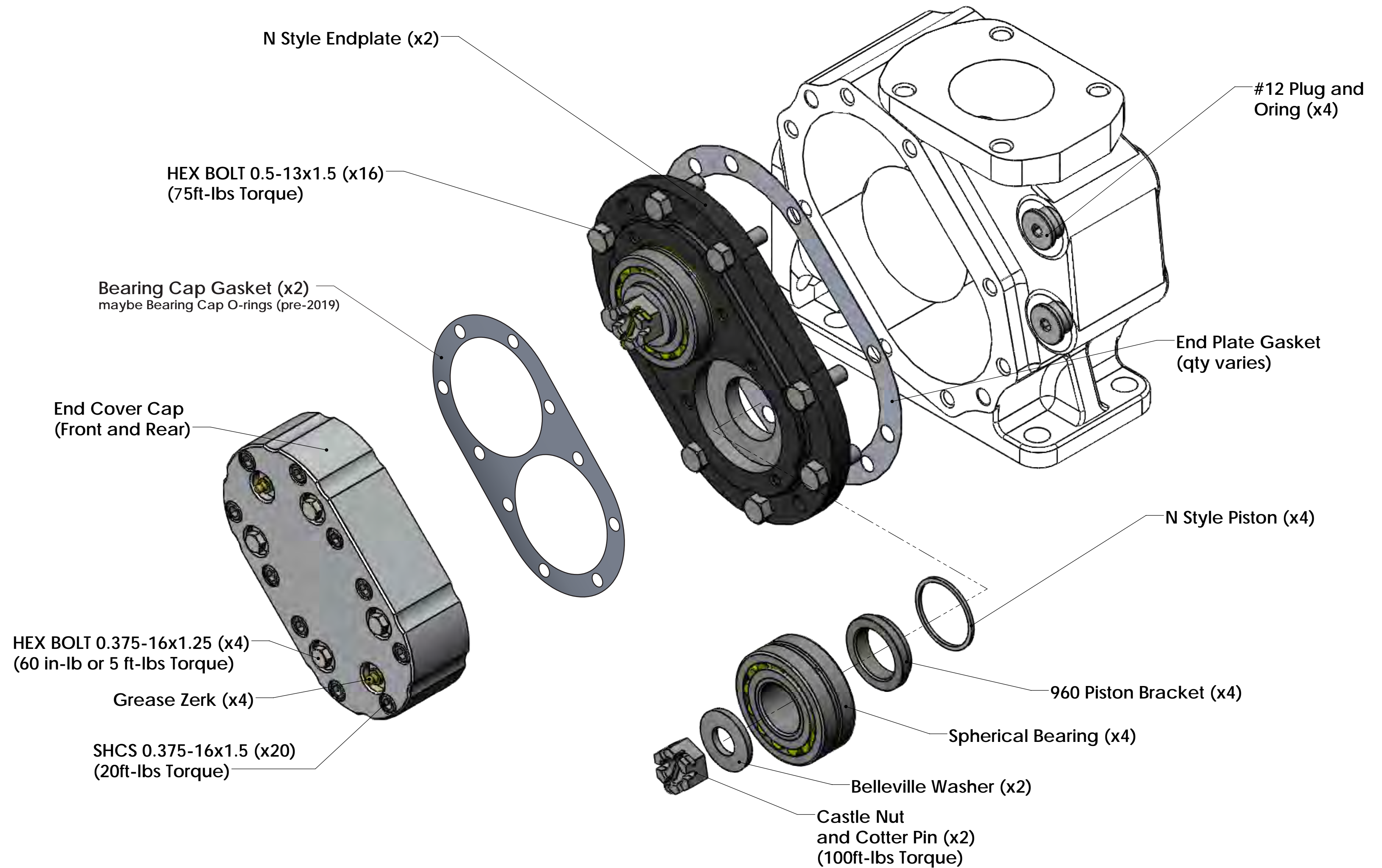


# K Style Diagram



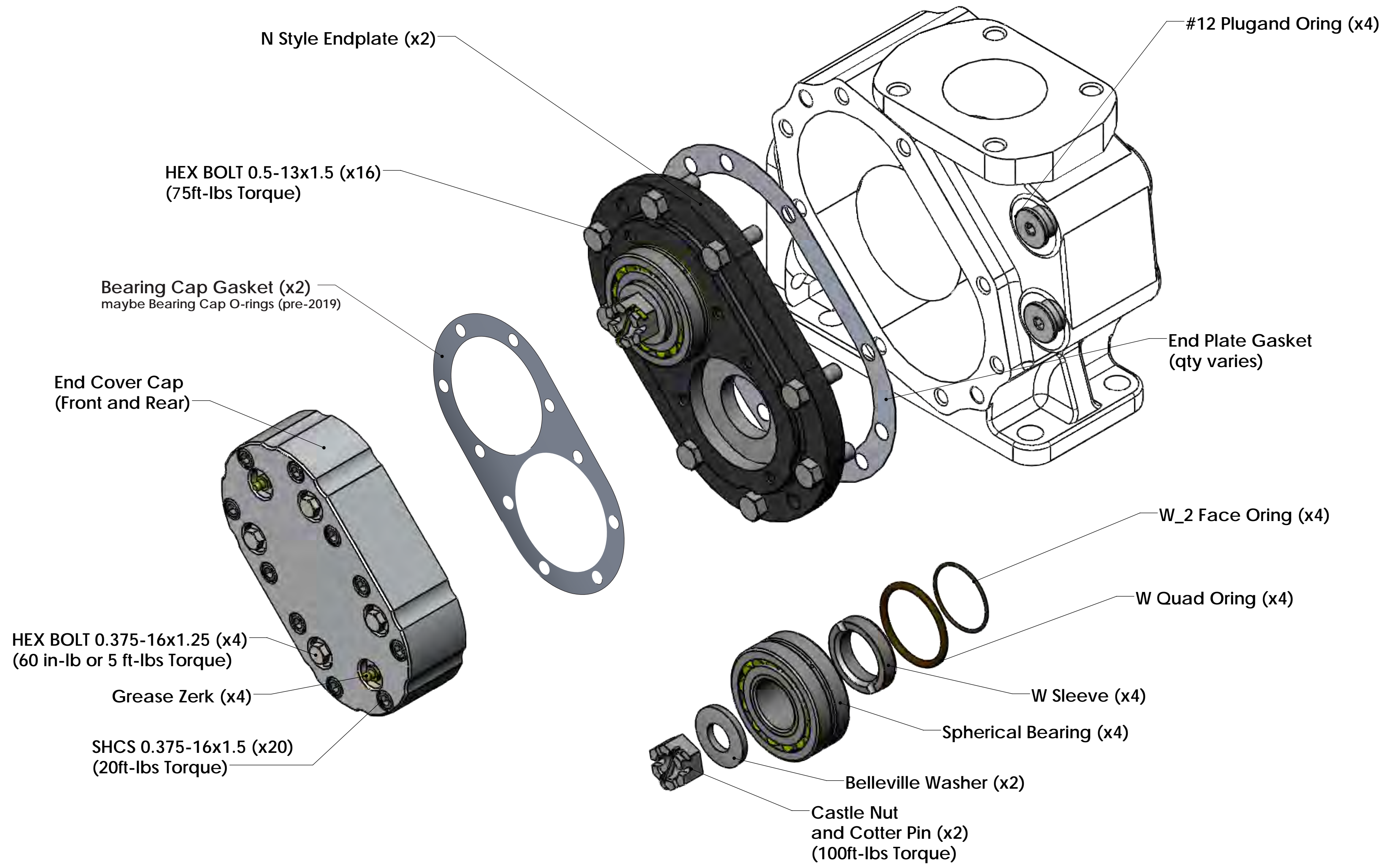


# N Style Diagram



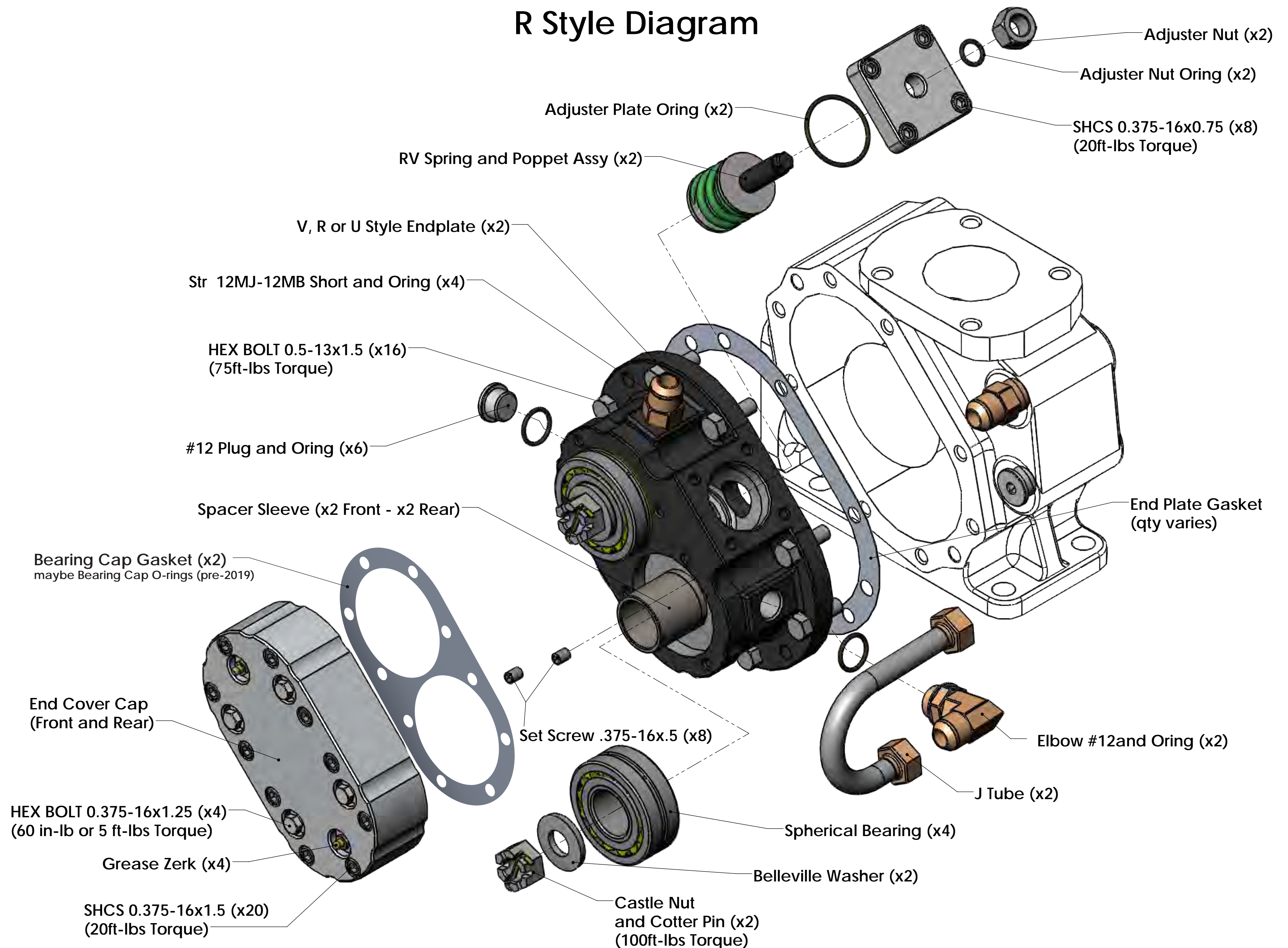


# W Style Diagram



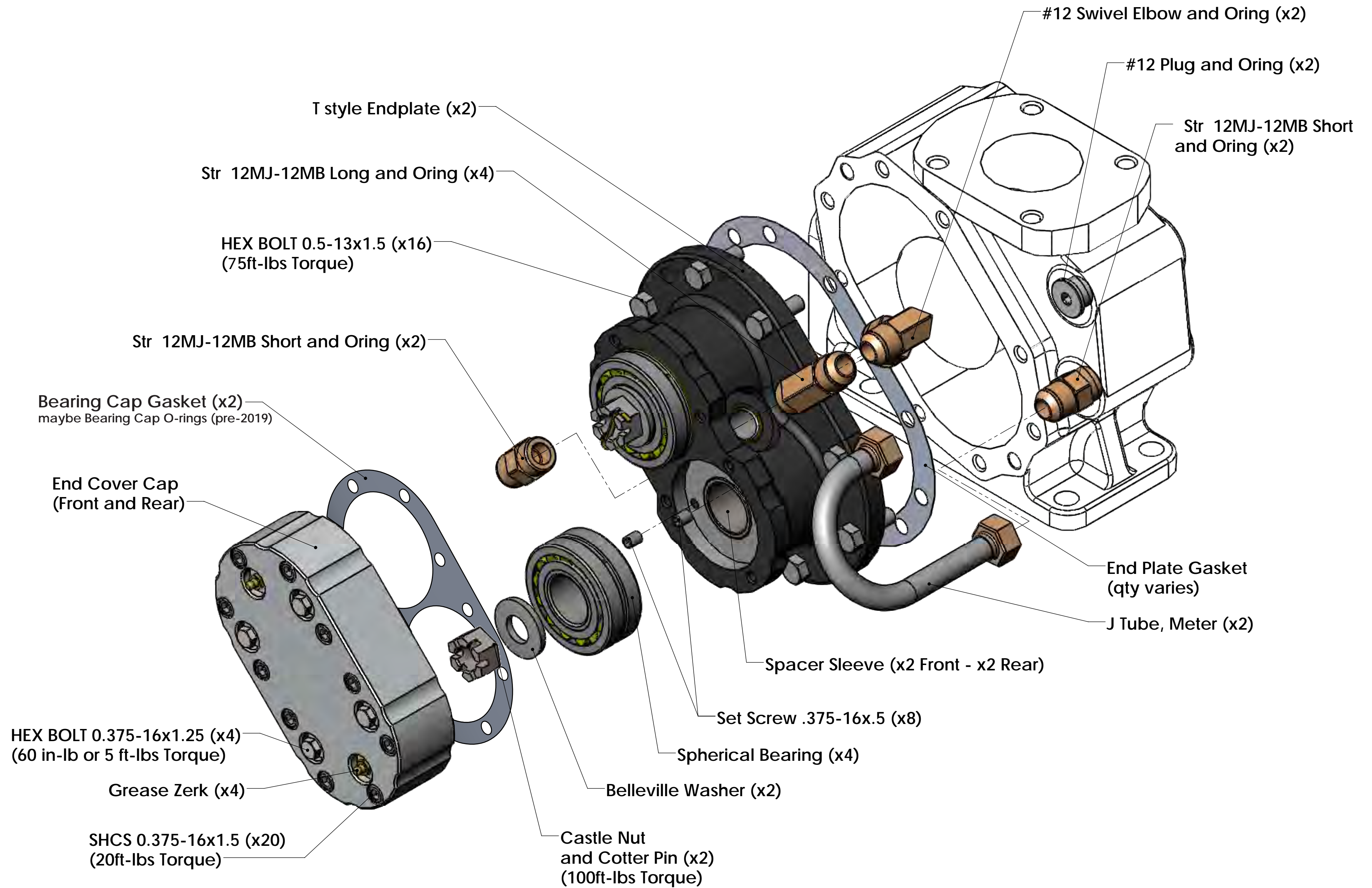


# R Style Diagram



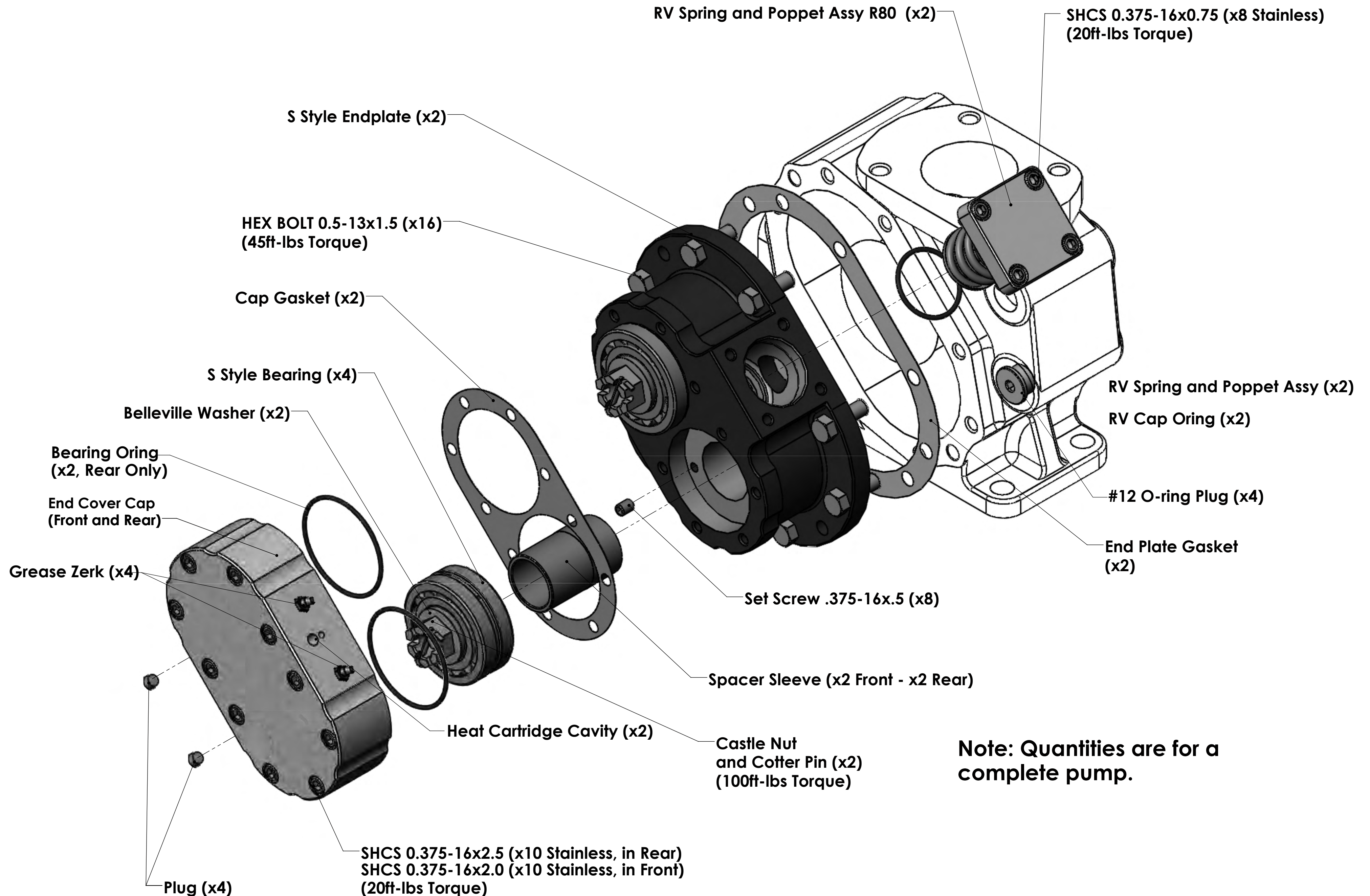


# U Style Diagram



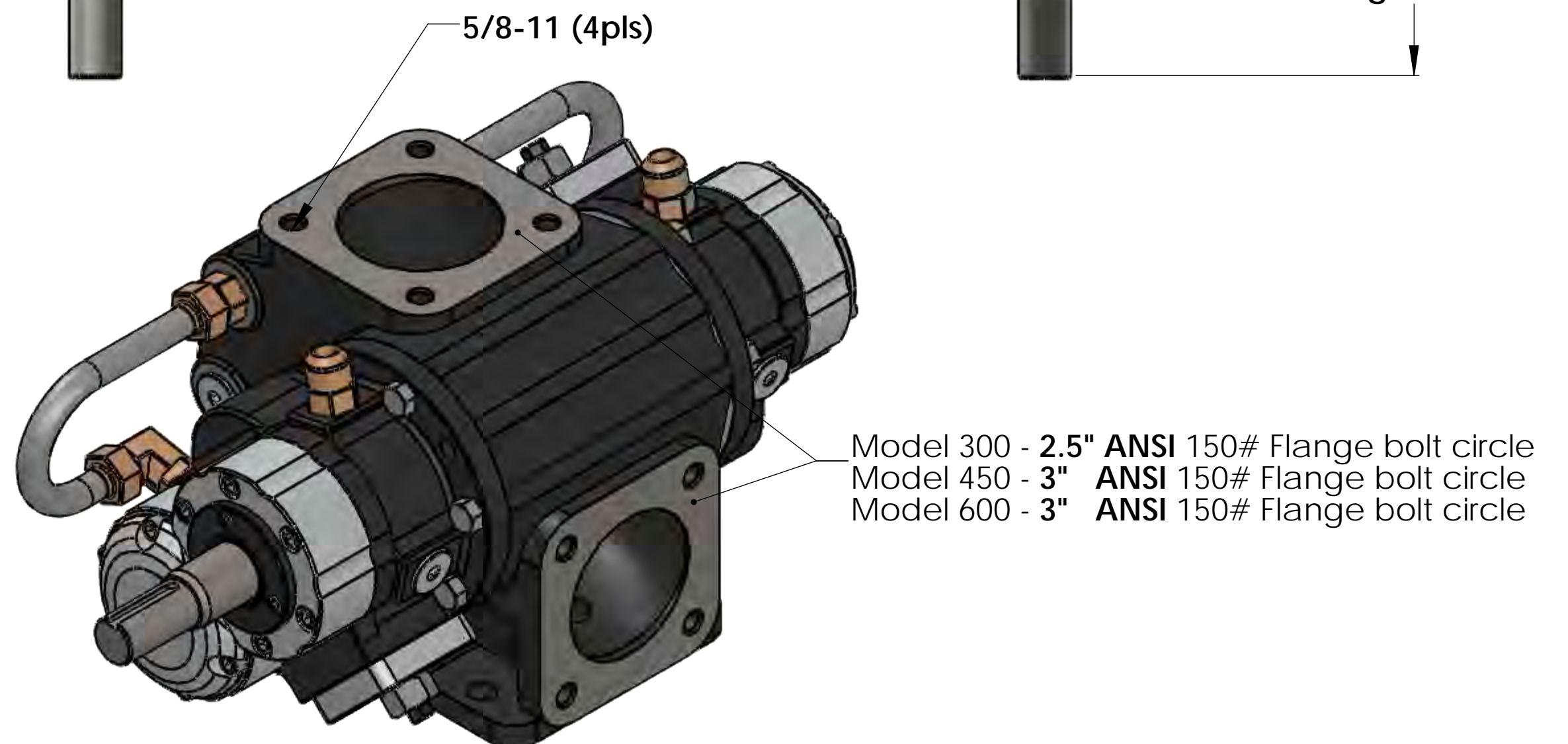
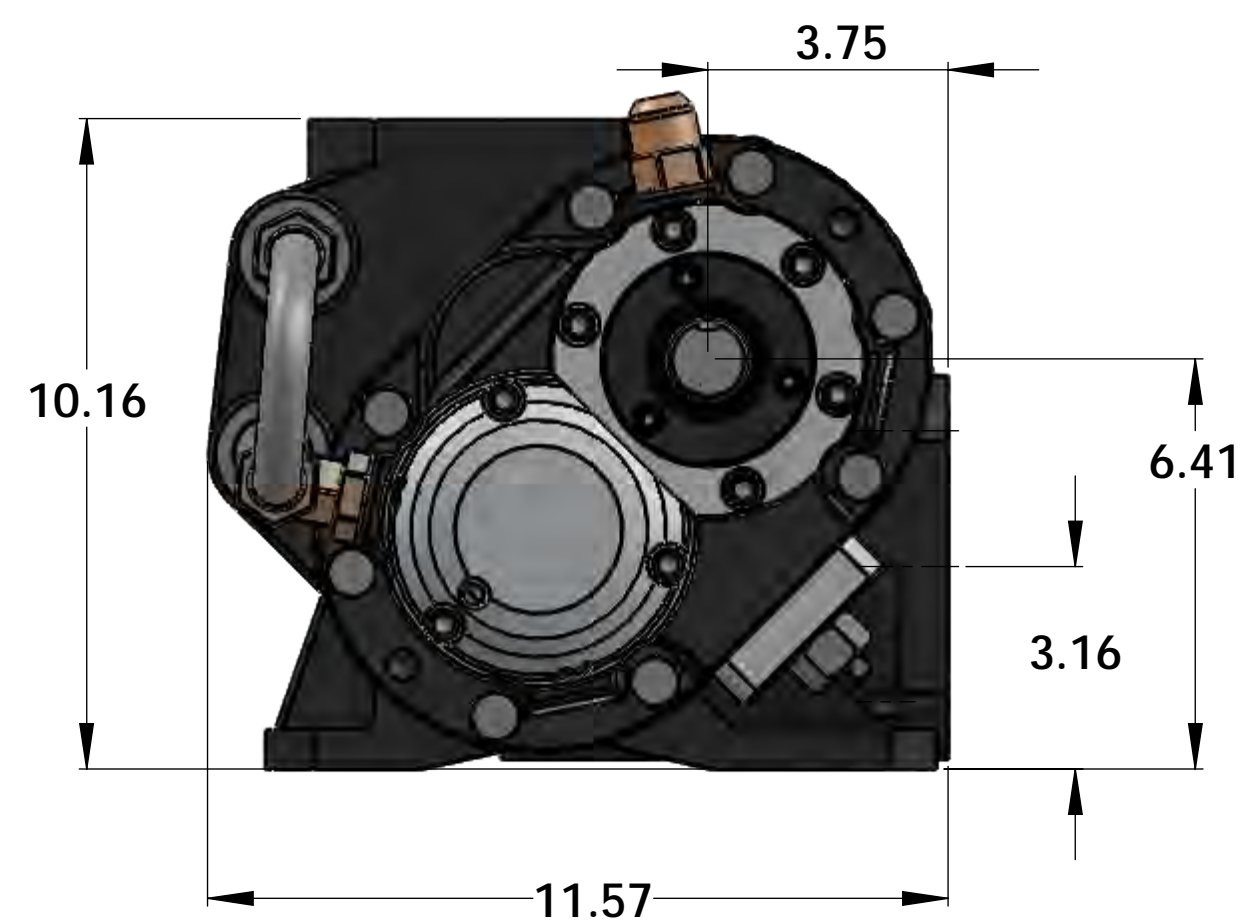
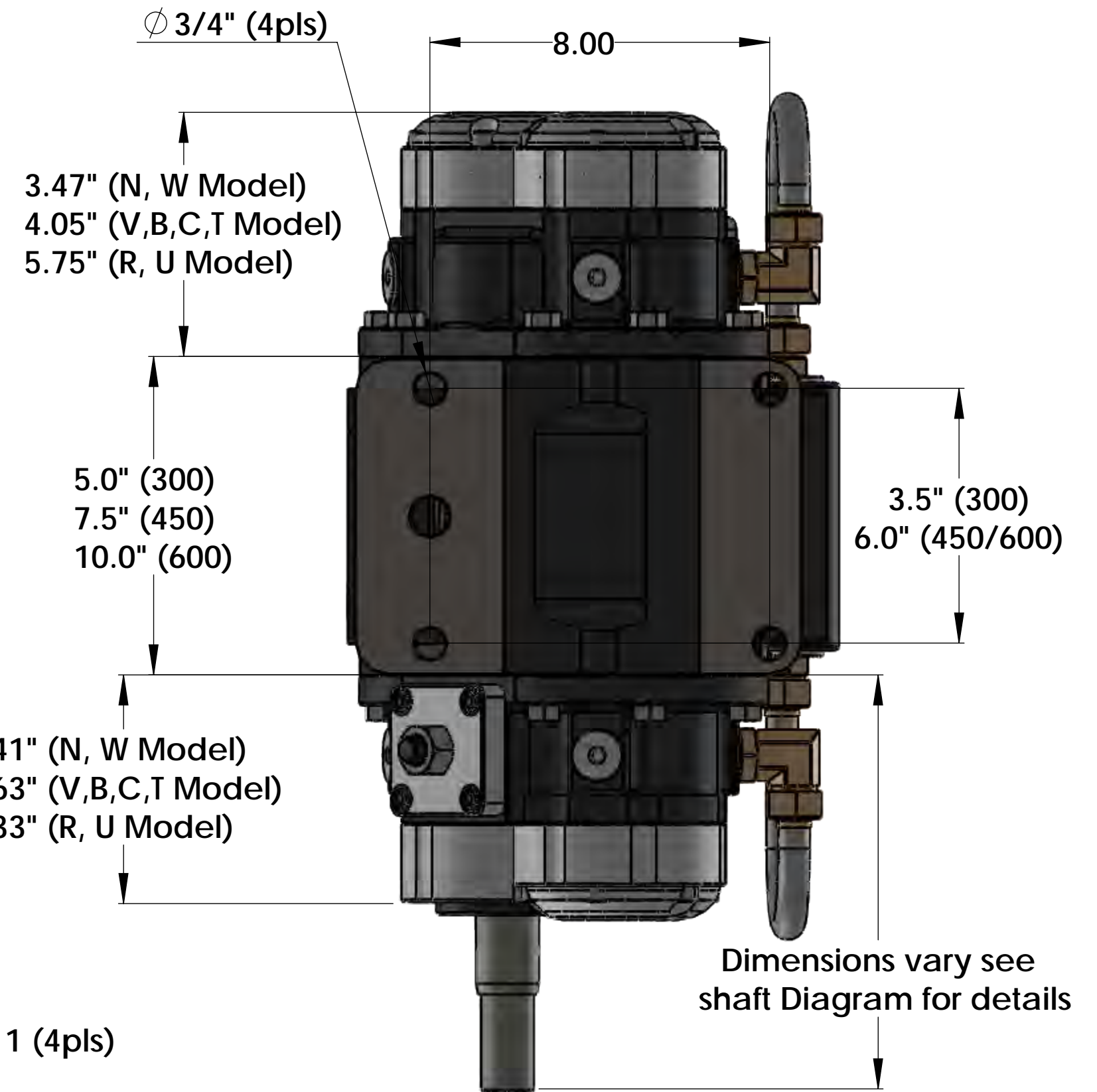
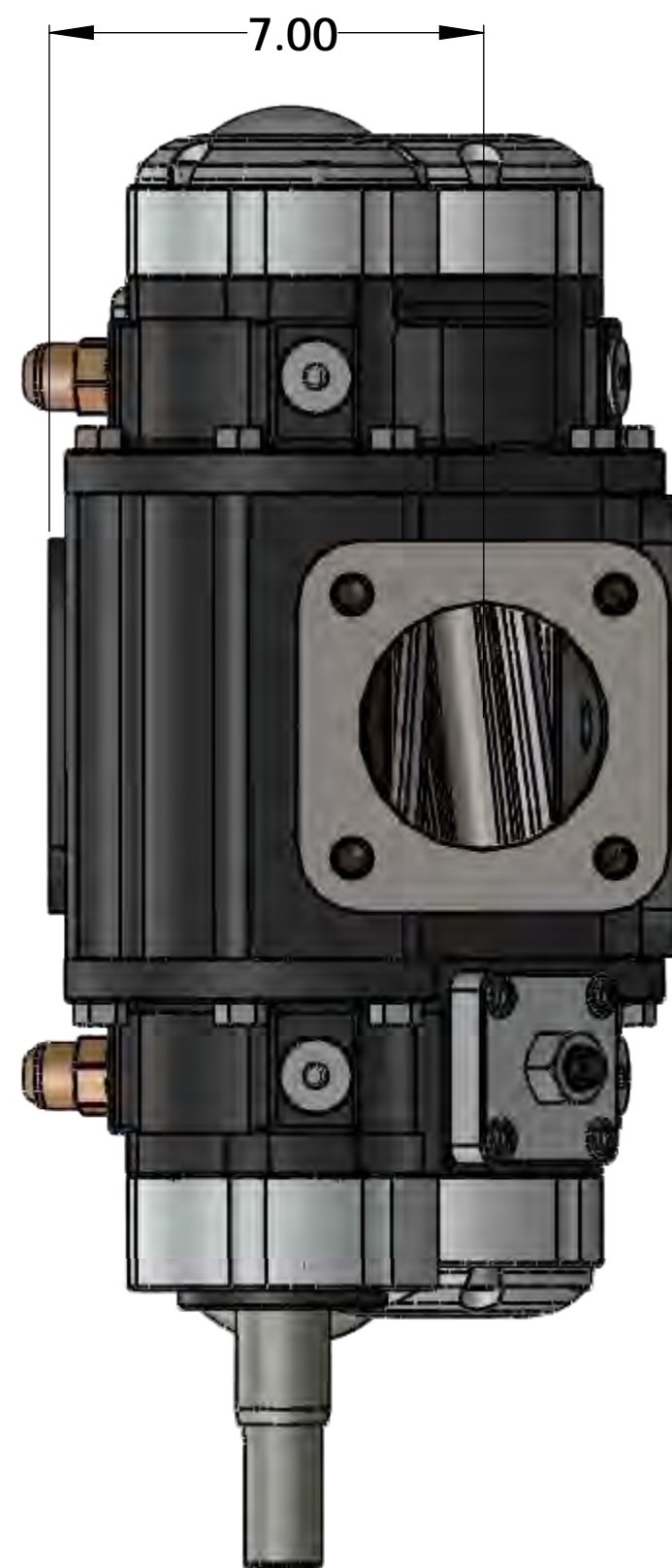
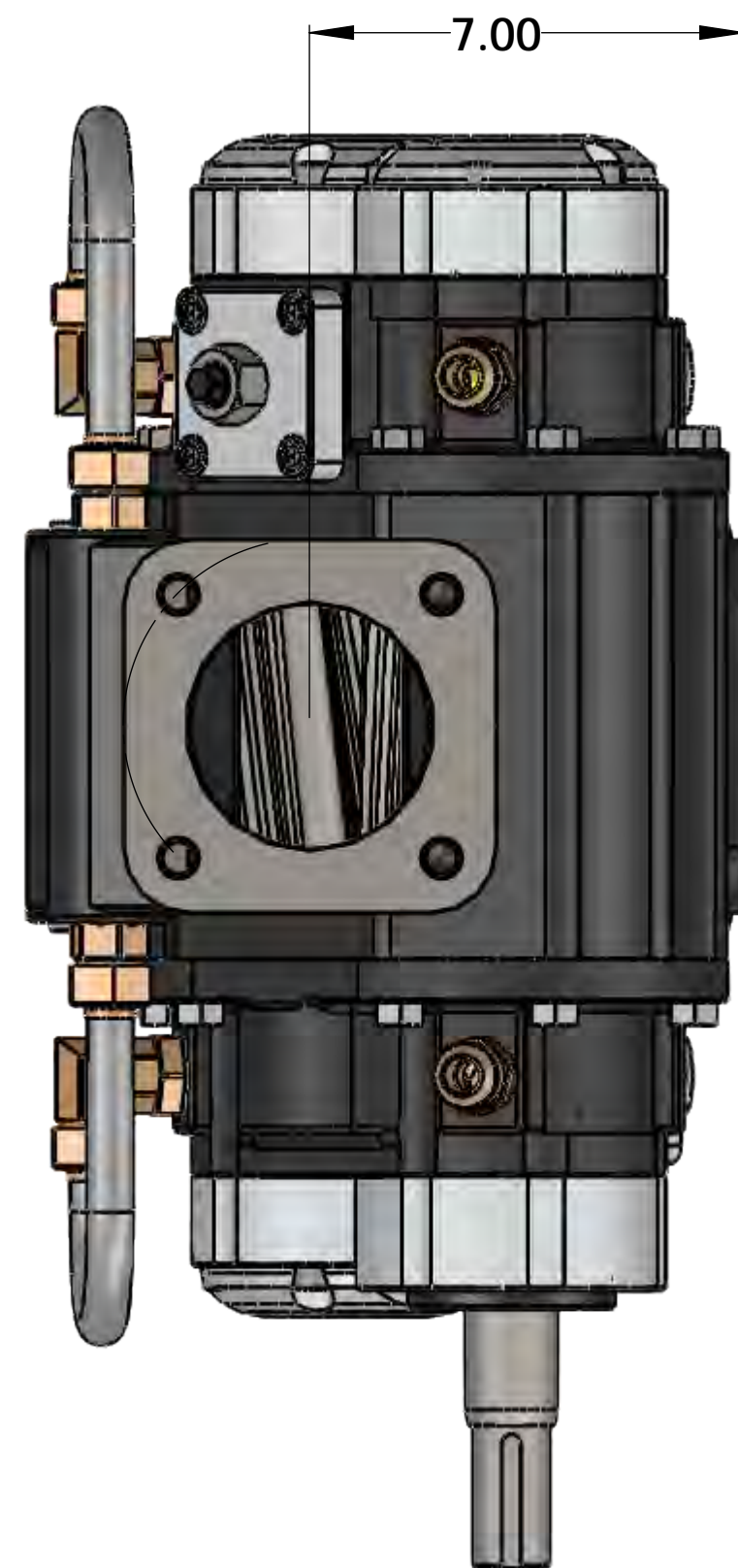


# S Style Diagram



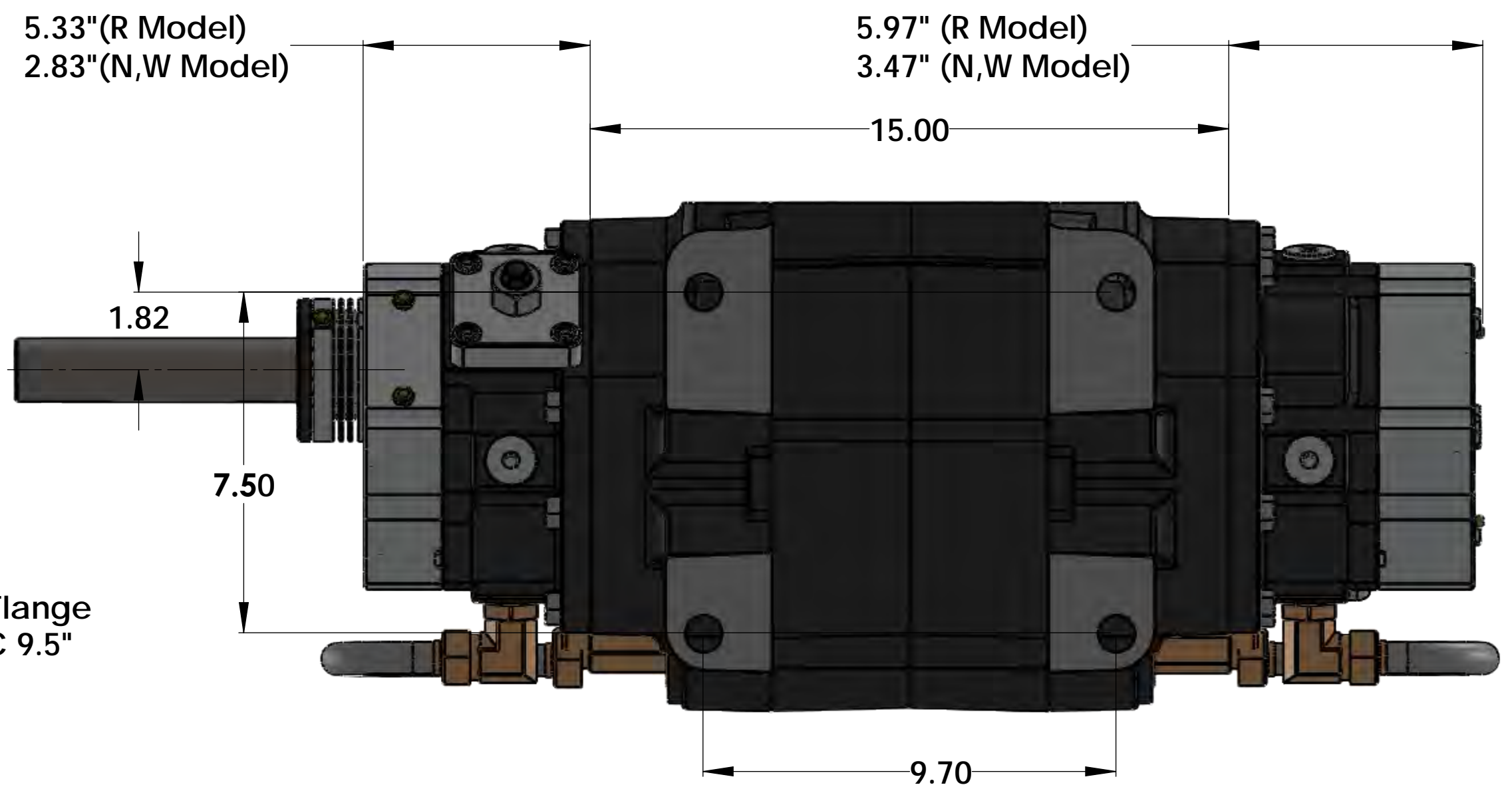
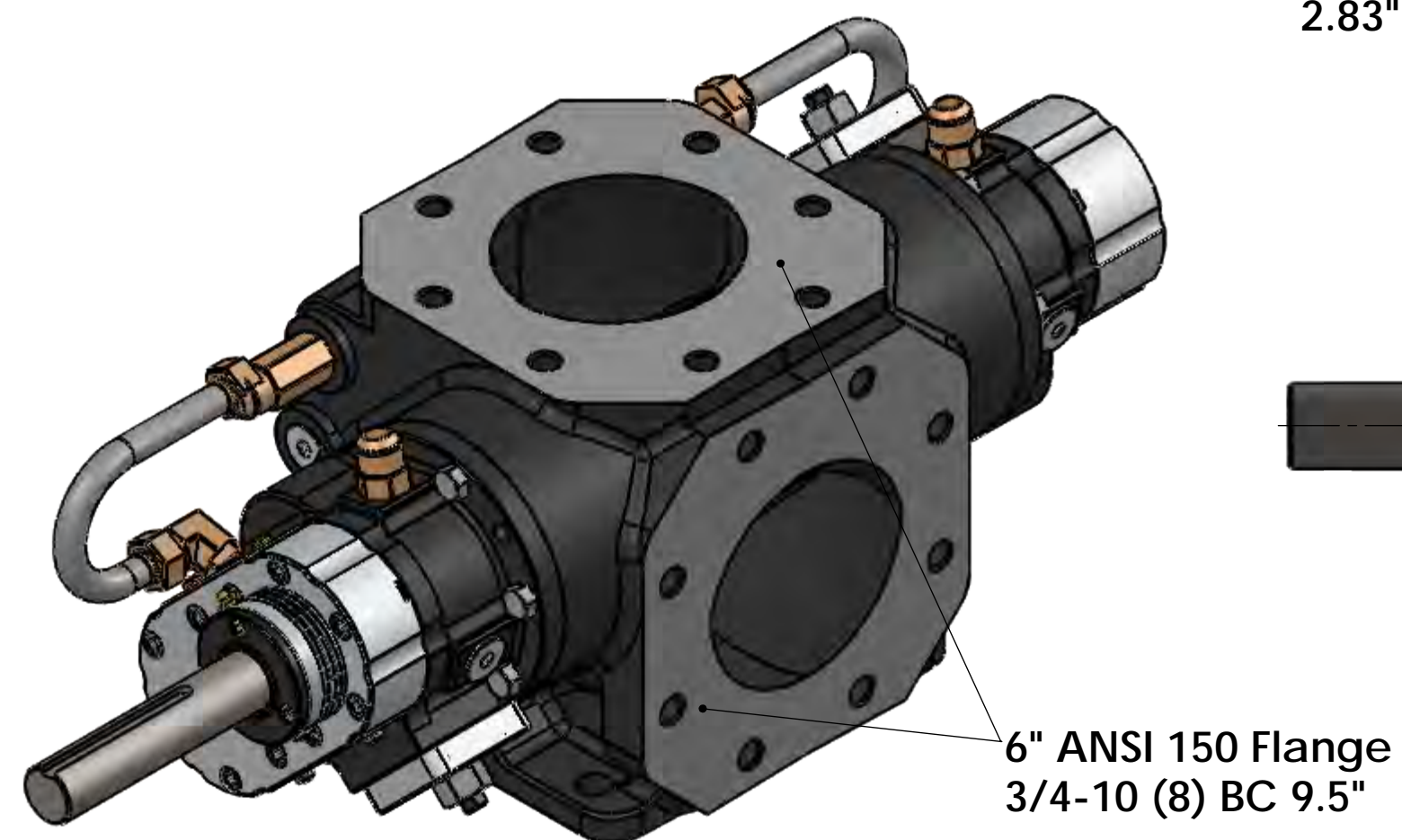
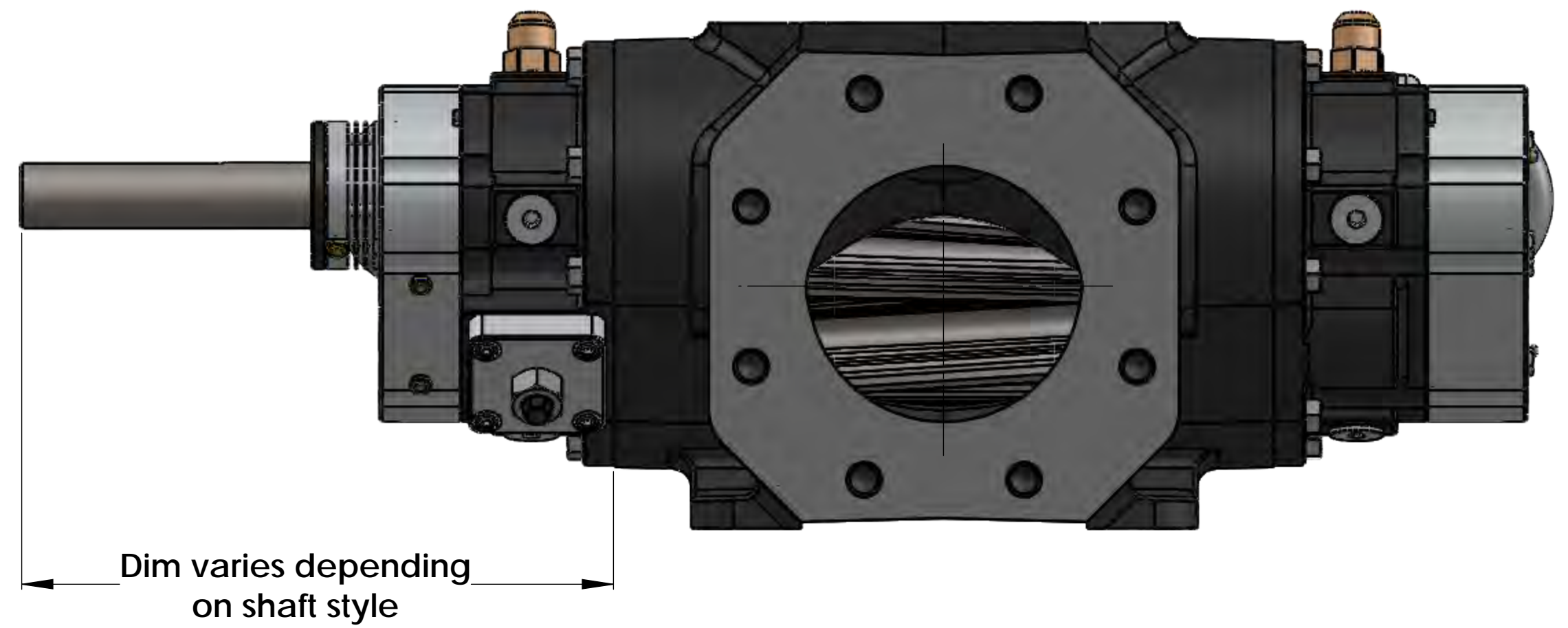
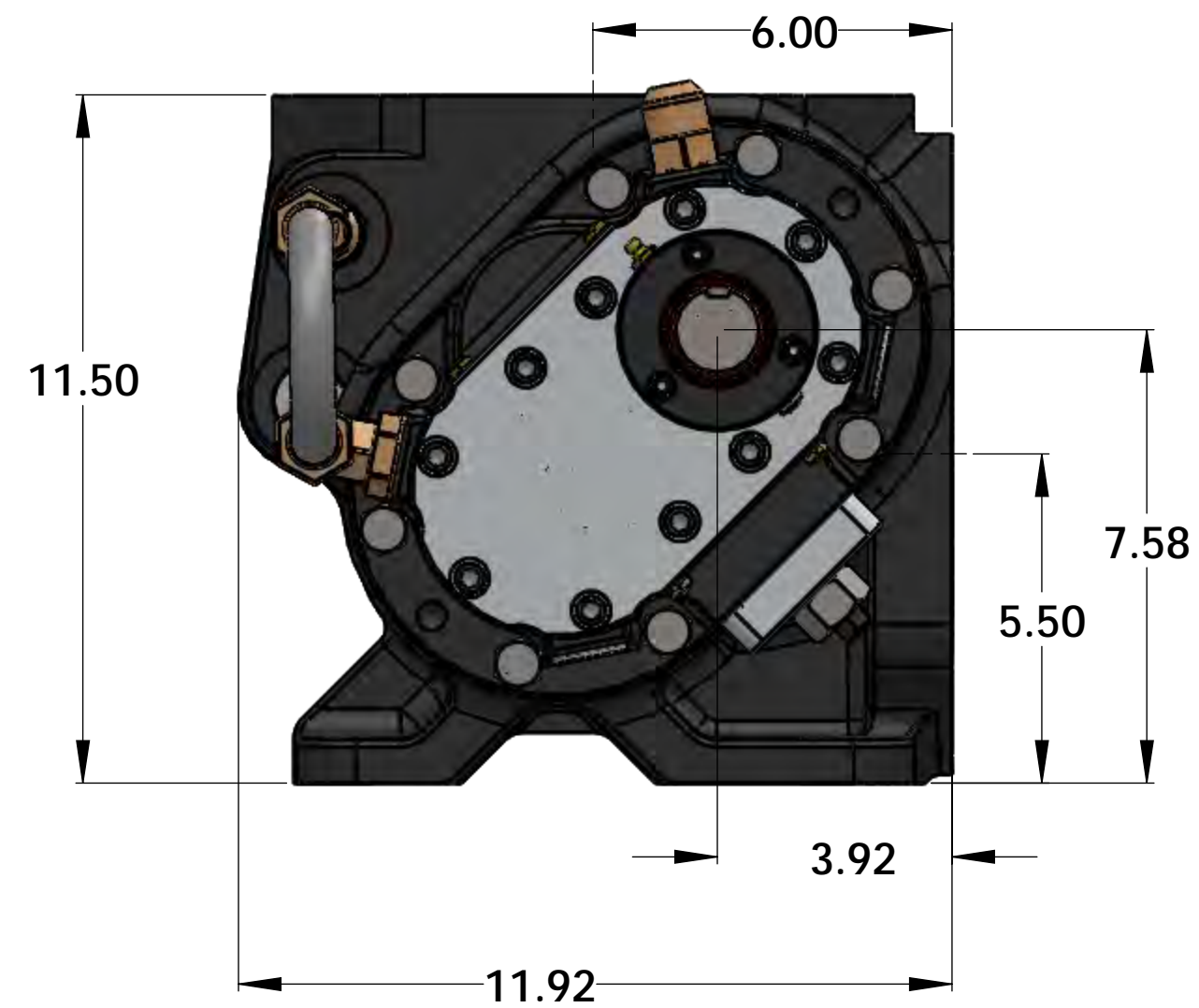


# Basic Dimensions





# 900 Basic Dimensions





# Shaft Dimensions

## Shaft Styles and Dimensions

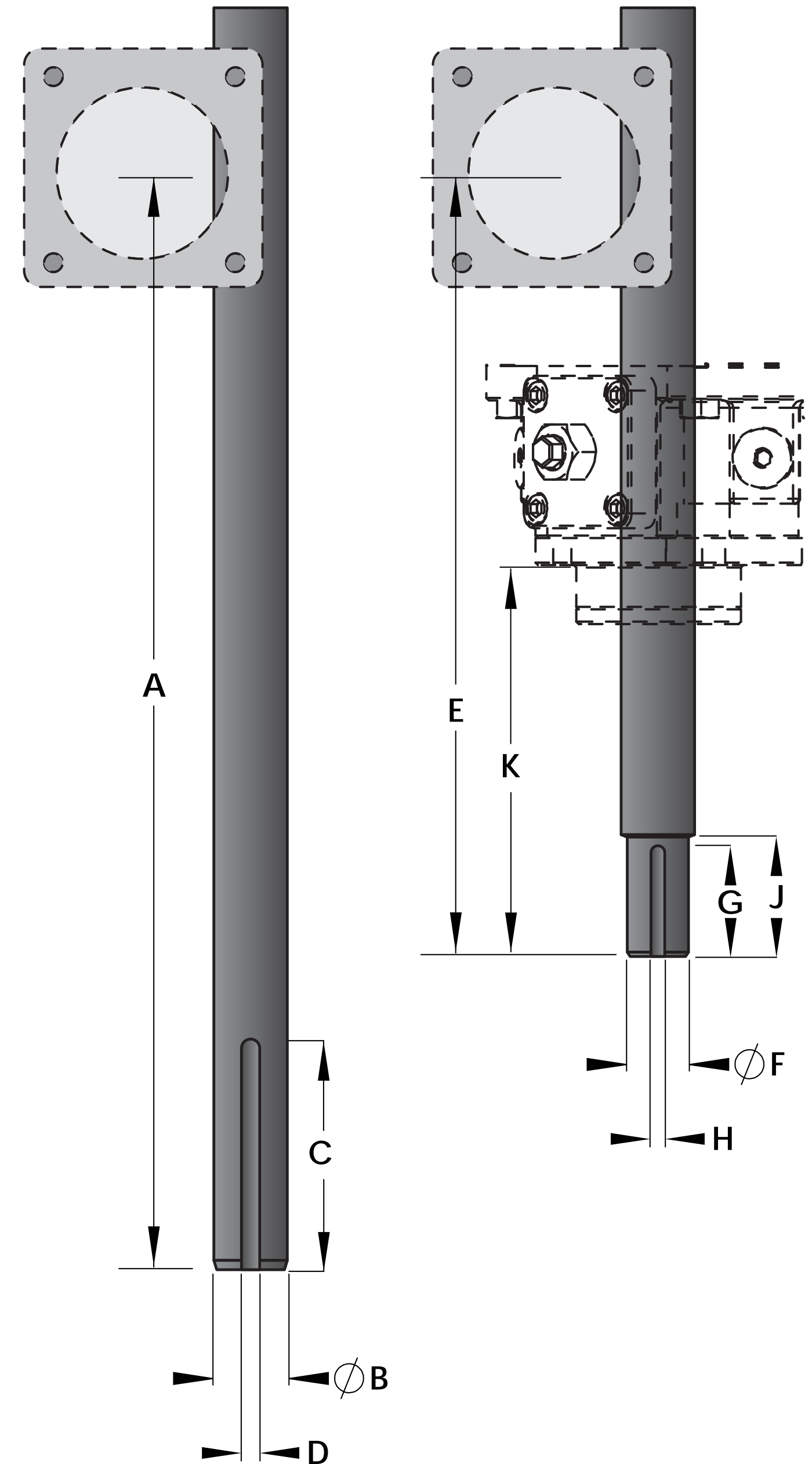
### Bearing Pump Series (R, U, S, K)

Model	Shaft Type	Dimensions										
		A	B	C	D	E	F	G	H	J	K	
300	H					12.36	1.25	2	0.313	2.25	4.5	*
300	X	15.25	1.5	6.5	0.375							
450	H					13.58	1.25	2	0.313	2.25	4.5	*
450	C	17.25	1.5	4.75	0.375							
450	X	19	1.5	6.5	0.375							
600	H					14.86	1.25	2	0.313	2.25	4.5	*
600	C	18.5	1.5	4.75	0.375							
600	X	19.75	1.5	6.5	0.375							
600	L	22	1.5	8.75	0.375							
900	H					17.36	1.25	2	0.313	2.25	4.5	*
900	X	21.75	1.5	6.5	0.375							

### Bushing Pump Series (V, B, T, C)

Model	Shaft Type	Dimensions										
		A	B	C	D	E	F	G	H	J	K	
300	H					9.43	1.25	2	0.313	2.25	4.5	*
300	S					11.1	1.25	2	0.25	2.25		
300	X	15.25	1.5	5.25	0.375							
450	H					11.93	1.25	2	0.313	2.25	4.5	*
450	S					13.6	1.25	2	0.25	2.25		
450	X	18	1.5	6.25	0.375							
600	H					13.18	1.25	2	0.25	2.25	4.5	*
600	S					13.6	1.25	2	0.25	2.25		*
600	X	18	1.5	6.25	0.375							

\* DENOTES THAT THIS SHAFT CAN NOT BE USED WITH A P-STYLE PACKING BOX

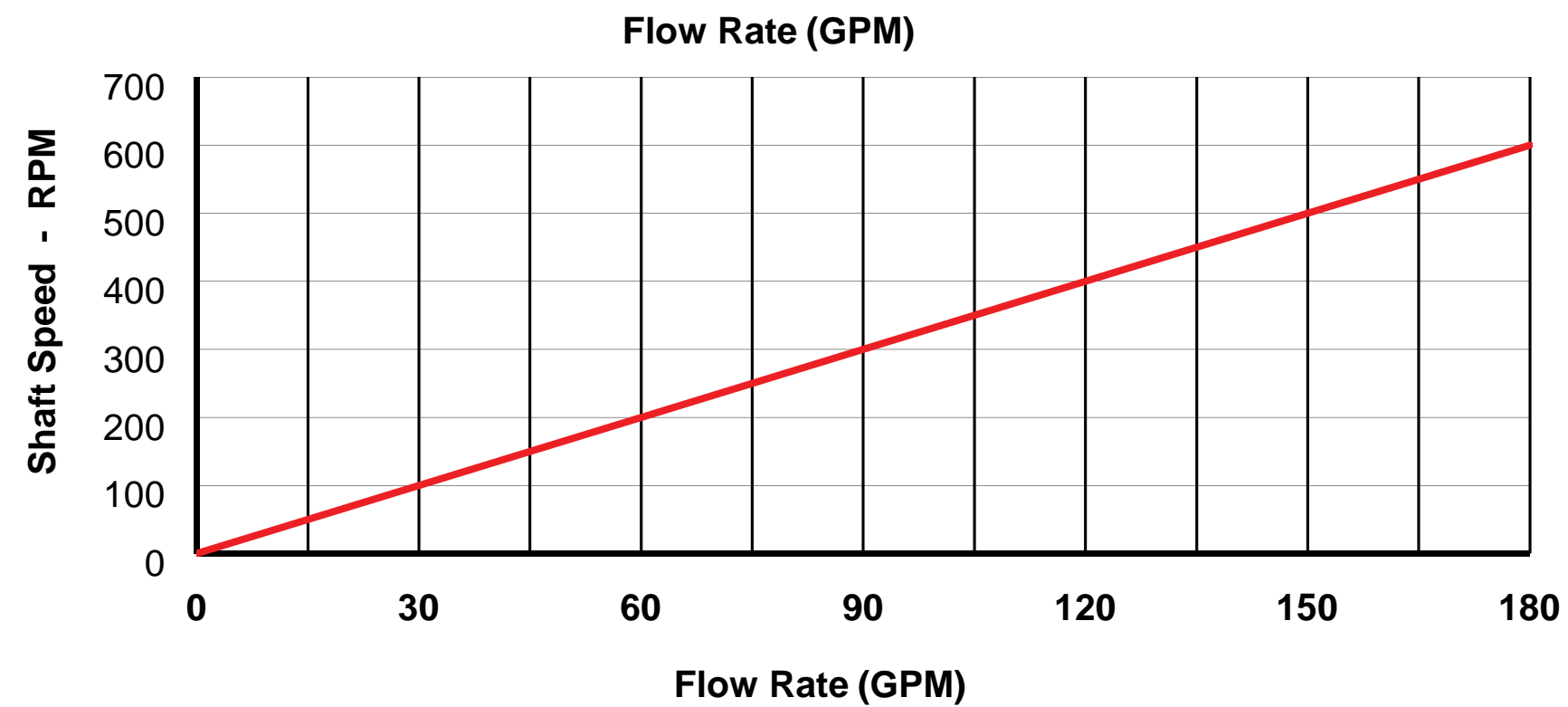




# Performance Curves

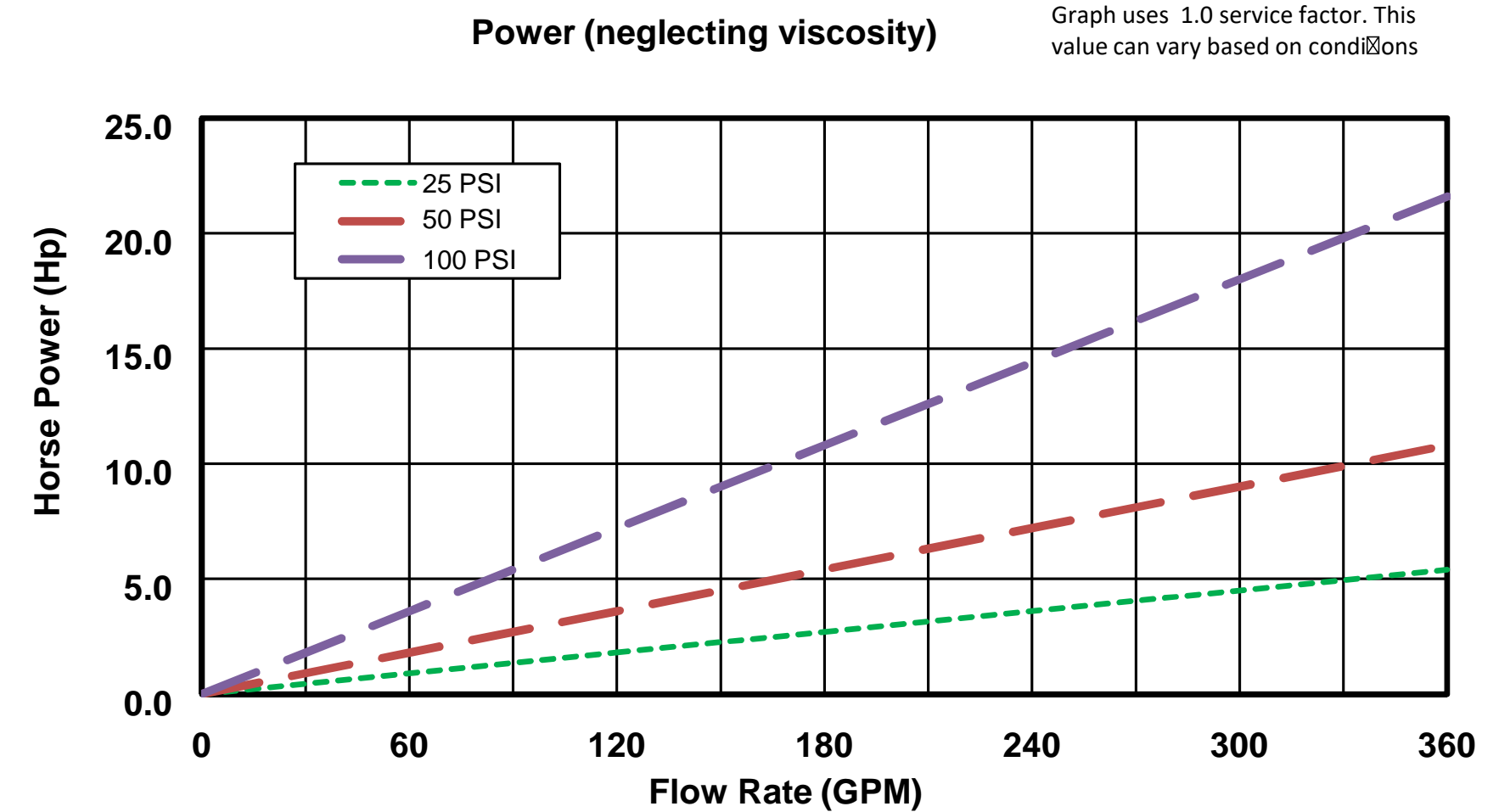
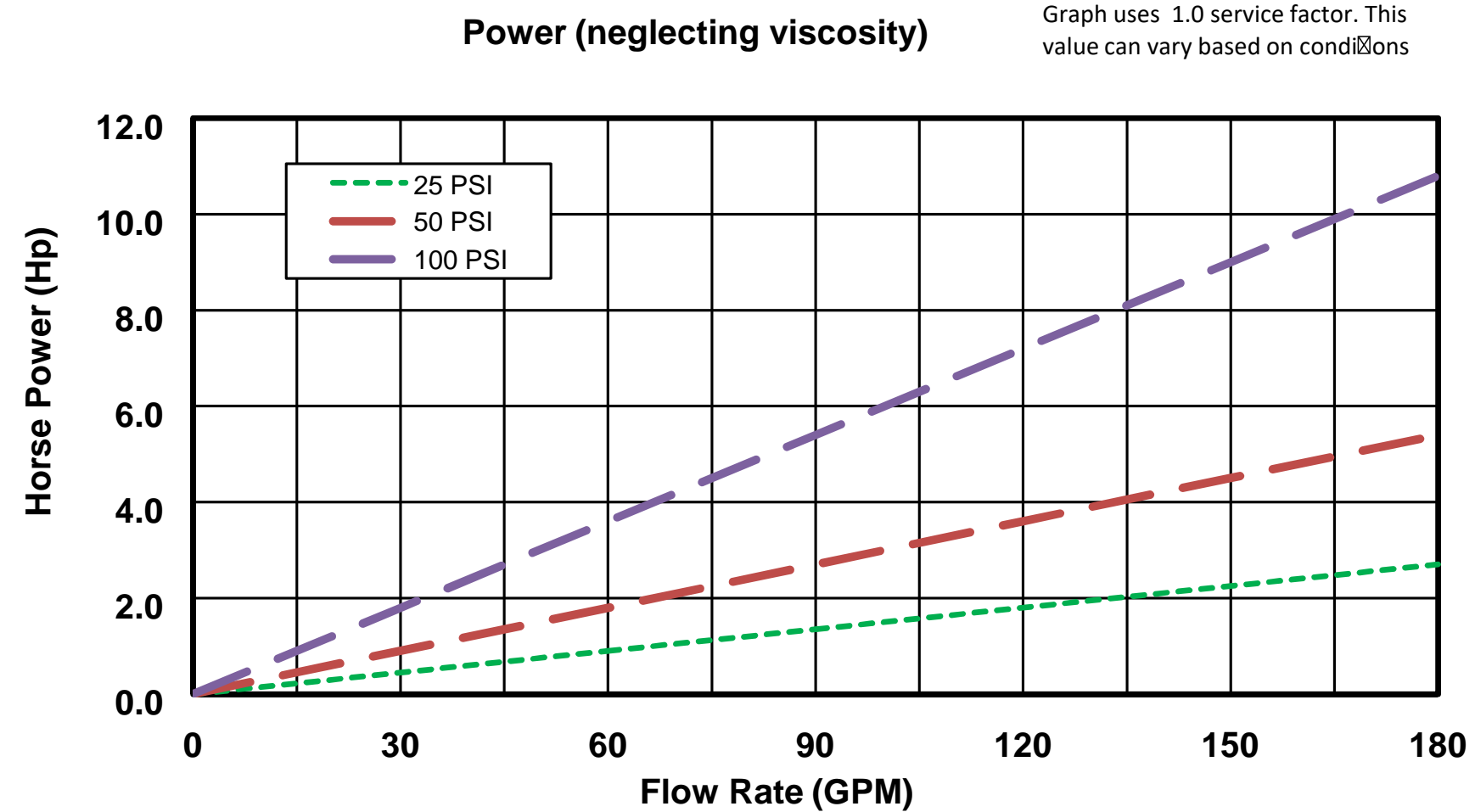
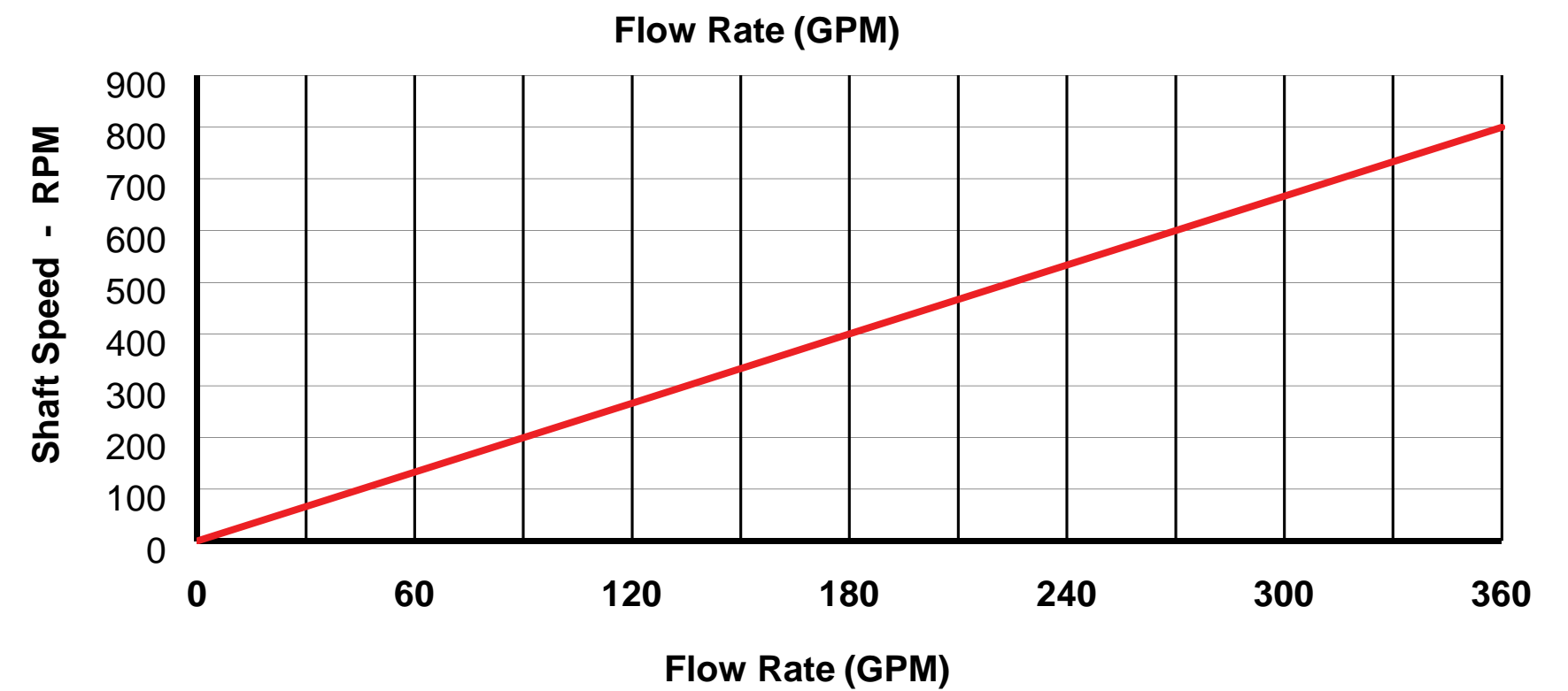
## 300

Pump Disp **300**  
Max RPM 600  
Max GPM 180  
Port Size 2.5in ANSI 150# Flange



## 450

Pump Disp **450**  
Max RPM 800  
Max GPM 360  
Port Size 4in Pump Flange\*  
\*Bolt circle on flange is ANSI 3in 150#  
\*Port adapters available for 4in ANSI 150#, 8-bolt

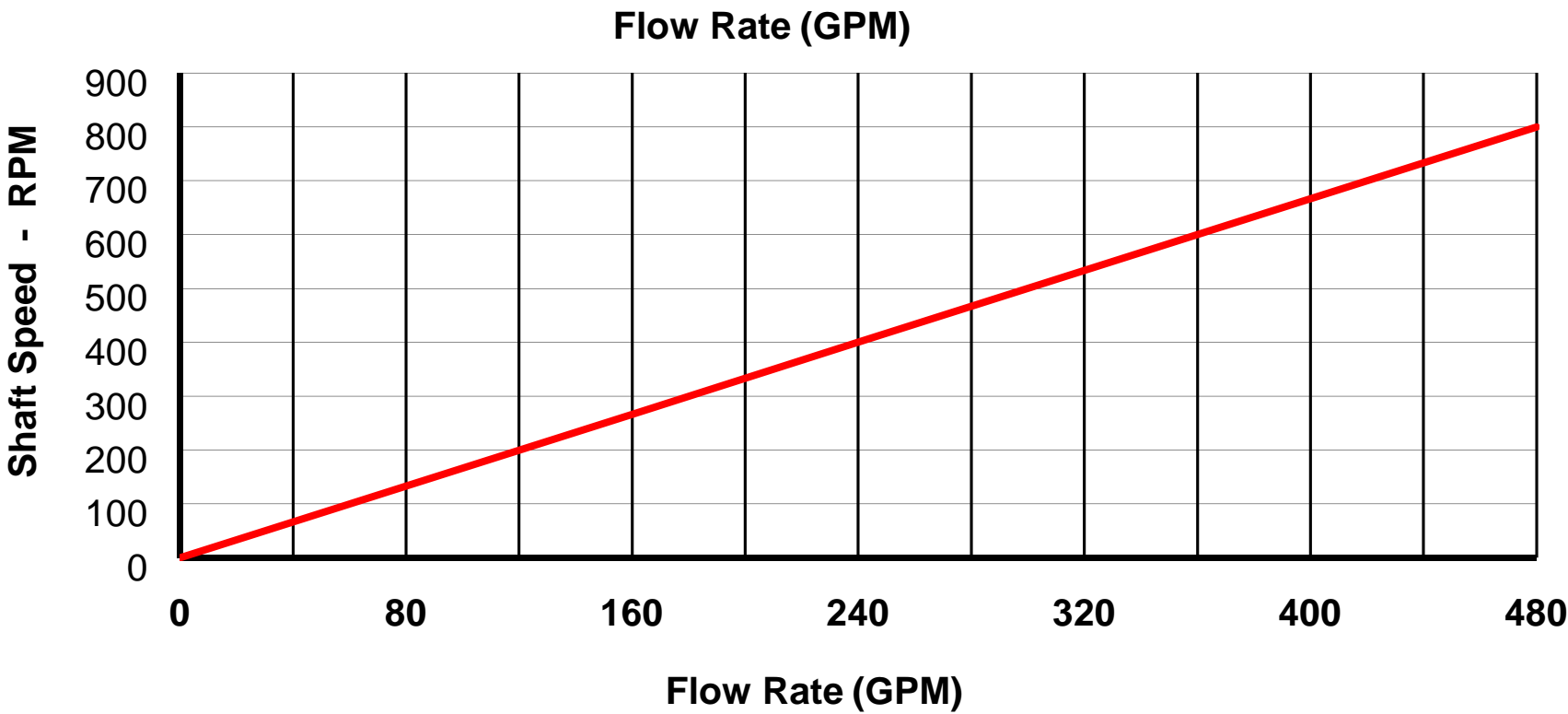




Performance Curves

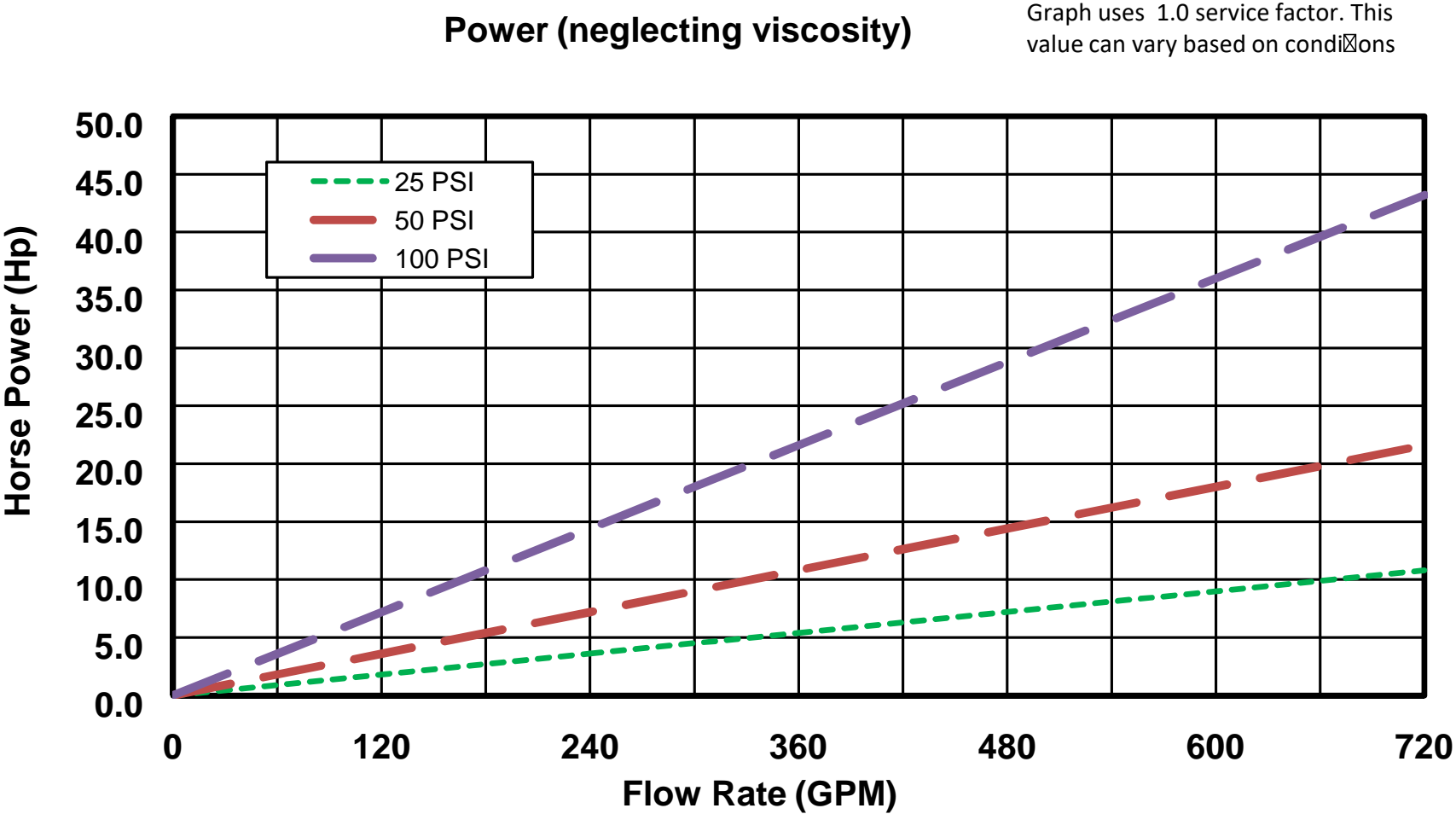
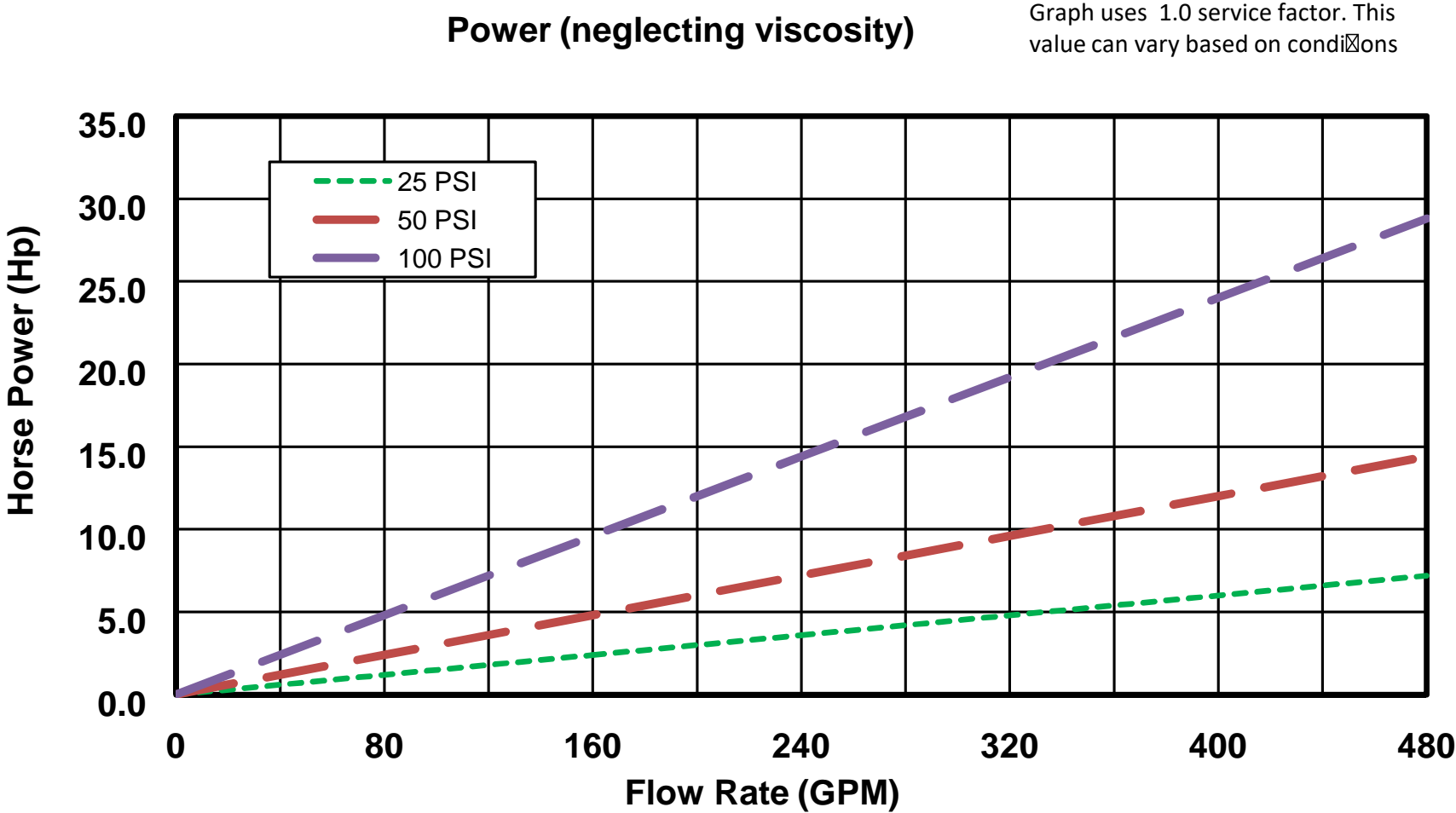
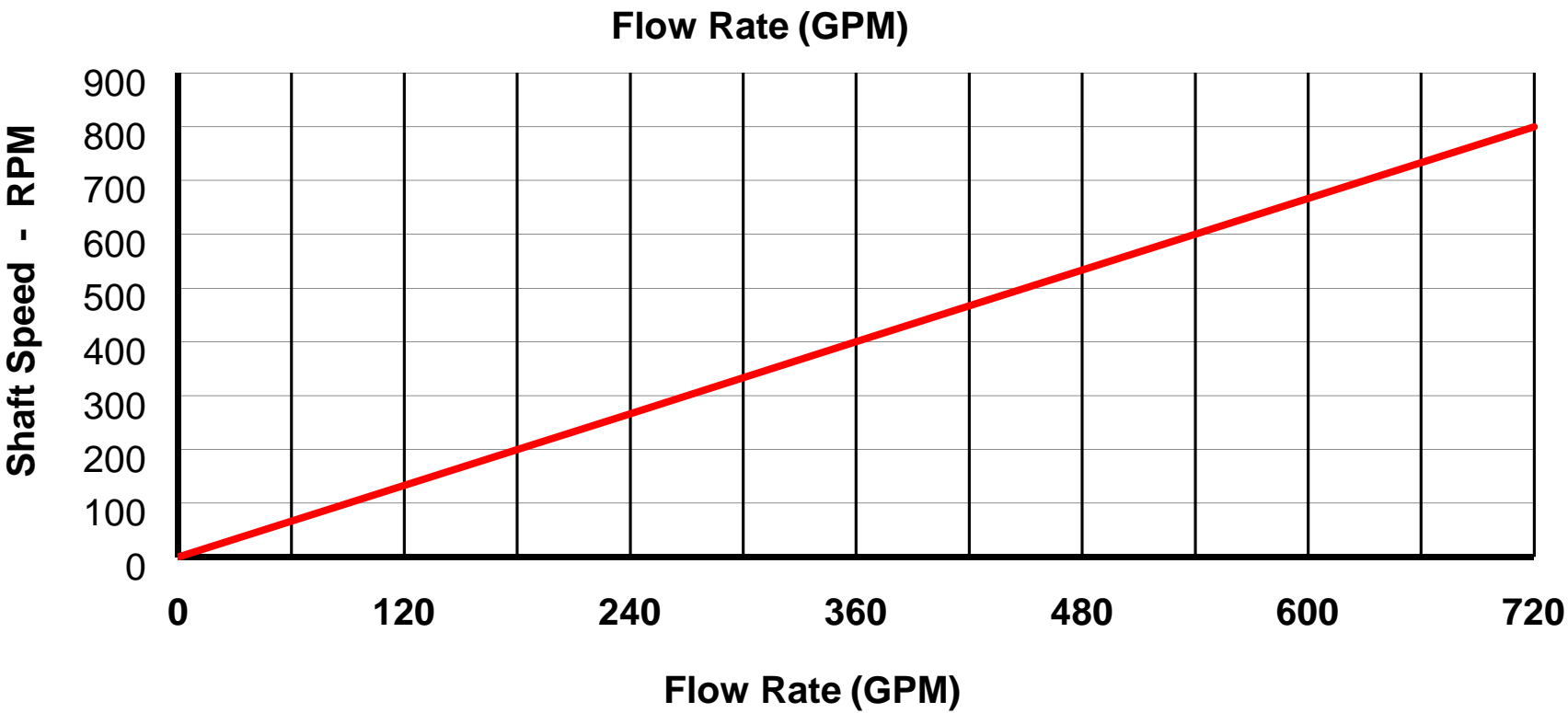
600

Pump Disp 600  
Max RPM 800  
Max GPM 480  
Port Size 4in Pump Flange\*  
\*Bolt circle on flange is ANSI 3in 150#  
\*Port adapters available for 4in ANSI 150#, 8-bolt



900

Pump Disp 900  
Max RPM 800  
Max GPM 720  
Port Size 6" Pump Flange\*  
\*Bolt circle on flange is ANSI 6in 150#





# 4in Asphalt Unloading Skid

## 4in Asphalt Unloading Skid with Screen Box

Below is an example of a skid for unloading asphalt tankers. Model numbers for ordering shown in **bold text**.

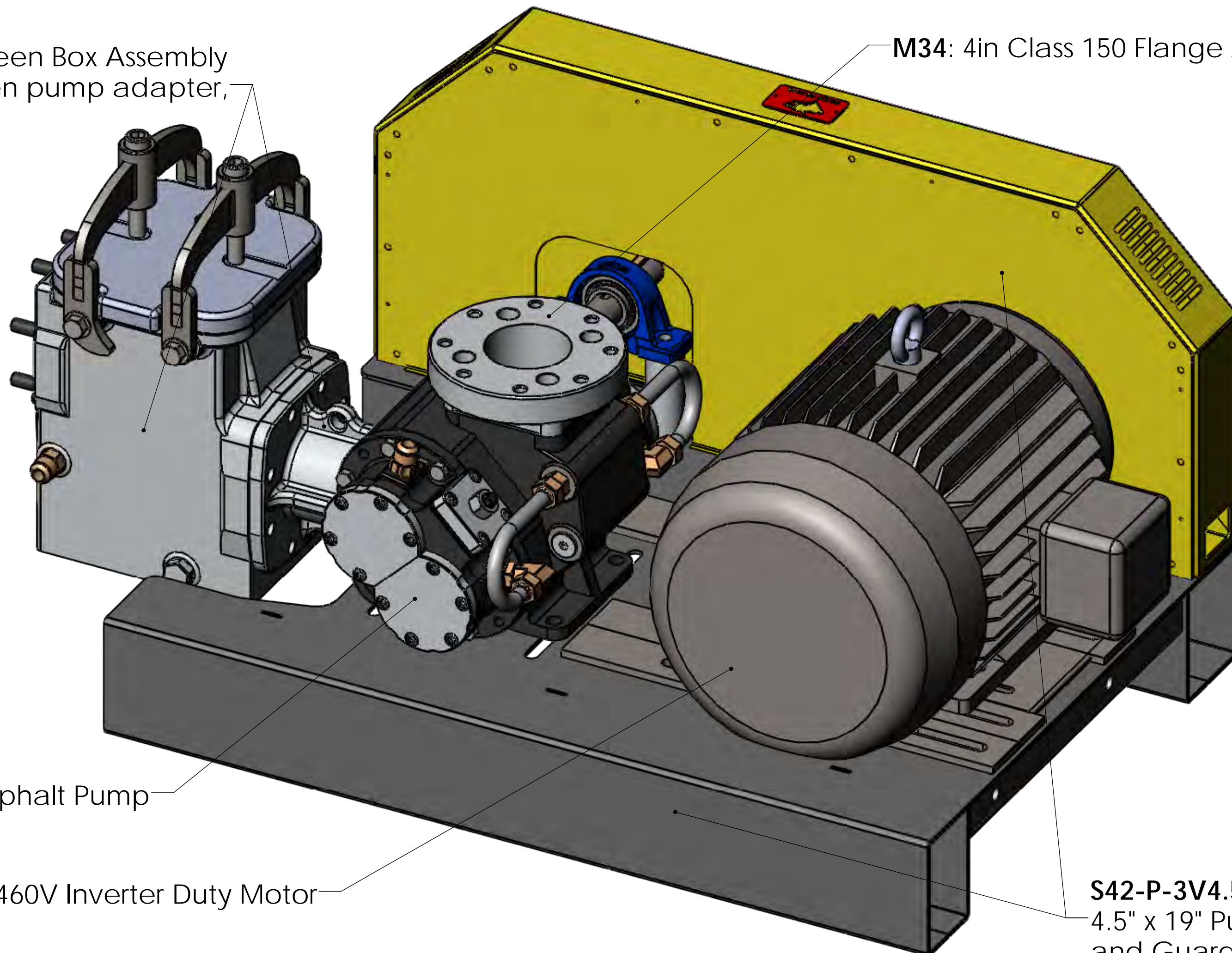
**SC4-C-43-30**: Screen Box Assembly with coarse screen pump adapter, and jumper hose

**M34**: 4in Class 150 Flange Adapter

**600VCX-RH**: Asphalt Pump

**15S**: 15HP, 460V Inverter Duty Motor

**S42-P-3V4.5-3V19**: Skid with 4.5" x 19" Pulleys, Belts, Bearing and Guards



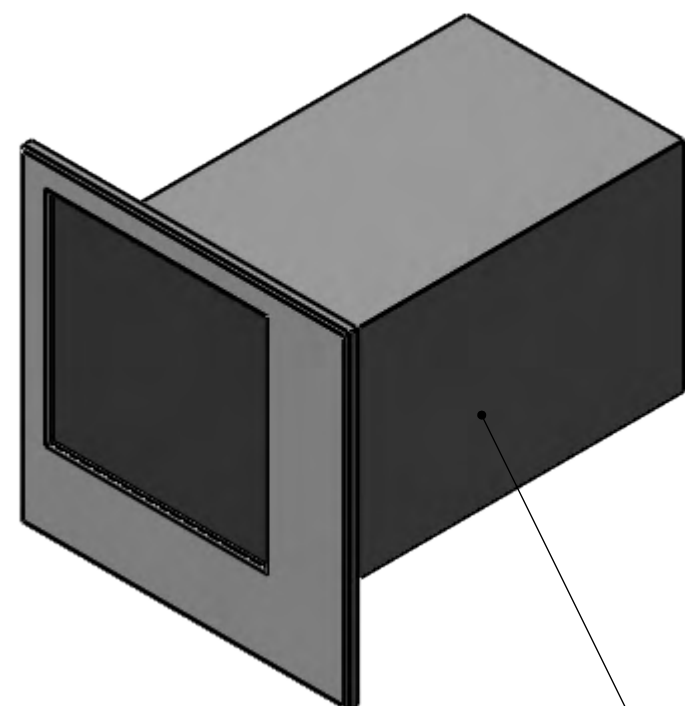


# 3in Micro Motion Metering Skid

## 3in Micro Motion Meter Skid

Below is an example of a Metering Skid for Rubberized Asphalt. Model numbers for ordering shown in **bold text**.

**SC4-C-43-30**: Screen Box Assembly, with coarse screen pump adapter and jumper hose



**3500 Transmitter**: MicroMotion 3500 Transmitter

**C3030**: 3in Pump to Meter Port Adapter

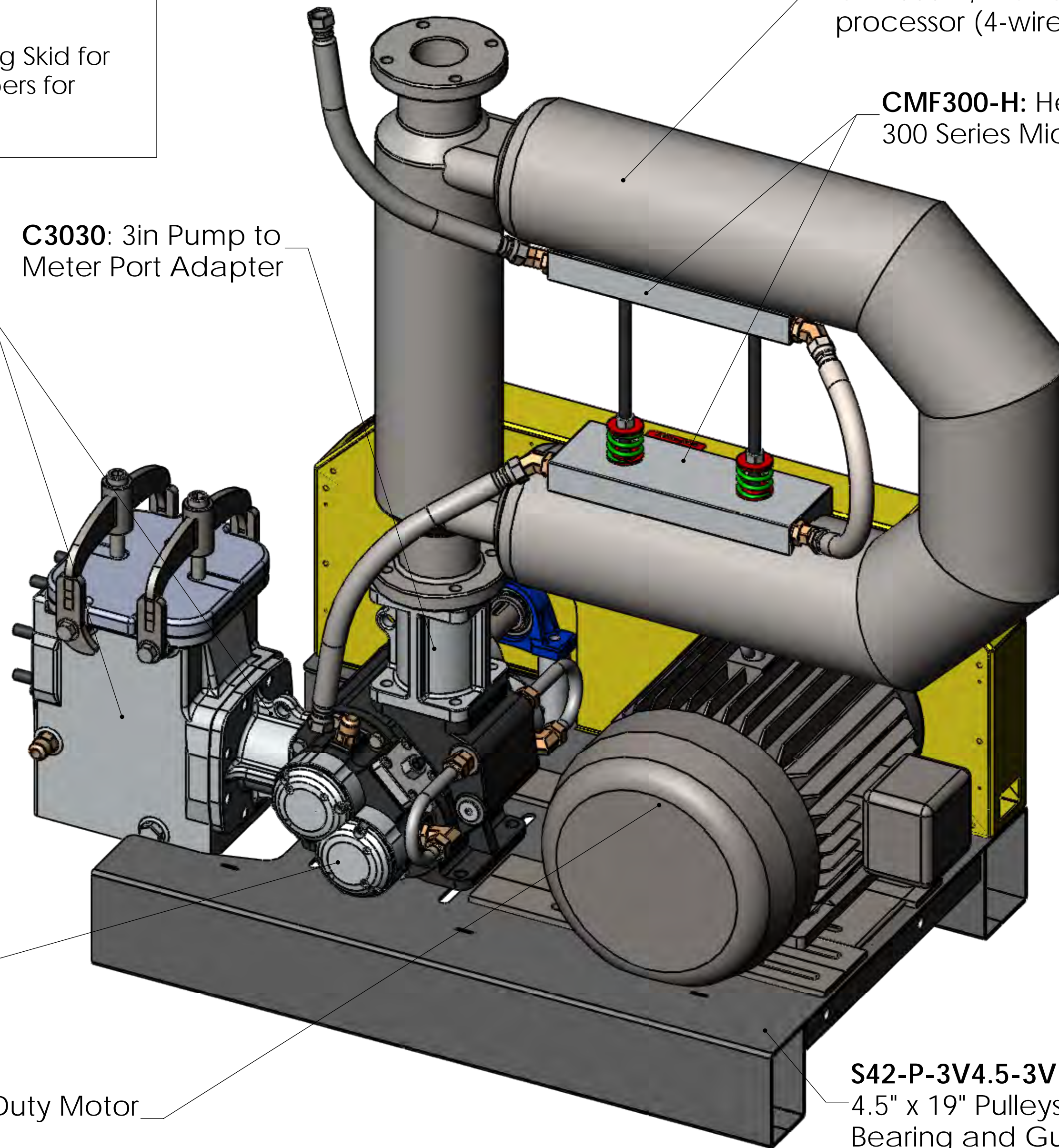
**CMF300M**: MicroMotion CMF300M, with extended core processor (4-wire)

**CMF300-H**: Heat Block kit for 300 Series Micro Motion

**600RCX-RH**: Asphalt Pump

**20S**: 20HP, 460V Inverter Duty Motor and adjustment tray

**S42-P-3V4.5-3V19**: Skid, with 4.5" x 19" Pulleys, Belts, Bearing and Guards

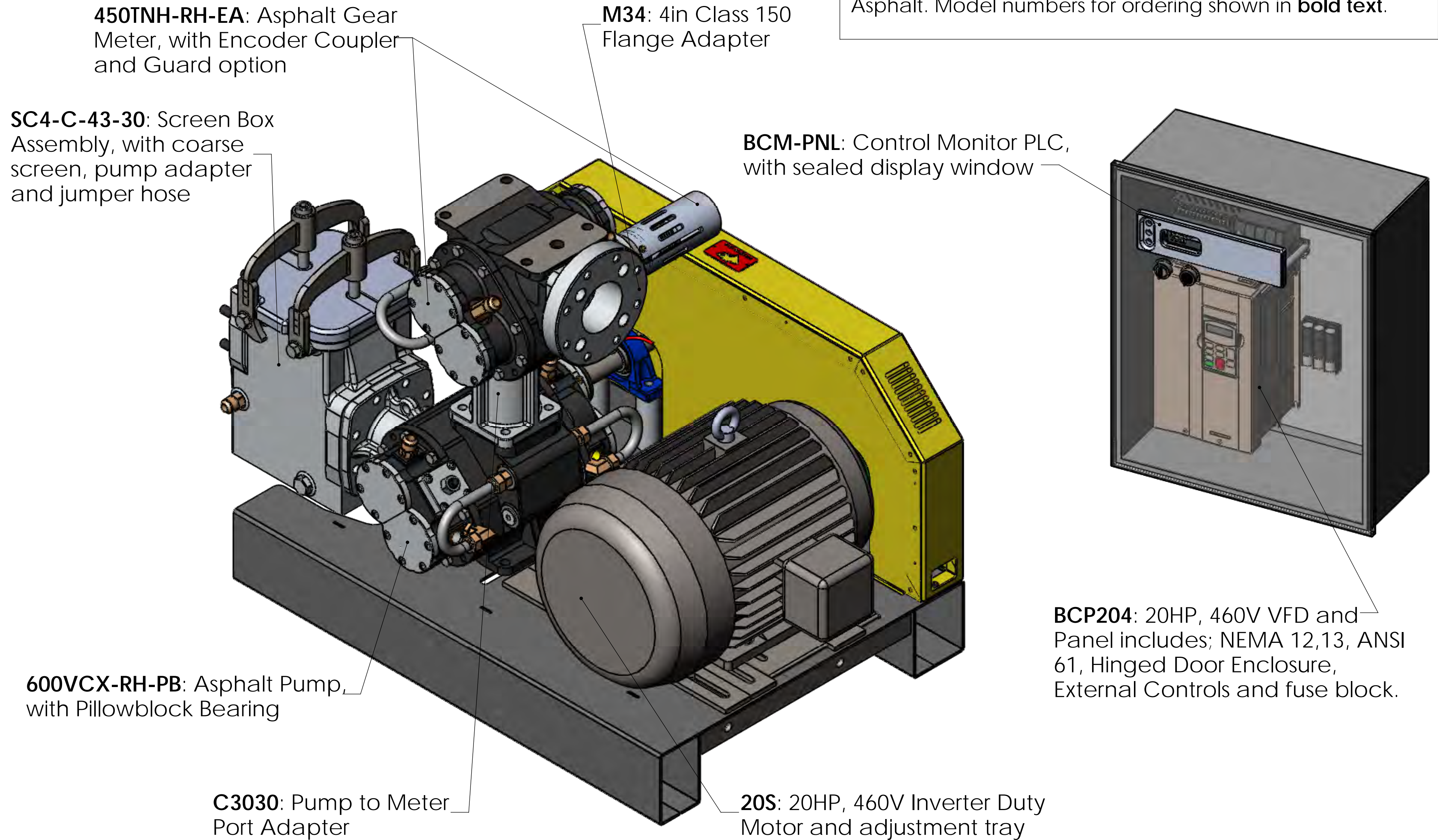




# 4in Gear Metering Assembly

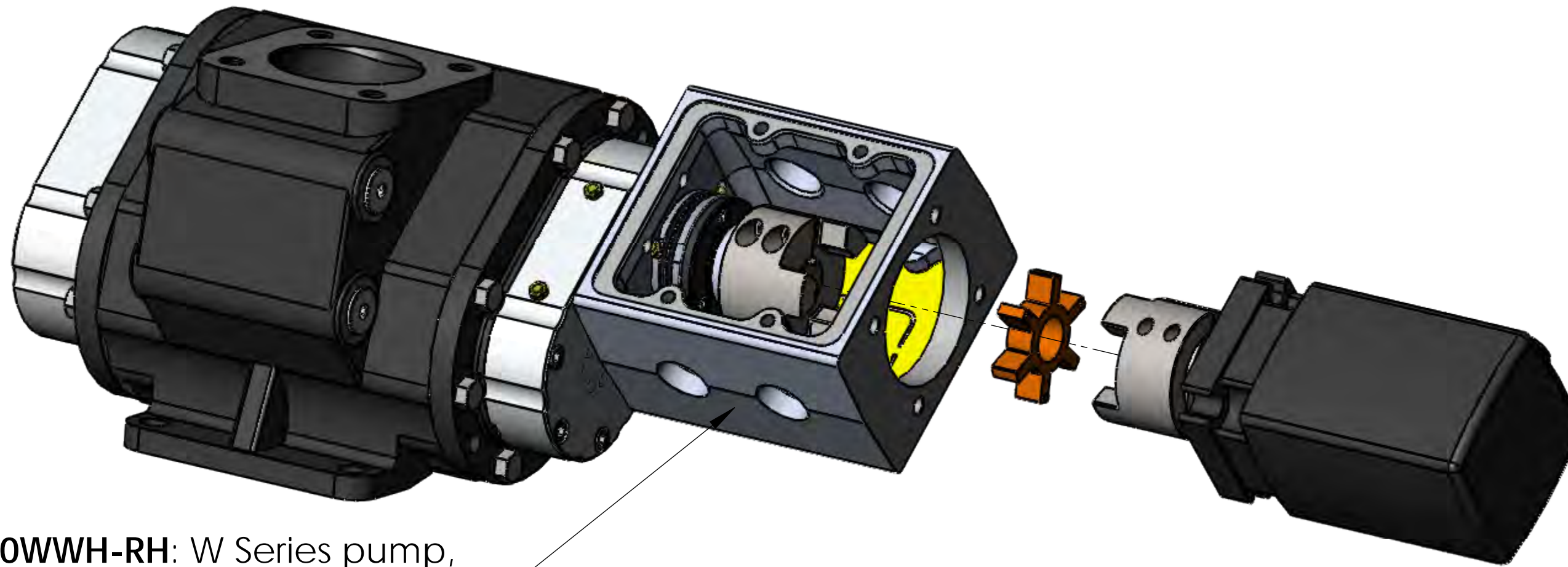
## 4in Gear Metering Assembly

Below is an example of a 4in Gear Meter System for Asphalt. Model numbers for ordering shown in **bold text**.

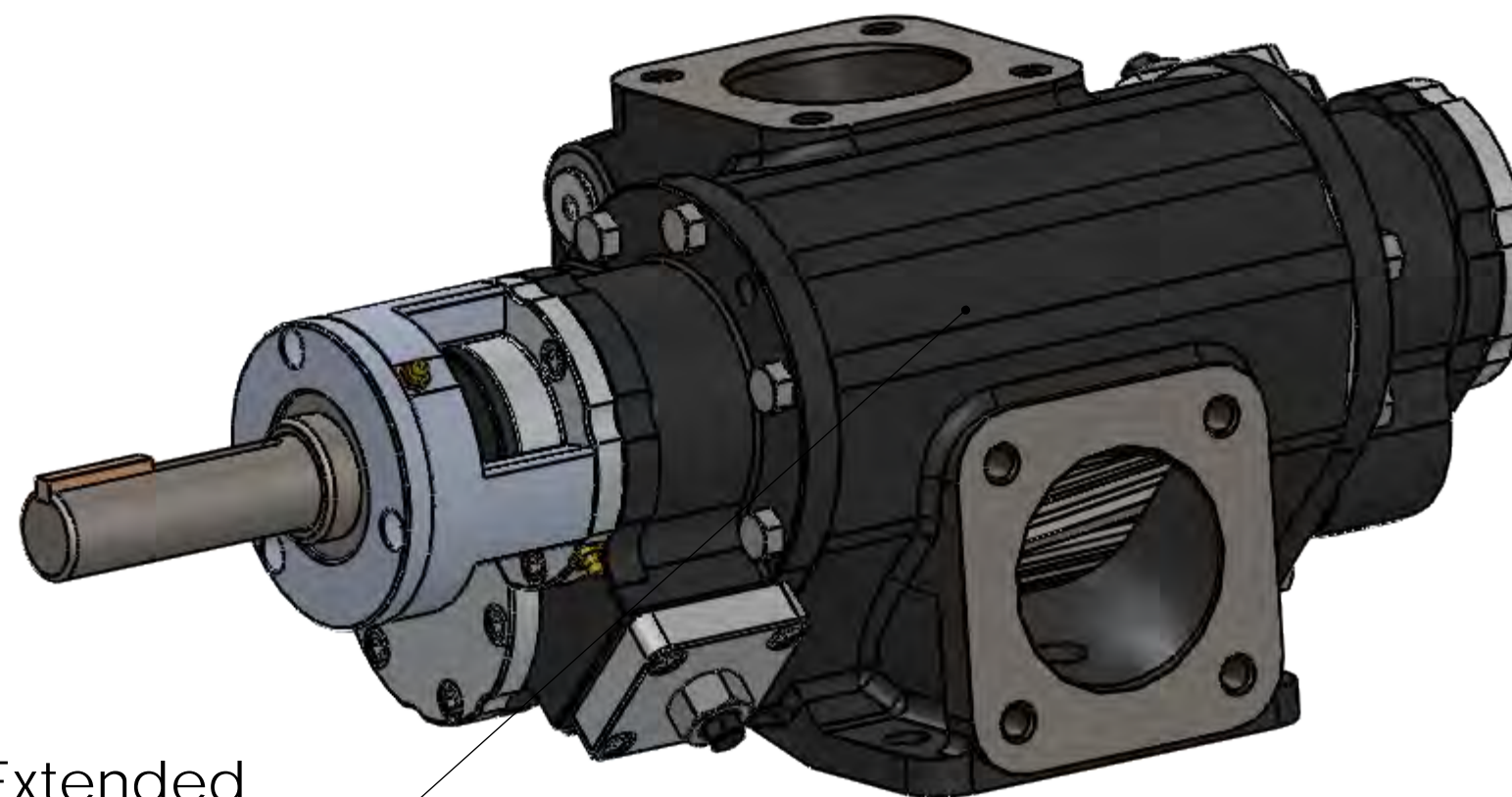




# Truck Pumps



**600WWH-RH:** W Series pump, with Hydraulic Motor and Split Clamp Coupler.



**600BMX-RH-OB:** B Series pump Extended Shaft and Outboard Bearing. Good choice for crude hauler truck, with PTO drive.