



CRUDE OIL PUMP SERIES

600SC Crude Oil Pump Manual

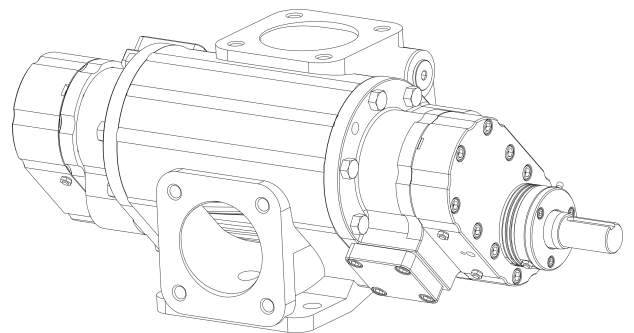
Installation, operation and maintenance

TECHNICAL MANUAL

Rev F | 2026.09.20

Document BCM-600SC-PM

Field manual



BearCat Pumps

1954 East Deer Valley Road, Suite 103 | Phoenix, AZ 85024

www.bearcatpumps.com | 623-587-1350

Overview and safety

Use the 600SC only within the installed truck, piping, drive, and site procedures.

CRUDE OIL SERVICE ONLY

The 600SC is designed for crude-oil transfer. It is not designed for hot asphalt or other hot-material service. Do not heat the pump or use it to pump hot material.

Contents

Identify the pump and application	3
Patent-pending scavenge system	4
Installation and pre-start	5
Start, operate, reverse, and shut down	6
Maintenance and service	7
Troubleshooting and service evidence	8
Parts and installation drawings	9-14

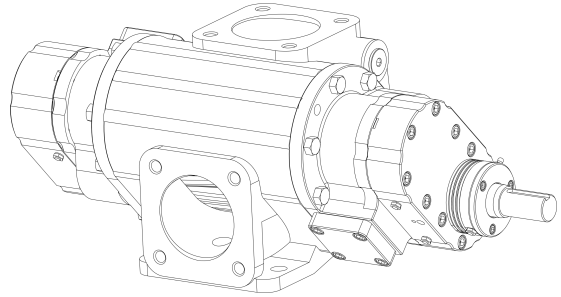
Safety boundary

- Only trained personnel may install, operate, adjust, or service the pump.
- Before service, stop and isolate the hydraulic or PTO drive, secure the controls, close the required valves, relieve trapped pressure, contain or drain crude oil, and verify zero motion and zero hazardous energy.
- Keep coupling and shaft guards installed. Never reach into the drive or remove a guard while the drive can move.
- Follow the carrier and site procedures for bonding, grounding, ventilation, ignition control, gas testing, spill response, and PPE appropriate to the crude oil being handled.

Identify the pump

Record the complete model and installed drive before ordering parts or changing the system.

MODEL FIELD	MEANING
600	0.60 gallon per revolution theoretical displacement
S	Bearing design, integral relief valve, no heat
C	Cooling spacer / shaft-seal configuration
H / X	Hydraulic drive standard / extended shaft
LL	Left-low configuration standard
88	No. 80 forward/reverse relief-valve configuration
L / O	Hydraulic mount / outboard-bearing option



Example family: 600SCH-LL-88-L

APPLICATION BOUNDARY

The 600SC is a positive-displacement crude-oil transfer pump. It is not a hot-material pump. Actual performance depends on speed, crude-oil viscosity, suction conditions, discharge pressure, piping loss, internal slip, and the installed drive. Do not publish or assume a flow limit that the complete system has not been verified to deliver.

Displacement and flow

Theoretical flow (gpm) = pump speed (rpm) x 0.60 gal/rev. Actual flow will be lower when slip, suction loss, entrained gas, or cavitation is present. Use a verified meter when delivered quantity matters.

RELIEF VALVE REALITY

The integral relief valve is pressure protection, not a pressure regulator. It does not open at one exact pressure under every condition, and it cannot pass unlimited flow. Relieving pressure changes with spring setting, crude-oil viscosity, speed, and return-path restriction. Keep the discharge path open and provide correctly sized system pressure protection.

Seal leakage and the scavenge system

The valve remains closed during normal operation and is opened when shaft-seal leakage is observed.

WHEN LEAKAGE APPEARS

Open the scavenge valve. The dual-path circuit applies suction to the seal chambers, captures the leaking crude, and returns it to the pump inlet. Confirm that crude is no longer escaping outside the pump. If the leakage is controlled, the transfer can continue and the truck can return fully loaded. If it is not controlled, stop the pump.



Response sequence: observe leakage - open valve - confirm external leakage is controlled

BI-DIRECTIONAL BY DESIGN

With the scavenge valve open, one side of the dual-path arrangement supplies suction to the seal chambers while the opposite side returns captured crude to the pump inlet. Reverse the pump and the two paths exchange jobs, keeping suction at the seal chambers either way.

SUCTION MAY RESTORE SEAL CONTACT

In addition to capturing leakage, suction from the scavenge circuit draws the flexible seal lips toward the shaft. This can help the lips reseal and may reduce or stop the leakage that prompted the operator to open the valve.

OPERATING CONDITION	WHAT THE 600SC DOES
Normal operation	The scavenge valve remains closed until seal leakage is observed.
Seal leakage appears	Open the scavenge valve. Suction captures the crude and may help pull the seal lips back against the shaft.
Main pump reverses	With the valve open, the dual paths exchange functions so suction remains at the seal chambers.

ADD SCAVENGE PROTECTION TO AN EXISTING 600SC

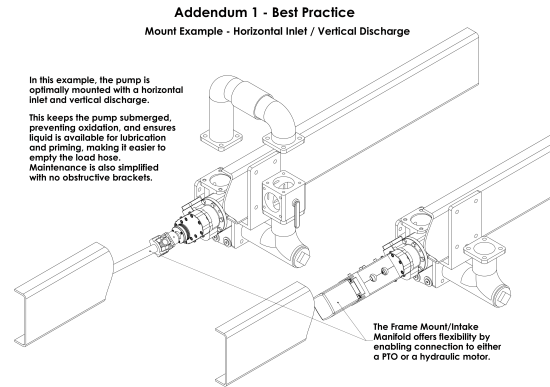
BearCat can convert eligible 600SC pumps at the factory. The pump is inspected, fitted with new seals and the complete dual-path scavenge system, then returned ready for service. The result is a familiar pump with a much better response to shaft-seal leakage. The conversion is factory-only; the customer arranges and pays freight both ways.

Install for a flooded, open flow path

The mounting shown in the original drawing package remains the preferred arrangement.

Mechanical and piping

- Mount the pump securely with the intake on the side and discharge on top.
- Whenever practical, locate the pump below the lowest normal liquid level so crude oil remains available for priming and lubrication.
- Support connected piping independently. Do not use the pump flanges to pull misaligned pipe into place.
- Keep the suction path short and unrestricted. Install usable inlet-vacuum and discharge-pressure indication.
- Align the PTO or hydraulic drive, install the coupling guard, and preserve access to caps, zerks, seals, and relief components.
- Do not plug, reroute, drill, or repurpose a scavenge-system port, passage, or connection.



Preferred concept: horizontal inlet, vertical discharge

OPEN DISCHARGE AND PRESSURE PROTECTION

A positive-displacement pump will continue displacing liquid when a valve closes. Verify the intended discharge or recirculation path is open before starting, and route every relief or bypass return to a safe, unrestricted destination.

CHECK	REQUIRED CONDITION
Identity	Correct 600SC model, drive, rotation, and crude-oil application.
Flow path	Required tank and discharge valves open; suction path flooded or primed.
Pressure	Relief/bypass route open; gauges serviceable; no trapped section.
Scavenge	Valve closed; factory configuration intact; no plugged, loose, or damaged connection.
Drive	Alignment correct; coupling and guards secured; hydraulic hoses sound.
Work area	People clear; ignition and spill controls in place; no visible leak.

Start, operate, reverse, and shut down

Start

- 1 Complete the pre-start check and confirm the intended source and destination.
- 2 Open the required suction and discharge valves. Establish a flooded suction or compatible liquid prime.
- 3 Briefly jog the drive to confirm shaft rotation and the resulting direction of main flow.
- 4 Start at the minimum practical speed. Confirm flow, stable inlet vacuum, and normal discharge pressure.
- 5 Inspect the pump, seal areas, scavenge lines and valve position, piping, hydraulic connections, and guard before increasing speed.
- 6 Increase speed gradually while watching delivered flow, inlet vacuum, discharge pressure, vibration, and sound.

WATCH	NORMAL EVIDENCE	STOP OR CORRECT WHEN
Suction	Stable vacuum and full prime	Vacuum rises, flow falls, or cavitation begins
Discharge	Pressure consistent with the open path	Pressure rises rapidly or relief repeats
Seals / scavenge	No leakage; scavenge valve closed	If leakage appears, open the scavenge valve; stop if it is not controlled
Drive	Smooth speed, guarded coupling, sound hoses	Unexpected motion, vibration, heat, or hydraulic leak

REVERSE DIRECTION

Bring the drive to a stop, confirm both flow paths, reposition valves using the truck's approved procedure, and restart at low speed. Never reverse into a closed line or trapped section.

SHUTDOWN

Reduce speed, stop the drive, secure the controls, and close valves in the machine-approved sequence. Relieve trapped pressure before inspection. Contain any drained crude oil.

A USEFUL BASELINE

Record pump speed, inlet vacuum, discharge pressure, flow direction, and delivered flow when the truck is working well. These readings provide the baseline needed to identify what changed.

Maintenance and service

Intervals depend on crude-oil properties, duty cycle, environment, and the installed drive.

WHEN	CHECK	ACTION
Before operation	Guards, fasteners, hydraulic hoses, piping, seals, scavenge lines, and valve	Confirm the scavenge valve is closed. Correct damage or looseness before starting.
During operation	Vacuum, discharge pressure, noise, vibration, seal leakage, and scavenge response when engaged	Stop for abnormal pressure, persistent cavitation, uncontrolled leakage, or unsafe motion.
Initially weekly	Bearing grease condition and coverage	Use a hand grease gun and compatible grease; inspect results and adjust the interval.
Periodic	Alignment, coupling, relief components, bearing condition, and service records	Repair wear and restore the factory configuration before return to service.

GREASING

Grease compatibility matters. Test candidate grease against the crude oil; clouding or separation indicates incompatibility. Use a hand-operated gun so bearing seals are not overpressurized. Begin with weekly greasing until inspection supports a different interval. Grease is useful. Hydraulic pressure delivered through a grease gun is not.

Seal service

- 1 Isolate the drive, close valves, relieve pressure, contain crude oil, and verify zero motion.
- 2 Remove the required guard, coupling, cap, and dust-seal bracket without damaging the shaft or bore.
- 3 Clean and inspect the shaft, seal bore, spacer, and scavenge passages. Do not drive debris into an internal passage.
- 4 Guide each main seal into its bore. BearCat compression tool TOOL-67200 can pre-form the seal lip for installation.
- 5 Reassemble with the correct front and rear spacers, torque the listed fasteners, align the drive, and reinstall every guard.

FASTENER / COMPONENT	SOURCE TORQUE
Castle nut	100 ft-lb
0.375-16 cap screws - end caps / relief caps / mount	20 ft-lb
0.5-13 housing or 12-point mount bolts	45 ft-lb
0.25-20 dust-seal bracket screws	8 ft-lb

Troubleshoot from evidence

Confirm the symptom, record the readings, and change one condition at a time.

SYMPTOM	CHECK FIRST	ACTION
No flow or poor prime	Valve path, liquid level, rotation, air leak, suction restriction	Open the correct path, restore flooded suction or prime, and correct rotation or leakage.
Low flow	Actual speed, inlet vacuum, entrained gas, discharge pressure, internal slip	Correct the limiting condition before increasing speed.
Noise or cavitation	Rising inlet vacuum, restricted piping, low liquid level, excessive speed	Reduce speed and clear the suction limitation. Judge the sound again under full prime.
Pressure rises / relief repeats	Closed valve, blocked line, trapped section, restricted bypass return	Stop the pump. Open or correct the flow path; do not use the integral relief as a flow-control valve.
Seal leakage appears	Open the scavenge valve; observe both seal areas and the system response	Confirm suction captures the leakage. If external leakage persists or increases, stop, isolate, contain, and contact BearCat.
Hydraulic drive unstable	Oil supply, pressure, return restriction, hose condition, motor/coupling	Correct the hydraulic system fault before evaluating pump performance.

SEND WIDE PHOTOS BEFORE CALLING

Send wide, well-lit, high-resolution photos of the complete installation from several angles. Keep the pump, drive, piping, valve positions, controls, and surrounding context in the frame. Do not send isolated close-ups. BearCat can zoom in; it cannot zoom out.

ALSO SEND THE EVIDENCE

Include the complete model and serial number, truck identity, flow direction, pump speed, crude-oil temperature, inlet vacuum, discharge pressure, delivered flow, scavenge response, and recent work.

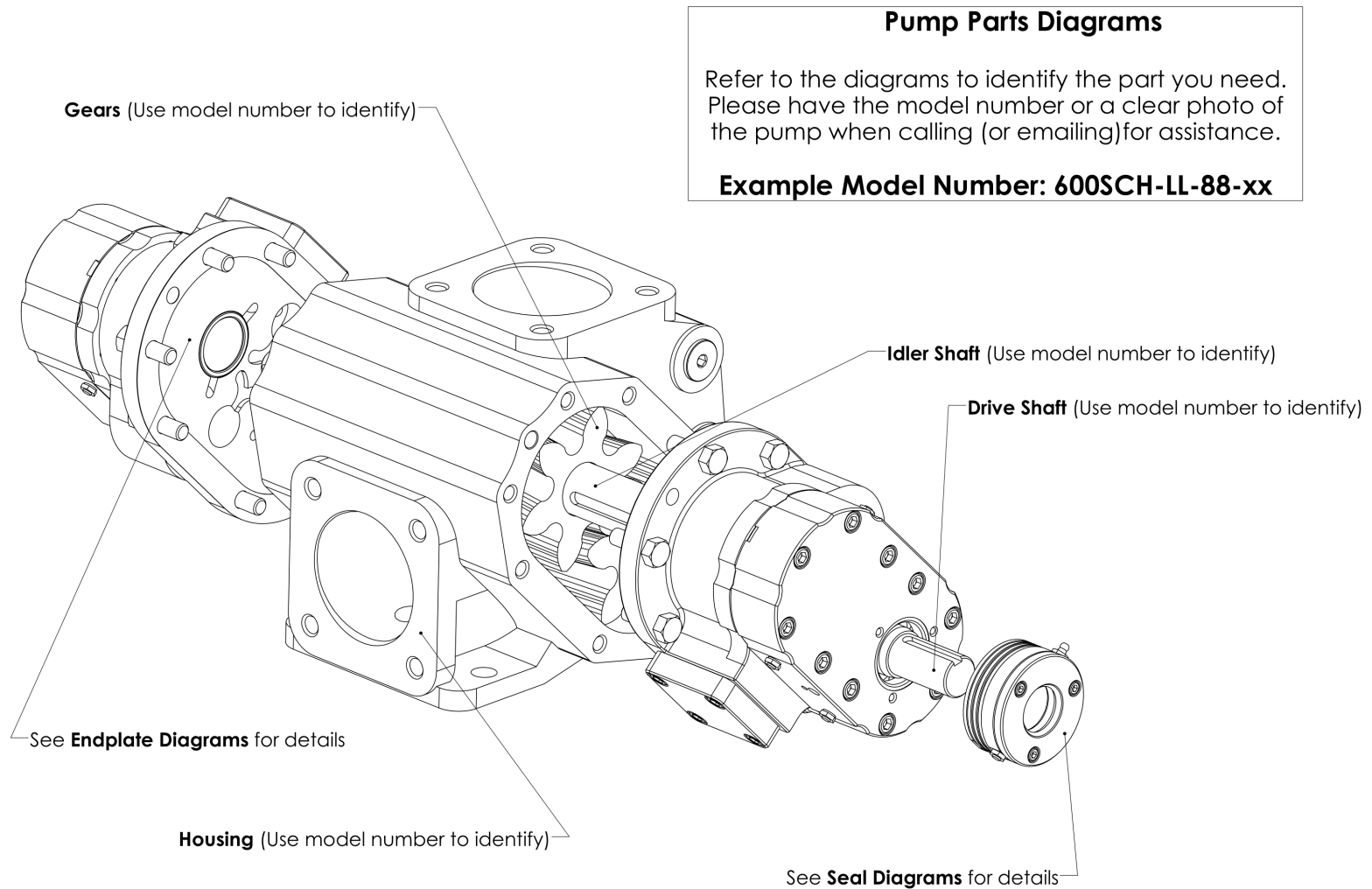
ONE CHANGE AT A TIME

Changing the valve lineup, pump speed, and hydraulic setting together produces one result and no answer. Record the baseline, change one condition, and compare.

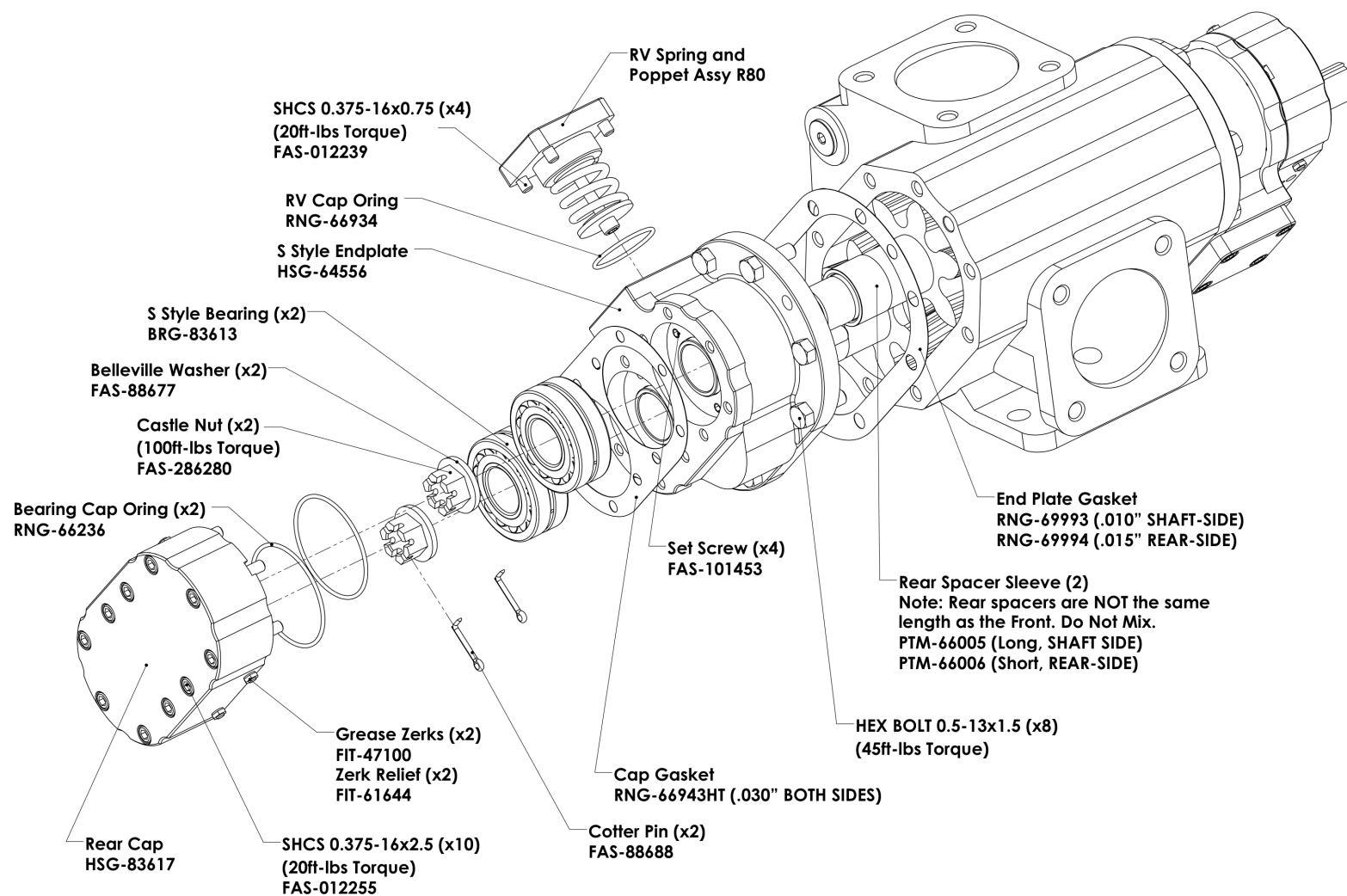
Revision history

REV	DATE	CHANGE
A	2026.09.03	Modernized 600SC manual; established crude-oil-only boundary; added scavenge-system guidance, field operation, maintenance, and troubleshooting.
B	2026.09.03	Rewrote the patent-pending scavenge-system section around seal-chamber suction, dual-path operation, internal leakage capture, and the return-fully-loaded benefit.
C	2026.09.03	Clarified the normally closed scavenge valve, leak-response sequence, suction-assisted seal reseating, and factory retrofit message.
D	2026.09.03	Refined the scavenge instructions and retrofit explanation for a more direct, technical field-manual tone.
E	2026.09.04	Applied the T7 visual standard, limited humor, and strengthened wide-photo requirements for service support.
F	2026.09.20	Added the selected assembled-pump illustration to the cover.

Base Component Diagram

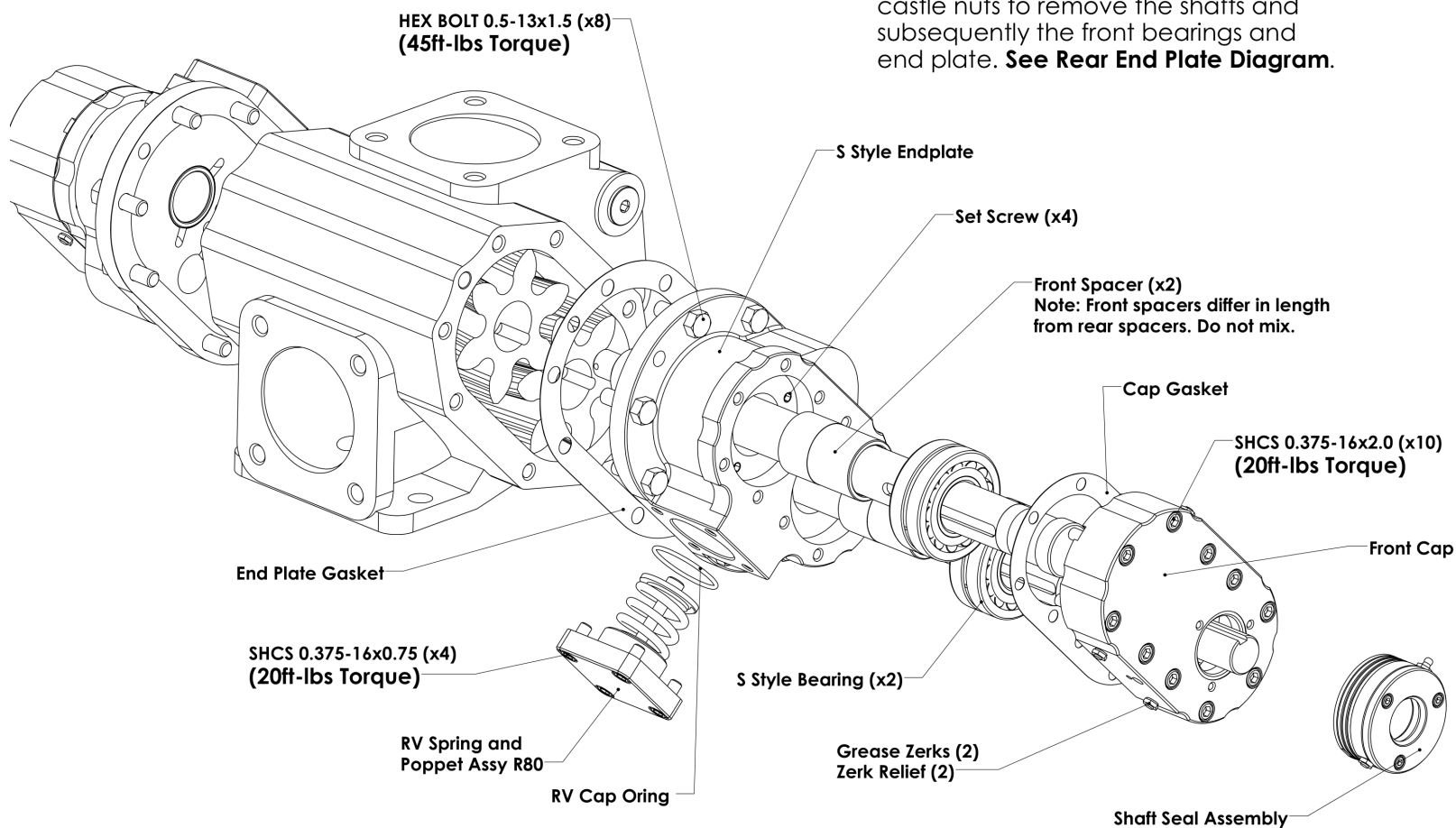


Rear End Plate S Diagram



Front End Plate S Diagram

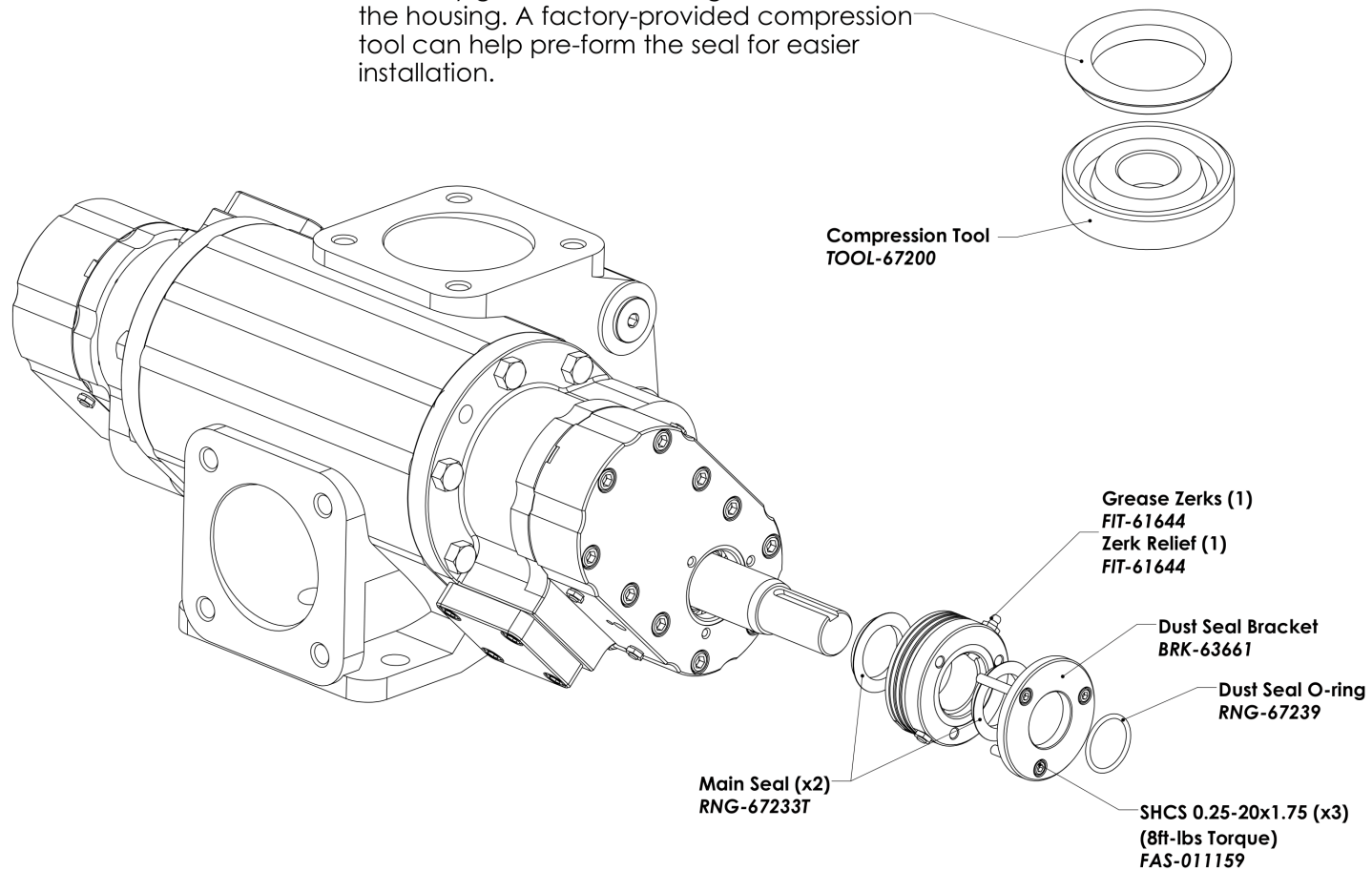
NOTE: You must remove the rear castle nuts to remove the shafts and subsequently the front bearings and end plate. **See Rear End Plate Diagram.**



Seal Assembly

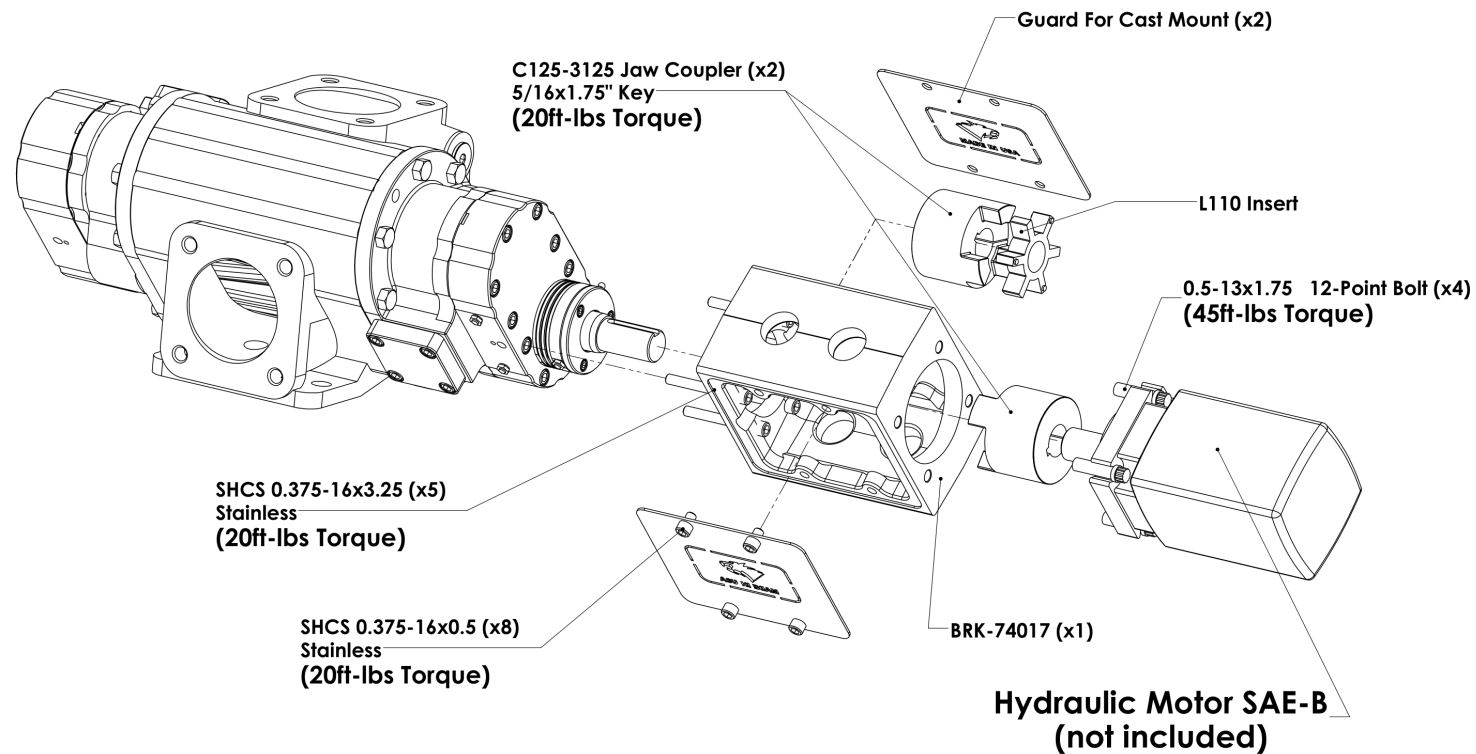
Installing the Main Seal:

Carefully guide the seal's edge into the bore of the housing. A factory-provided compression tool can help pre-form the seal for easier installation.



Option (L) - Hydraulic Mount

Example 600SCH - LL - 88 - (L)
Option 'L' will include the following items.

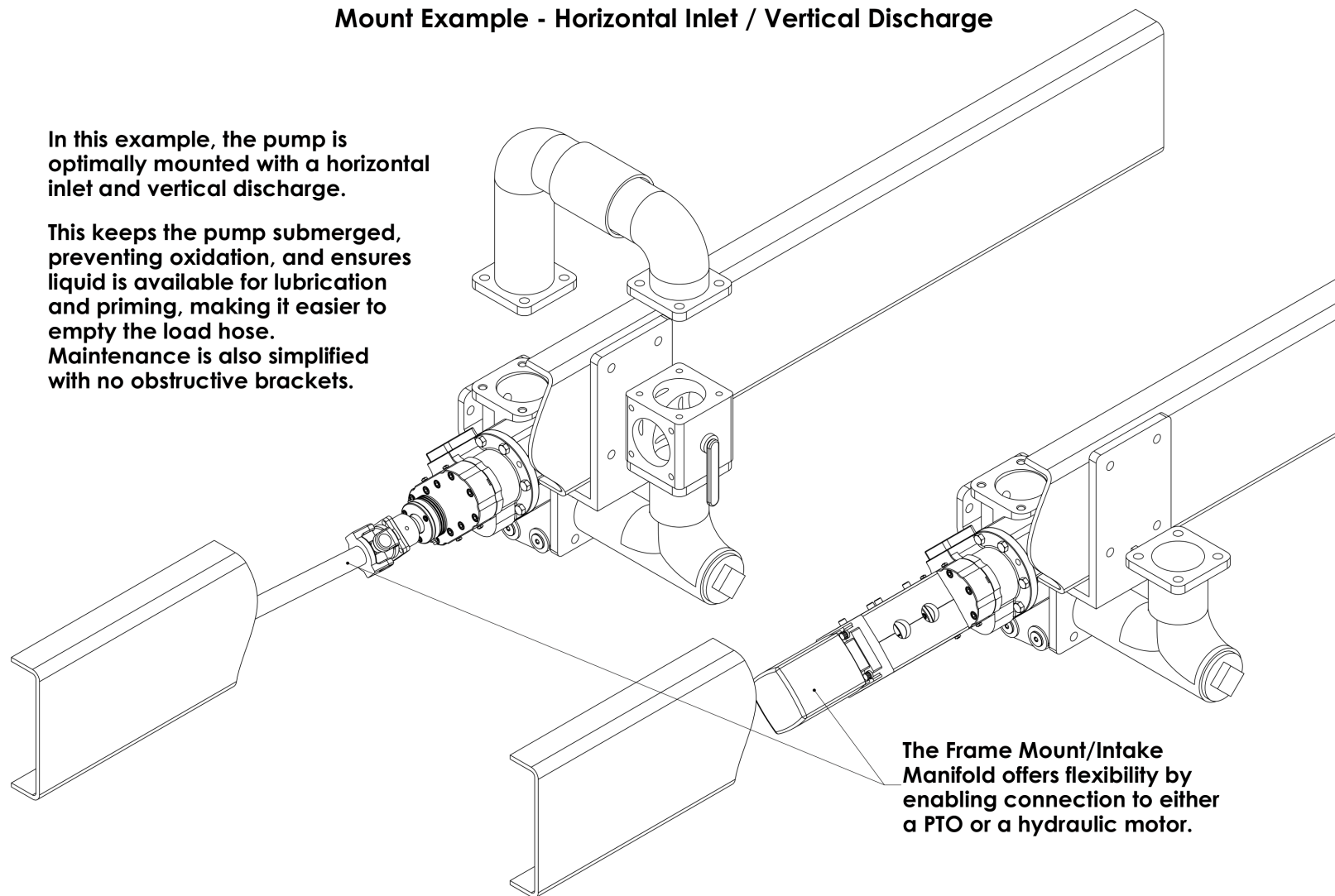


Addendum 1 - Best Practice

Mount Example - Horizontal Inlet / Vertical Discharge

In this example, the pump is optimally mounted with a horizontal inlet and vertical discharge.

This keeps the pump submerged, preventing oxidation, and ensures liquid is available for lubrication and priming, making it easier to empty the load hose. Maintenance is also simplified with no obstructive brackets.



The Frame Mount/Intake Manifold offers flexibility by enabling connection to either a PTO or a hydraulic motor.