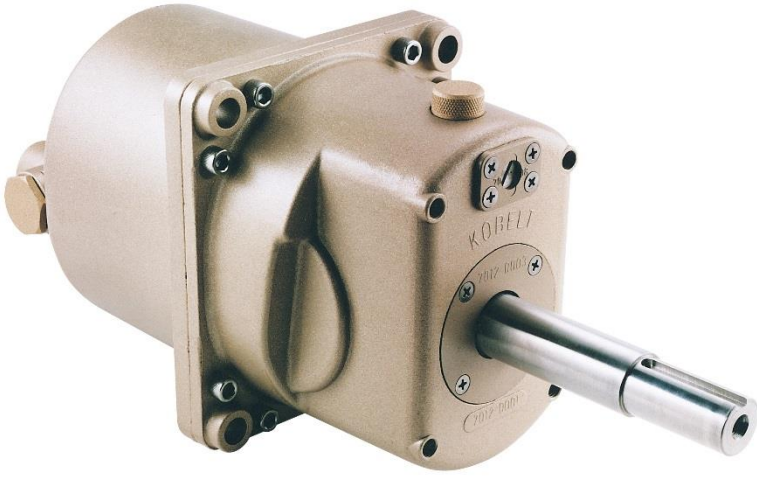
HELM PUMP

7012

Owner's Operation, Installation & Maintenance Manual



June 2023
(Rev B)

NOTES:

RECORD DATA BEFORE INSTALLATION FOR FUTURE REFERENCE	
Model #:	
Serial #:	
Date of Purchase:	
Date of Installation:	

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1 INTRODUCTION

1.1 CONTACT

Kobelt Manufacturing Co. Ltd.
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Fax: +1-604-590-8313
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Website: www.kobelt.com

This document is intended to clearly present comprehensive product data and provide technical information to assist the end user in design applications. Kobelt reserves the right, without notice, to change the design, or construction, of any products and to discontinue or limit distribution of any products. Kobelt also reserves the right to change, or update, without notice, any technical information contained within this document.

Kobelt recommends that customers visit our website to check for updates to this Manual. Once a product has been selected for use, it should be tested by the user to ensure proper function in all possible applications. For further instructions, please contact our distributors or visit our website.

1.2 COMPLIANT USE

This device is only intended for use by persons trained in operating marine systems.

The installer shall:

- Only use non-defective products.
- Check the safety of operation and the condition of the device before each use.
- Verify that the product is operational at all times and keep it in good working conditions.

Only Kobelt Manufacturing Co. Ltd. Authorized Dealers or Authorized Technicians are to repair Kobelt products.

1.3 COPYRIGHTS & TRADEMARKS

2 SAFETY

2.1 SAFETY ALERTS

Throughout this manual, the following symbols, and their accompanying explanation, are used to alert the user to special instructions concerning a service or operation that may be hazardous if performed incorrectly or carelessly. The associated risk levels are stated below.

⚠ DANGER	This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	This symbol indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
NOTICE	This symbol informs the reader of events not related to personal injury but which there is a risk of damage to property or equipment.
SAFETY INSTRUCTIONS	This symbol informs the reader of safety-related instructions or procedures.

2.2 NOTICE TO INSTALLER

Disregarding the following safety measures can result in an accident causing severe injury to personnel and damage to material assets.

- Only use the product as directed in this manual.
- Never put the product into service if there is evidence of visible damage.
- Never put the product into service before fully completing installation and commissioning.
- Do not carry out any modifications to the product.
- Only use authentic Kobelt spare parts.
- Observe all local regulations, directives and laws during the installation of this product.
- All installation, commissioning, and maintenance work must only be conducted by qualified personnel. (For the purpose of this manual, qualified personnel are persons who are familiar with the assembly, installation, commissioning, and operation of the product and who have the qualifications necessary for their occupation.)
- Observe all specifications in this manual. If these guidelines are not followed and damage occurs, the warranty will be voided.

3 ABOUT HELM PUMP

3.1 PRODUCT DESCRIPTION

Kobelt Manufacturing produces different Helm Pumps, all of which are made from bronze and stainless steel, except for the thrust and roller bearings and, of course, hardened and ground pistons. These Helm Pumps can be installed in any location on the vessel because of their durable materials and watertight construction.
The Helm Pumps incorporate lock valves, filler plugs and interconnecting plugs for multi station applications. A front mounting plate is available (optional) for all pumps, where the pump is mounted behind the console face. The following Kobelt Hydraulic Pumps are based on the same design and are of the VARIABLE DELIVERY TYPE.
The delivery of these pumps is fully adjustable, with easy-to-alter output flow as simple as turning an external adjusting screw on the pumps' front face with a standard screwdriver.

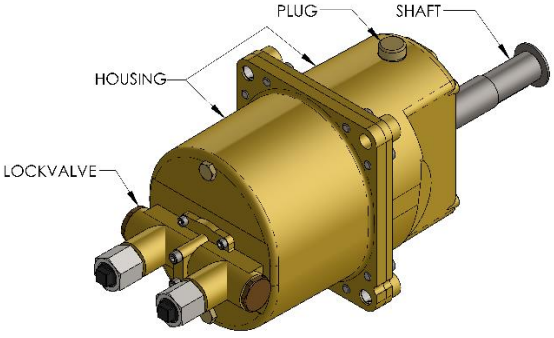


Figure 1: Product Overview Diagram

These pumps have been extremely well received by the industry, because of their variable displacement capability, which allows the operator to select the number of turns from hard over to hard over, without installing a different pump. For manual hydraulic systems, under normal conditions, the load on the steering wheel rim should not exceed 36 ft. lbs. (16 kg), and generally the hydraulic system pressure should not exceed 650 psi (45 bar). For electro-hydraulic systems on emergency-driven hydraulic pumps, the steering angle that must be maintained manually, in case the power fails, is only 15° to either side. At 15° the rudder torque is easily controlled with a helm pump and the helmsman will have no problem maintaining the steering. One must remember that producing 12 cubic inches per turn at 600 to 1000 PSI requires a tremendous amount of human effort, and it is not practical to expect a person to produce this kind of pressure and volume continuously.

3.2 ORDERING OPTIONS

Ordering options

Finish	A	Bronze Finish
	B	Black Epoxy Finish
Shaft	L	Long Shaft (for behind console mount)
	N	Short Shaft (for through console mount)
Connection block	P	Porting Block (no lock valve) Omit for lock valve option
Plug	V	Vent plug Omit for non vented plug

3.3 TECHNICAL SPECIFICATIONS

MODEL	7012	
KOBELT P/N	7012L	7012N
DISPLACEMENT PER TURN	4 - 12 in^3 [65 - 197 cc]	
MAXIMUM PRESSURE	1000 PSI [69 bar]	
RECOMMENDED FLUID	ISO VG 32, VI 60 hydraulic oil	
LOCK VALVE PORT SIZES	-10 SAE ORB	
REAR TOP/BOTTOM THREAD SIZE	1/4" NPT	
FILLER CAP THREAD SIZE	5/8" UNF	
STEERING WHEEL DIAMETER	24" to 40" [600 mm to 1000 mm]	
PHYSICAL DIMENSIONS (L x W x H)	17.5" x 6.2" x 7.0" [445 mm x 158 mm x 177 mm]	15.0" x 6.2" x 7.0" [380 mm x 158 mm x 177 mm]
MOUNTING DIMENSIONS (L x W)	6.0" x 5.25" [152 mm x 133 mm] 4x 0.56" [14 mm] THRU-HOLES	
PRODUCT WEIGHT	38 lbs [17.2 kg]	
SHIPPING DIMENSIONS (L x W x H)	20.0" x 8.0" x 8.0" [508 mm x 203 mm x 203 mm]	

Table 1: Technical Specifications

4 UNPACKING THE PRODUCT

When unpacking the box containing the 7012 Helm Pump, the box should include the following additional items:

- 1x 7012 Helm Pump
- 1x 7012 Owner's manual (this document)
- 1x 7012 Cut-Out

If any of these items are missing or damaged, please contact Kobelt to arrange replacements.

5 INSTALLATION

5.1 MECHANICAL

The helm pumps are supplied with a short shaft or with a long shaft. The helm pumps can be mounted through the console or behind the console, although the short shaft version would normally be mounted in the thru-console mode.
When deciding which way to mount the pump, attention must be paid to the method of filling the system. Now is a good time to install your fittings in the helm pump.
Allow space for the steering wheel.
When mounted thru-console, the filler plug is accessible, but when behind the console, it is obscured. In the behind console mounting, either arrange access to the filler plug or adopt some form of remote filling system. The remote filling system can either be a small tank or a tube run up from the pump to a position convenient for topping up with oil.
Helm pump Model 7012 are best installed with the shaft on a horizontal plane.

5.1.1 Thru-console

A template is provided for the cut-out to allow the front half of the pump to protrude through the console with the flange butting up against the back or front face of the console.
The pump should be secured to the console by four bolts through the bolt holes at the four corners of the pump flange.

5.1.2 Behind console

A template is provided for the cut-out to allow the pump shaft through the console and for the drilling of four holes to secure the pump to the back face of the console.
Four bolts and washers are required to screw into the tapped holes in the face of the pump.
If the variable flow facility of the helm pump is to be used, cut the hole for access to the adjusting screw.

5.1.3 Expansion Tanks

Expansion Tanks are normally supplied by the shipyard. They can also be obtained from Kobelt and, we recommend that approximately 1 Quart (or 1 Litre) minimum volume should be used in this application. The vent line from the Expansion Tank to the Helm Pump should protrude approximately 1" from the bottom of the Expansion Tank into the tank itself. This avoids dirt and condensed water from entering the steering system. The vent plug must be arranged in such a fashion that water spray and rain cannot enter the tank. (See Figure 2)

5.1.4 Installation with adaptor plate

An adaptor plate is optionally available to simplify mounting of the pump. This plate can be installed on either side of the console. A template is provided to drill the necessary holes.
Two bolts with washers are required in this case to secure the pump to the bulkhead.

Ordering number: 7012-0011A (cast bronze finish)

7012-0011B (black epoxy finish)

5.2 HYDRAULIC

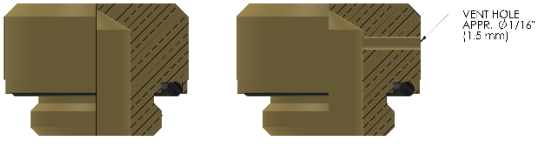
For Manual Systems, it is recommended to use ISO #32 Hydraulic Oil. We do not recommend using any other type of fluid. The hydraulic oil used should be new and clear of all foreign matters.

During installation it is of utmost importance to keep dirt and foreign matters out of the system. Cleanliness is extremely important.

- We do not recommend the use of Teflon tape for pipe sealing. This often rolls over the edge of the fitting and is cut off on installation; it then floats in the system. It is recommended that liquid Teflon sealant or its equivalent is used. It is easier to ensure that none of this type of sealant gets into the system.
- Copper or Stainless-Steel tubing is preferred for the piping material. The tubing should be of large inside diameter to avoid excessive friction in the hydraulic system, especially in cold weather environments.
  Depending on the number of stations, the length of runs and the size of the Helm Pump, the piping must be chosen accordingly.
  We recommend the minimum diameter of 1/2" tubing, but on the long runs 3/4" tubing is recommended. When installing this tubing, it is very important to have a steady rise in the lines towards the highest point in the steering system. It is very difficult to bleed the tubing system with a rise and fall pattern, because air gets trapped in the elevated pockets.
- It is also recommended that an expansion tank is installed on the uppermost station, to provide an additional reservoir of oil. This expansion tank must have a vented plug. The plug, however, must be arranged in such a fashion that water cannot enter the steering system. All other filler plugs on the steering stations must be of a non-vented type. If an expansion tank is not used, the uppermost steering station must have a vented filler plug on the Helm Pump.
  This is to allow the oil to expand during a hot day and contract when the temperature declines.

5.2.1 Non-Vented and Vented

If no Header Tank is installed, a Vented Plug is required at the highest pump. This can be done by drilling a small hole into the side of the plug.



NOTICE	Installers should familiarize themselves with the equipment and their instructions. Operators should fully understand how the system works

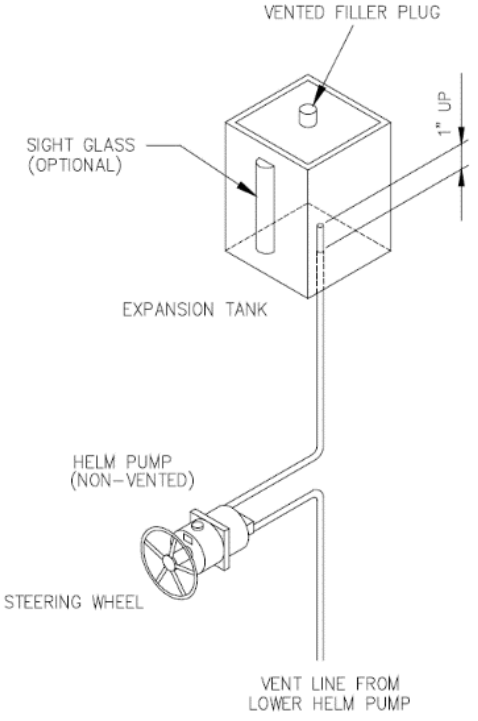


Figure 2: Expansion Tank Installation

6 COMMISSIONING

6.1 HYDRAULIC FILL & BLEED

6.1.1 Filling a Single Station System

1. The pump(s) should be set to maximum volume prior to filling and bleeding the system.
2. Fill the helm pump with hydraulic oil using a funnel or filling tube. Be sure to re-install all filler plug. If a header tank is installed, fill the header tank to about ½ full.
3. Turn the wheel slowly in one direction until the pump starts to operate, at which point the level in the helm pump/header tank will go down.
4. Check the oil level frequently and top up as required.
5. Continue to turn the wheel in the same direction, until some resistance is felt.
6. At this point, the cylinder may be observed to move.
7. Open the bleed fitting on the cylinder on the side into which the oil is passing.
8. Continue to turn the wheel once again at about one turn per second and ensuring a good head of oil on the pump until clear oil and no air emerges from the bleed fitting on the cylinder.
9. Close the bleed fitting and do not turn the steering wheel in the opposite direction.
10. Provided the head of oil has been maintained and the wheel has been turned slowly, this side of the system should now be reasonably free of air.
11. Continue to turn the wheel until the cylinder moves to the hard over position.
12. There should, at this point, be a significant resistance to further turning.
13. Now turn the wheel in the opposite direction. There may be, at this point, a blow-back of air up the tubing into the pump, which can expel oil with some force from the funnel, or filling tube. A rag held over the top will prevent the oil from splashing over onto the surrounding area. If the oil level in the funnel has dropped, refill to ensure that the head of oil is maintained.
14. Open the bleed fitting on the pressure side (opposite side) of the cylinder and continue to pump until clear oil and no air is issuing from the bleed fitting.
15. Close the bleed fitting.
16. Fill the helm pump/header tank to the correct level.

The system should now be reasonably free of air and the cylinder should operate in both directions when the wheel is turned to either starboard or port.

Residual air may be removed from the system as follows:

Put the wheel hard over in one direction and apply pressure to the wheel. On breaking the hydraulic lock and turning the steering wheel in the opposite direction, air may be observed coming up the funnel or filling tube (Sometimes with considerable force).

Repeat this procedure in both directions several times.

Allow a period of several hours for any air bubbles in the system to group together and then repeat the hard over to hard over procedure.

While there is still air trapped in the system, the pump may be quite stiff to turn and on reversing the wheel, there is quite a distinct noise as the lock valve moves across. Once air is out of the system, the pump should turn smoothly, and the lock valve will move quietly from one side to the other on reversing the rotation of the wheel.

6.1.2 Filling a Two Station System

1. Fill the system from the top Helm Pump or Header Tank.
2. At the lower helm, follow steps (3) to (15) in section "Filling a Single Station System", keeping a head of oil at the top pump.

⚠WARNING	Do not use other types of fluids such as automotive transmission fluid or brake fluid. They contain additives that are harmful to oil seals used in steering systems.
⚠CAUTION	All hydraulic lines in the steering system must be thoroughly cleaned prior to filling the system. Ensure all hydraulic lines are secured and fittings are tight.

6.2 CALIBRATION AND ADJUSTMENT

The Kobelt Model 7012 helm pumps outputs are adjustable. These Helm Pump have a variable output. This enables the pump to be set at the optimum number of turn's hard over to hard over, either during or after installation.

Increasing the output of the pump decreases the number of turn's hard over to hard over. The lower the number of turns, the stiffer the steering will feel. Larger diameters of wheel may be necessary at full pump output, depending on cylinder size. Consult our distributor or dealer.

Decreasing the output of the pump increases the number of turn's hard over to hard over. The steering will become lighter with the increased number of turns and this should allow the use of small diameter wheels.

To increase output, Turn the screw clockwise

To decrease output, Turn the screw counter clockwise

7 OPERATION

The operation of a hand hydraulic steering system is very simple. A steering wheel is fitted directly to the helm pump. Two hydraulic lines from the lock valve (or porting block) on the rear of the helm pump connect to a double acting balanced displacement steering cylinder. A tiller arm is clamped to the rudder shaft and the steering cylinder is bolted to the tiller arm.

Turning the steering wheel will pump hydraulic oil to one end of the steering cylinder. As the cylinder moves, oil from other end of the steering cylinder is push backed up to the opposite side of the helm pump. This called a two-line system.

When you stop turning the steering wheel, the hydraulic oil in both lines is “locked” by the rudder lock valve (sometimes called a non-return valve). The rudder will stay in place and not move until you start turn the steering wheel. Second function of the lock valve in a two or more-station system, - steering wheels not in use do not turn.

NOTICE	If helm pump order with **Porting Block** instead of lock valve, then the rudder will not stay in position and can move by water current. Some sailing boat use porting block to feel rudder force on the wheel.

8 MAINTENANCE

8.1 PREVENTATIVE MAINTENANCE

Minimal maintenance is necessary. All Kobelt products are designed to provide many years of trouble-free operation Kobelt products are machined and assembled in-house and then put through comprehensive testing and quality assurance procedures before shipping.

- Monthly (12 times/year)
  - Check the oil level in pump. If a header tank (expansion tank) is installed, the oil level should be about ½ full.
  - Test Manual Mode to ensure proper hand-over and operation.
- Quarterly (4 times/year)
  - Inspect connections for leaks, and mounting bolts and nuts are tight for their functions.
- Every two years
  - Sample and analyze the oil in the steering lines.
  - Check for corrosion and excessive wear at all moving parts that could cause problem in normal operation.

8.2 RECOMMENDED SPARE PARTS

As a minimum Kobelt recommends the following spare parts are on-hand:

Table 2: Recommended Spares

RECOMMENDED SPARES		
QTY	**ITEM**	**KOBELT PART #**
1	REPAIR KIT FOR HELM PUMP 7012 • O-RINGS AND SEAL SHAFT	7012-RK

When purchasing spare parts refer to Appendix B: Parts List at the back of this manual for Kobelt component Part Numbers. See instructions at the end of this manual for shaft seal replacement.

NOTICE	It is recommended that any required service work on a Kobelt product be performed by a factory authorized service representative. Please contact the nearest Kobelt authorized distributor for assistance.

9 TROUBLESHOOTING

If you encounter problems with the operation of your product, please refer to the trouble-shooting suggestions before contacting Kobelt for assistance. If the steps below do not resolve your issue, please reach out either Kobelt directly or our Dealers in your area.

Table 3: Common Troubleshooting Problems

Problem (Issue encountered)	Cause (What it means)	Corrective Action (What to do)
Helm pump doesn't turn actuator in correct direction.	The tube connection from helm pump to cylinder is backward.	Switch PORT and STBD connection at helm pump or at the cylinder.
Cylinder movement is not smooth	Air did not bleed properly.	Refer to bleeding procedure in section 6.1.1.

10 WARRANTY

Kobelt Manufacturing Co. Ltd. (“Kobelt”) warrants the Products and Parts manufactured by Kobelt to be free from defects in workmanship or material and that said products are designed mechanically and functionally to perform to specifications.

This warranty is effective providing:

- The equipment is used within the intended operating conditions and in accordance with Kobelt recommendations
- The equipment is installed according to equipment diagrams, specifications and recommendations which Kobelt has provided

This warranty becomes invalid if the factory supplied serial number has been removed or altered on the product. This warranty does not cover cosmetic damage or damage caused by an act of God, accident, misuse, abuse, negligence or modification of any part of the product. This warranty does not cover damage due to improper operation or maintenance, connection to inappropriate equipment or attempted repair by anyone other than an authorized Kobelt representative.

Upon identification of a potential issue or defect with a Kobelt Product or Part, the Warranty Applicant (“Applicant”) must immediately contact Kobelt and describe the issue in writing, by letter, fax, email or other electronic conveyance. Kobelt will then assess the cause of the defect and determine warranty applicability and appropriate remediation.

If any part is found to be defective, Kobelt will replace said part FOB the Kobelt factory provided that any such defective part is returned by the Buyer with freight and applicable forwarding charges prepaid by the Buyer. Kobelt’s sole obligation to the Applicant will be to repair or replace the defective part with same or similar product, to a maximum value of the list price of the product or part. The Kobelt warranty does not cover labour charges, travel or any other associated expenses.

All Products and Parts manufactured by Kobelt, are subject to a warranty against manufacturer’s defects in materials or workmanship for a period of two (2) years from the date of purchase.

Kobelt will be responsible for all Products or Parts sold by Kobelt but manufactured by 3rd party manufacturing companies. However, these products and parts are subject to applicable 3rd party warranties and may not be the same as the Kobelt warranty.

11 APPENDIX A: INSTALLATION DIMENSIONS

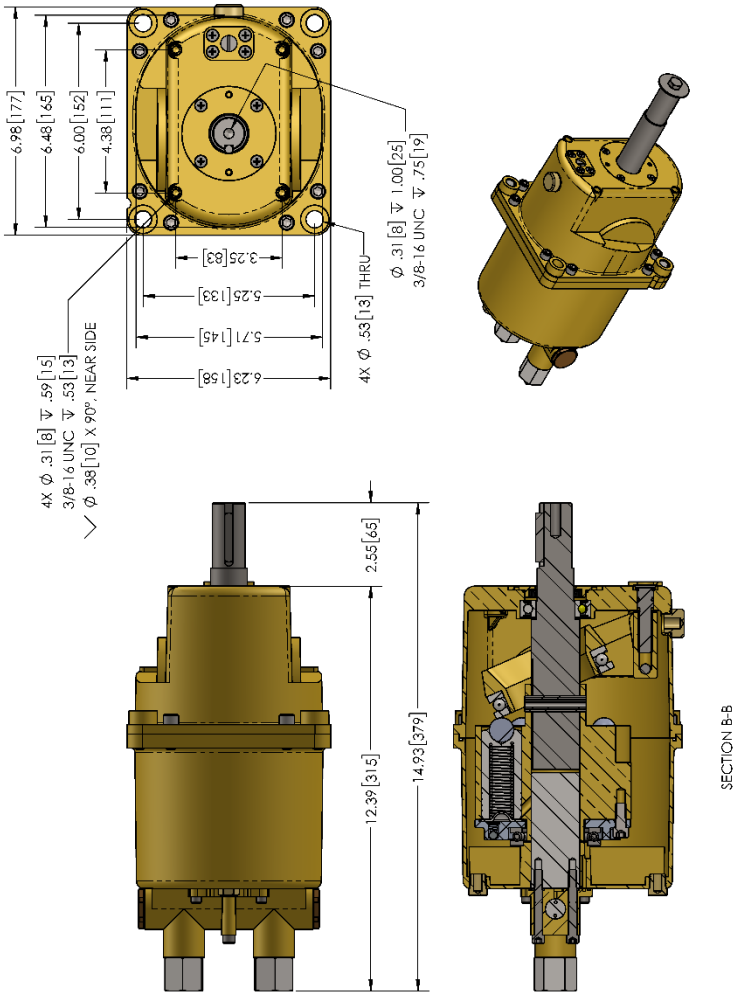


Figure 2: Installation Dimensions (Short Shaft)

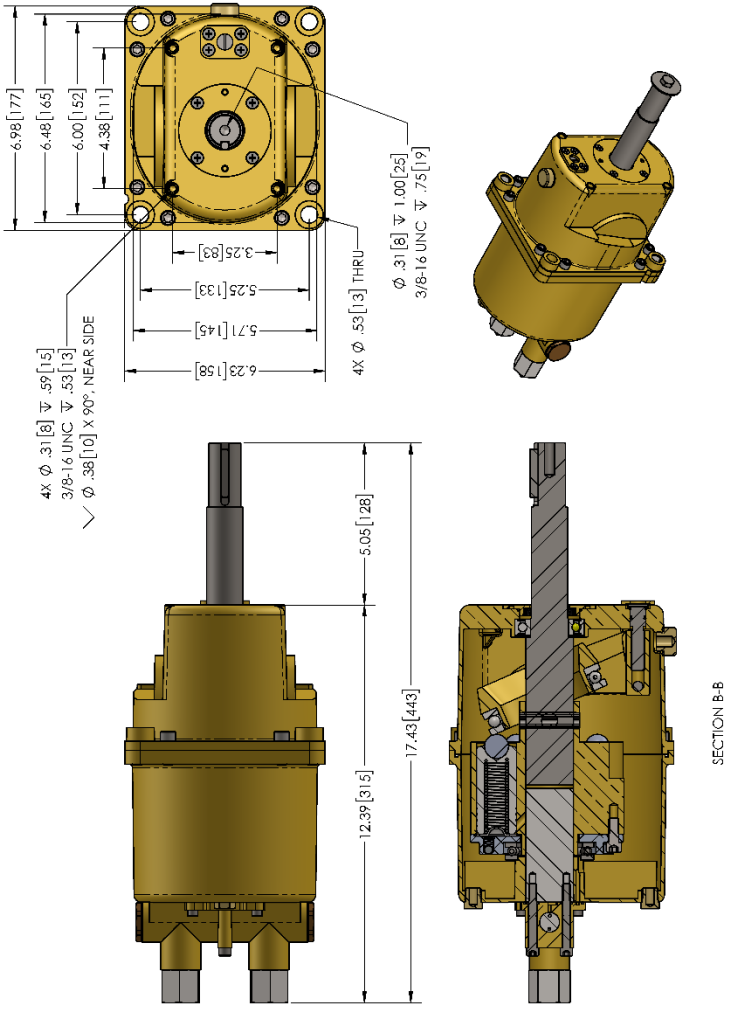


Figure 4: Installation Dimensions (Long Shaft)

12 APPENDIX B: PARTS LIST

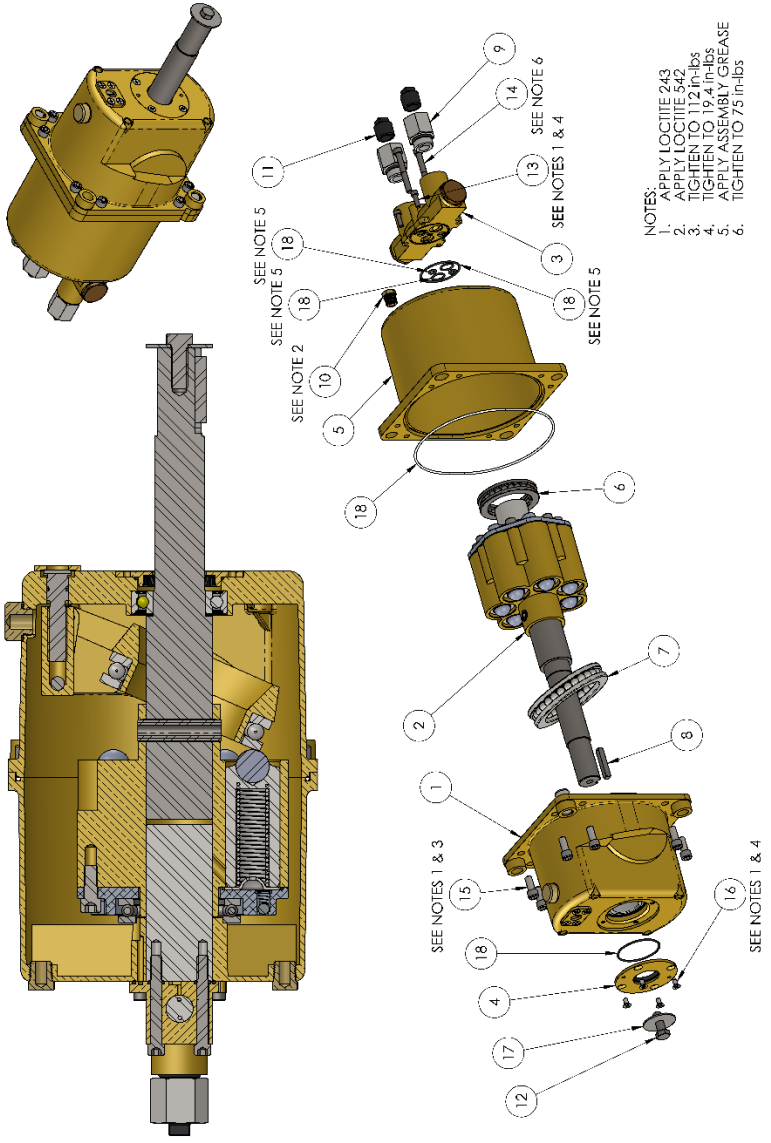
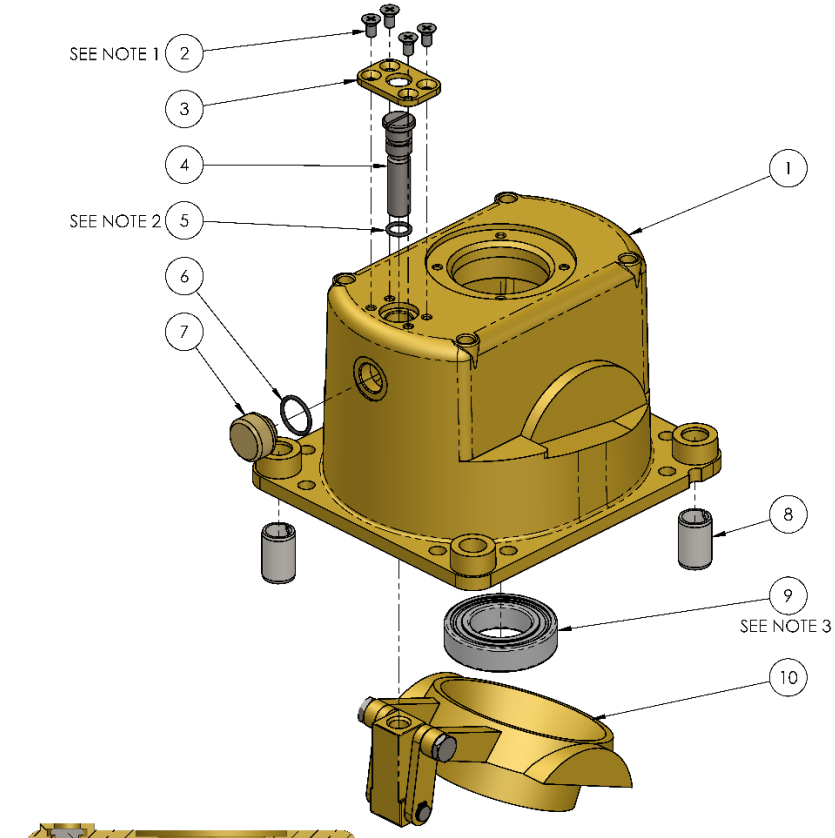
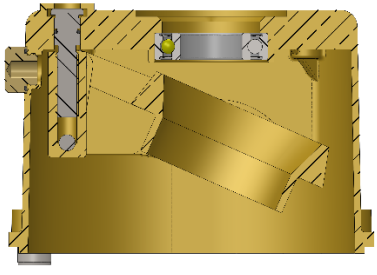


Figure 5: Parts Diagram

Table 4: Parts List

	Model No.:	7012	
	Part No.:	7012-AL	7012-AN
ITEM	DESCRIPTION		
1	FRONT HOUSING SUB- ASSEMBLY	7012-5001	
2	ROTOR SUB-ASSEMBLY	7012-5002-L	7012-5002-S
3	LOCK VALVE SUB-ASSEMBLY	7012-LVC	
4	FRONT SEAL RETAINER SUB-ASSEMBLY	7012-5005	
5	REAR HOUSING	7012-0002	
6	BEARING, THRUST	7012-51110	
7	BEARING, THRUST	7012-51115	
8	SQUARE KEY	7005-0019	
9	FITTING, ADAPTER	7039-0144	
10	FITTING, HEX HEAD PLUG	7039-1342	
11	PLUG	7039-3044	
12	HEX HEAD SCREW	1001-1216	
13	SOCKET HEAD SCREW	1002-0810	
14	SOCKET HEAD SCREW	1002-1032	
15	SOCKET HEAD SCREW	1002-1112	
16	FLAT HEAD SCREW	1009-0805	
17	WASHER	1023-0245	
18	7012 HELM PUMP REPAIR KIT	7012-RK	



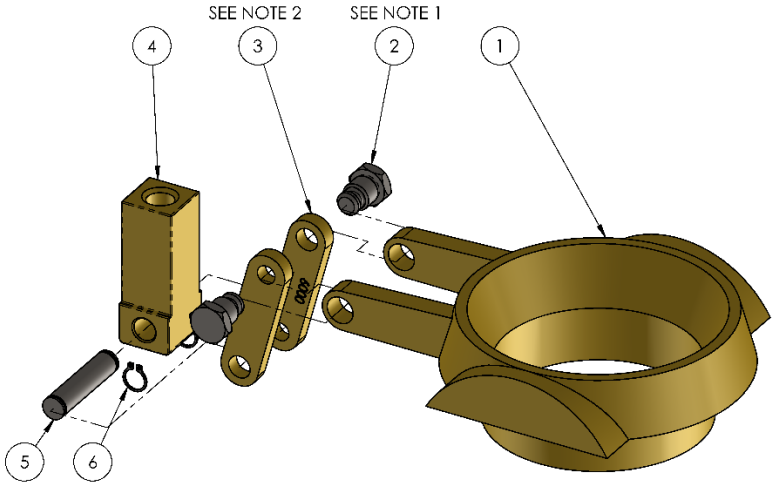


NOTES:
1. APPLY LOCTITE 243
2. LUBRICATE SEALS WITH WHITE ASSEMBLY GREASE
3. APPLY LOCTITE 609

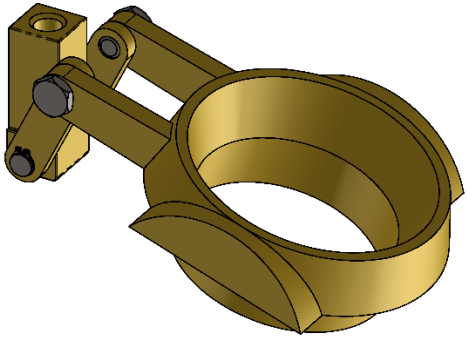
	Part No.:	7012-5001
ITEM	**DESCRIPTION**	
1	FRONT HOUSING	7012-0001
2	FLAT HEAD SCREW	1009-0805
3	ADJUSTMENT SCREW COVER	7012-0008
4	ADJUSTMENT SCREW	7012-0023
5	O-RING	1101-0012
6	O-RING	1101-0017
7	FILLER PLUG	7005-0028
8	DOWEL PIN	7012-0029
9	BALL BEARING	7005-6006
10	ADJUSTMENT BLOCK SUB-ASSEMBLY	7012-0007-SA

⚠CAUTION	Front housing of the pump is spring loaded. Opening and closing of front housing for repair or maintenance need extra caution.

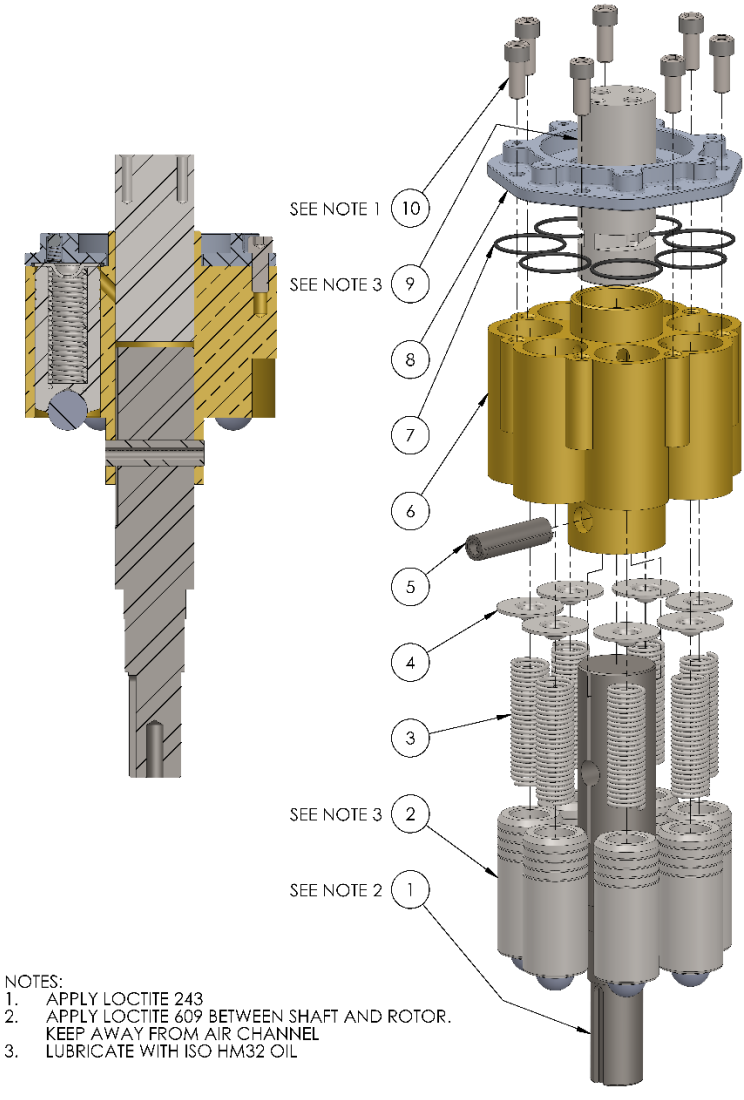
NOTICE	At the time of installation leave the adjustment screw (item 4) all the way out at minimum displacement position.



NOTES:
1. APPLY LOCTITE 243 AND TIGHTEN TO 112 in-lbs
2. EMBOSSED TEXT TO BE FACING INWARDS



	Part No.:	7012-0007
ITEM	**DESCRIPTION**	
1	THRUST BEARING RETAINER	7012-0007
2	SHOULDER BOLT	7012-0022
3	ADJUSTMENT LINK	7012-0009
4	ADJUSTING BLOCK	7012-0010
5	PIN	7012-0021
6	RETAINING RING	1029-1031


SEE NOTE 1
10
SEE NOTE 3
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3
SEE NOTE 3
2
SEE NOTE 2
1
NOTES:
1. APPLY LOCTITE 243
2. APPLY LOCTITE 609 BETWEEN SHAFT AND ROTOR. KEEP AWAY FROM AIR CHANNEL
3. LUBRICATE WITH ISO HM32 OIL

	Model No.:	7012-5002-S	7012-5002-L
ITEM	**DESCRIPTION**		
1	SHAFT	7012-0015	7012-0016
2	PISTON	7012-0012	
3	SPRING	1201-0168	
4	SPRING SEAT	7012-0032	
5	PIN	1024-2030C	
6	ROTOR	7012-0005	
7	O-RING	1101-0026	
8	PISTON CHECK VALVE	7012-5003	
9	PINTLE	7012-0013	
10	SOCKET HEAD CAP SCREW	1002-1112	

13 APPENDIX C: TYPICAL SYSTEM ARRANGEMENT

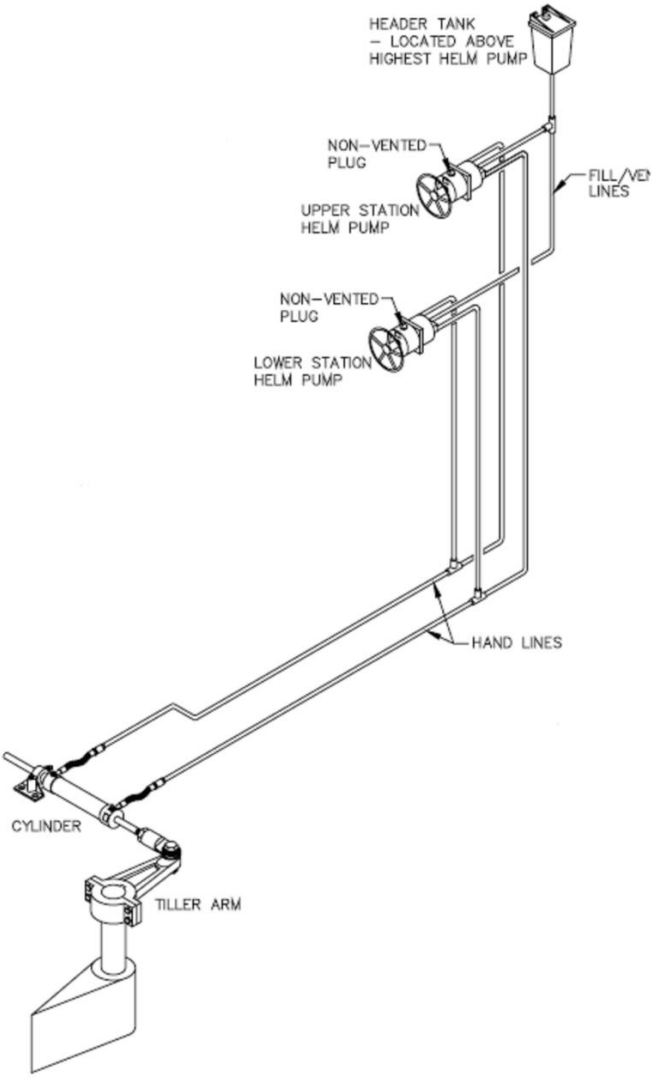
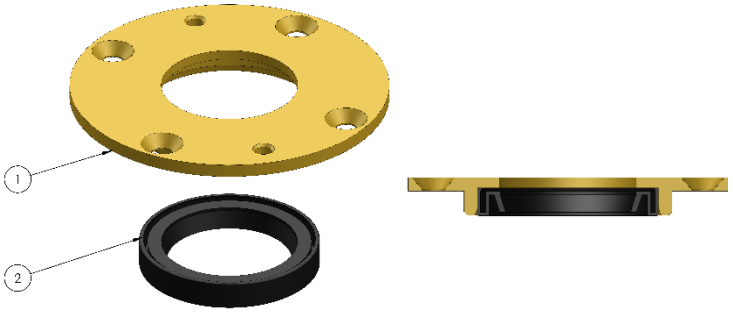


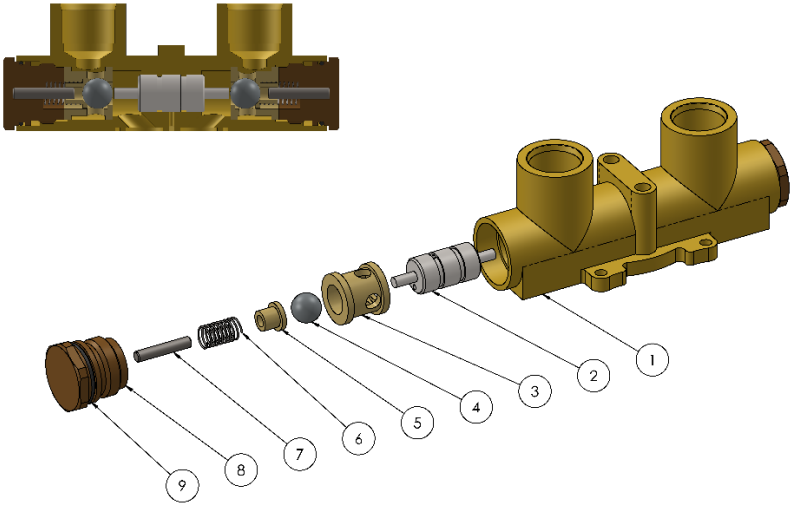
Figure 6: Typical System Arrangement

14 APPENDIX D: SHAFT SEAL REPLACEMENT



	Model No.:	7012-5005
ITEM	**DESCRIPTION**	
1	FRONT SEAL RETAINER	7012-0003
2	SHAFT SEAL	7005-11130

15 APPENDIX E: LOCK VALVE SUB-ASSEMBLY



	Model No.:	7012-LVC
ITEM	**DESCRIPTION**	
1	LOCK VALVE BODY	7012-0006
2	SHUTTLE	7012-0014
3	BALL SEAT	7012-0026
4	BALL	1301-0116
5	SPRING SEAT	7012-0031
6	SPRING	1201-0167
7	PIN	7012-0024
8	PLUG	7012-0025
9	O-RING	1101-0021

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