

KOBELT

KP08 & KP10 Hydraulic Thrusters

Owner's Manual



October 2020

Kobelt Manufacturing Co. Ltd.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

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

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1 INTRODUCTION

1.1 CONTACT

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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 SAFETY

1.2.1 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.

1.2.2 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.

1.2.3 Product Hazards

 WARNING	The rotating components of the thruster can generate forces that can cause pinch or crush injuries. Keep body parts clear of the thruster when it is operating. Lock out any power sources before working on the thruster.
 WARNING	Exercise safety precautions pertaining to hydraulics including: <ul style="list-style-type: none"> • Wearing safety glasses. • Exhausting pressure and locking out the pressure source. • Being qualified to work on hydraulics.
NOTICE	On standard thruster installations, the mounting saddle installation to the tube should be considered permanent once installed and should not be removed. The leg and propeller assemblies can simply be detached from the saddle when service is required. This ensures the saddle stays sealed and correctly aligned eliminating the need for propeller realignment or saddle resealing.
NOTICE	On transom mounted thruster installations, the mounting plate and saddle installation should be considered permanent once installed and should not be removed. The thruster leg assembly and tube can simply be detached from the rest of the installation when service is needed allowing the mounting plate installation to remain sealed.
NOTICE	To help prevent corrosion, it is strongly recommended to connect the thruster to the vessel's existing bonding system. Consult a marine electrical specialist for advice regarding modifying your vessel's bonding system.

2 PRODUCT DESCRIPTION

Tunnel thrusters are meant to assist in docking, station keeping and maneuvering in tight spaces and are typically installed to an athwartships tunnel that goes through the vessel’s hull (standard installation). Kobelt also offers transom mounted thrusters which do not attach to a tunnel but instead mount to the transom of a vessel. Thrusters are powered by a hydraulic motor which is mounted to the thruster saddle. The direction of thrust is determined by the input device drive direction and can be reversed. All thrusters are available in aluminum or bronze versions. Refer to the figure below to familiarize yourself the names of the thruster’s components as they will be referred to in this manual.

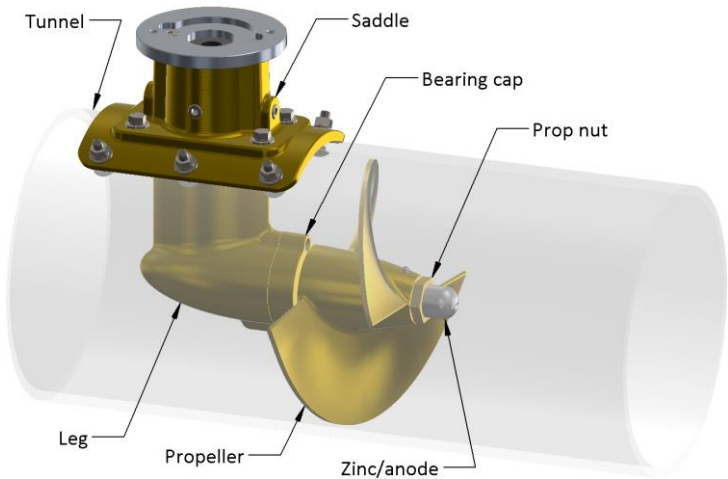


Figure 1 - Names of thruster components

2.1 TECHNICAL DATA

Typical flow and pressure requirements of the standard motors that are supplied with the KP08 and KP10 are shown in Table 1 below. Your actual operating parameters may also vary due to the effects of hull and tunnel geometry on thruster performance. Additionally, Kobelt can supply a different motor that it is better suited to your vessel’s existing hydraulic system and would operate at different flow and pressure.

Table 1 - Hydraulic motor operating specifications

Model	Flow	Pressure	Power	Input RPM
KP 08	7.5 gpm	2,000 psi	8.0 hp	3,000
	28 lpm	138 bar	6.0 kW	
KP 10	10 gpm	2,700 psi	15 hp	3,000
	38 lpm	186 bar	11 kW	

2.2 PARTS

Detailed parts lists can be found in section 5 of this manual. You should find the following items when you receive your Keypower thruster:

- Thruster drive unit
- Hydraulic motor
- Propeller
- Anode (see zinc identification drawing on page 36 for replacement anode part numbers)
- Installation bolt kit
- Prop puller tool
- Header tank and its mounting hardware
- Template for thruster tube cut (standard installations)
- Fibreglass tube (transom-mounted thrusters)
- Mounting plates (transom-mounted thrusters)
- This manual

Kobelt can supply fibreglass, steel and aluminum tubes for your thruster if desired. If you wish to supply your own tube, be aware that the wall thickness must be correct for proper alignment of the thruster; you may be required to build up to the thruster saddle for thinner tubes. Refer to the table below for the required tube dimensions of each thruster size.

Table 2 - Thruster tube dimensions

Model	Tube ID [inches]	Wall Thickness [inches]
KP 08	8	3/8
KP 10	10	3/8

3 INSTALLATION AND LOCATION SELECTION

This section has been prepared to assist the owner and the installer in understanding the installation of the thruster to the vessel. All work should be performed by a professional who is competent in marine mechanical installations.

NOTICE

Installation of the thruster involves cutting into the hull of the vessel and improper material use or workmanship can result in property damage, and/or a degradation in performance.

Care should be taken when selecting a location for the thruster installation as it can greatly affect the performance of the thruster. A thruster is a low-pressure axial pump whose performance is sensitive to the interference of the influx of water to the propeller and the pressure distribution outside of the vessel's hull. Additionally, the thruster installation can increase the drag of the vessel if due care is not taken in selecting its location. For the reasons mentioned above, special consideration must be given so that a hydrodynamically favourable and economically sensible installation is achieved. If the guidelines in this manual are not taken into consideration, then a loss of thrust should be expected. Best results can be achieved by consulting with a naval architect familiar with the vessel.

3.1 STANDARD THRUSTER LOCATION SELECTION AND INSTALLATION

This section describes the installation of the tunnel and thruster to your vessel. You can either:

- Install the tube to the hull first, and then install the thruster to the tube.
- Make the leg cut out and mounting holes first (steps 1 to 6 in section 3.1.4 on page 12), install the tube to the vessel, then complete the installation by sealing the thruster to the tube (remaining steps in section 3.1.4).

Note that the following instructions are for standard thrusters only (installing to an athwartships tunnel through the vessel's hull), see section 3.2 on page 14 for transom mounted thruster installation instructions.

3.1.1 Locating the Thruster on Your Vessel

Consider the following when selecting a location to install the thruster:

- Locating the thruster as far forward in the vessel will maximize its effectiveness.
- The propeller's midline should be located as close to the centreline of the vessel as possible. The provided cutting template has the propeller midline location marked on it which will allow you to accurately locate the propeller midline.
- Account for the space the saddle, motor, and any hydraulic fittings and hoses will take up within the vessel. See Figure 22 on page 37 for the thruster's dimensions.
- The thruster can be installed so that the drive components are above the tube, horizontal to the tube or at any angle in between.
- No parts of the thruster are to extend outside of the hull.
- The tunnel's length, vertical positioning, and opening shape all greatly affect thruster performance. Refer to Figure 2 on page 8 and accompanying Table 3 for definitions of these parameters and their recommended values.

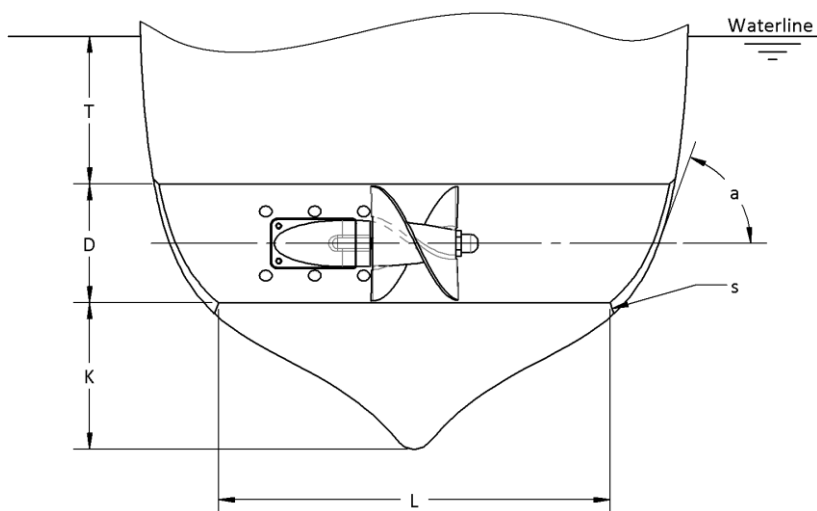


Figure 2 - Thruster tunnel location parameters that affect performance

Table 3 - Recommendations for thruster tunnel location.

Dimension	Recommendation	Consequence if recommendation not met
T	<ul style="list-style-type: none"> $T \geq D^*$ $T = 1.5D$ is best 	<ul style="list-style-type: none"> Insufficient length can cause air suction which reduces thrust, increases noise and vibration, and can damage the thruster. Note that excessive depth can be inefficient and cause excessive roll of the vessel during thruster operation.
L	<ul style="list-style-type: none"> $L \geq 2D$ $L \leq 6D$ 	<ul style="list-style-type: none"> Insufficient length does not allow the flow to calm down thus decreasing thrust. Excessive length increases flow resistance thus decreasing thrust.
K	<ul style="list-style-type: none"> If $L < 3D$, then $K \geq D/2$ If $L \geq 3D$, then $K \geq D/4$ 	<ul style="list-style-type: none"> Circular currents can develop below the hull of the ship which decrease thrust.
a	<ul style="list-style-type: none"> Close to 90° as possible 	<ul style="list-style-type: none"> Greater hull inclination results in decreased thrust (for this reason a bulbous bow makes an excellent location for a thruster).
S	<ul style="list-style-type: none"> $S \geq 0.10D$ $S \leq 0.15D$ Cone (good) or radius (better) 	<ul style="list-style-type: none"> Insufficient tunnel fairing causes incoming water to be excessively turbulent decreasing thrust. Excessive fairing will increase the hull drag during normal ahead travel.

*Note this dimension applies to the *lightest* waterline. Additionally, vessels used in open seas must also consider the effects of pitch, roll and wave action on the submersion of the thruster.

3.1.2 Protective Grid

Grids are often fitted to thruster installations with the intent of reducing the drag created by the tunnel opening and to prevent the ingress of objects that could potentially damage the thruster. Kobelt recommends consulting with a naval architect to design the protective grid as the optimum design will depend greatly on the shape and operating conditions of your vessel.

NOTICE

It is recommended to consult with a naval architect/shipyard to design a protective grid. The optimum grid design depends highly on the specifics of your vessel. A poorly designed grid can cause a large decrease in thruster performance.

If it is not possible to consult with a professional regarding the design of a protective grid but it is still desired to have one, follow the instructions below for a general installation that will achieve satisfactory performance at best.

- The grid should be made up of two to four equally spaced parallel bars which are interconnected by one perpendicular bar across the centre of the parallel bars (see Figure 4 below).
- Elliptical bars will result in the best performance. Rectangular bars should also result in acceptable performance if cost is a concern. Round and square bars are not recommended under any circumstances as they generally perform poorly.
- The bars should not cover more than 10% of the tunnel area.
- Mount the grid behind the induction cone/radius (see Figure 3 below).

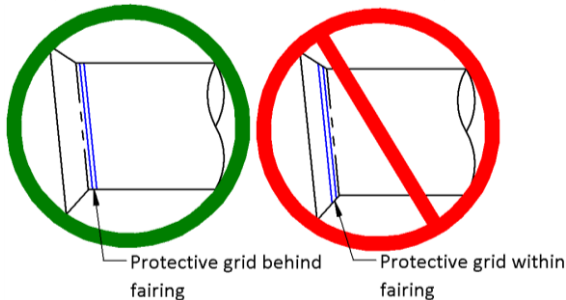


Figure 3 - Recommend location of protective grid

- Angle the parallel bars so they are aligned perpendicular to the flow of water over the hull of the bow in the location of the tunnel (left image in Figure 4). The flow of the water of the hull is typically determined from model tests. If the direction of the flow is not known, mounting the bars 15° relative to the waterline *could* result in *satisfactory* performance (right image in Figure 4).



Figure 4 - Orientation of protective grid relative to vessel

3.1.3 Installation of Fibreglass Thruster Tubes

This section has been prepared to assist the owner and installer in understanding the installation of fibreglass thruster tubes. All work should be done by a professional who is competent in marine mechanical installations. The tube can be installed after or before the leg cut-outs and mounting holes have been made (steps 1 to 6 in section 3.1.4 on page 12 instruct how to make the cut out and mounting holes).

1. Determine a suitable location for the thruster using the guidelines described in *3.1.1 Locating the Thruster on Your Vessel*.
2. Cut a hole in the hull large enough in diameter to allow for a fairing with a minimum radius as specified in Table 3 on page 8.
3. Cut the tube to length so that it fits in between the holes cut in the hull. Allow for a gap between the tube and hull for the radius. If the mounting holes and cut-out have already been made, then you must also ensure that the tube length is cut so that the propeller midline is centred as much as possible athwartships.
4. Move the tube to the desired position in the vessel and fix it in place.
5. Fibreglass the tube in place. Fibreglass must cover the entirety of the tube exterior except in the area the saddle will mount to. Fibreglass thickness should be in accordance to the applicable marine standards for the vessel. Refer to Figure 5 on page 11 for an example of a fibreglass tunnel installation.

NOTICE

Under no circumstances should fibreglass be applied to the area of the tube which contacts the underside of the saddle. Any additional thickness in the area of the flange will adversely affect the fit of the thruster assembly.

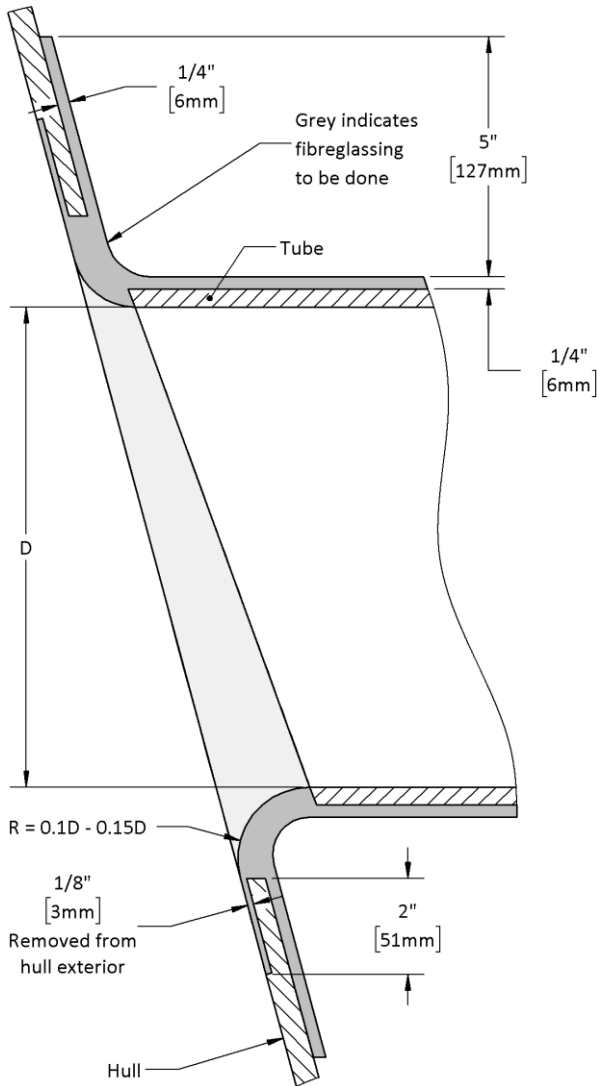
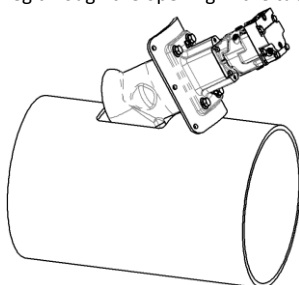


Figure 5 - Thruster tube fibreglassing example

3.1.4 Installing the Thruster to the Tube

This section has been prepared to assist the owner and installer in understanding the installation of the thruster to the tube. All work should be performed by a professional who is competent in marine mechanical installations. The thruster can be installed to the tube before or after the tube has been installed to the hull.

1. Use the provided cutting template to cut the required opening in the tube. Note that the bolt holes are not shown are the cutting template. These are added later.
2. Remove the propeller as directed by the instructions in section 4.3 *Propeller Installation and Removal* on page 20 of this manual. Also, refer to that section whenever these steps instruct you to reinstall the propeller.
3. Insert the thruster leg through the opening in the tube as shown below.

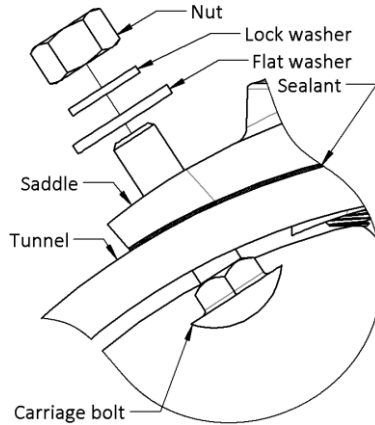


4. Reinstall the propeller and trial-fit the thruster. Check for tip clearance by using wooden shims between the propeller blades and inner surface of the tube to centre and position the thruster.
 - Variations in tube thickness can cause the propeller to sit too close to one side. It may be necessary to shim or grind the area on the tube where the saddle sits.
5. With the thruster properly aligned, match drill six 3/8" holes through the existing saddle mounting holes and into the tube.
6. Remove the propeller from the thruster assembly and remove the thruster assembly from the tube, then:
 - Metal tubes: File the holes in the tube so that they are squares.
 - Fibreglass tubes: Drill 31/64" holes through the holes made in step 5.
7. At this point it is recommended to apply a marine barrier coat and antifouling paint to the thruster tunnel. The following sub-steps will guide you through that process:
 1. Obtain marine barrier epoxy and antifouling paint that is appropriate for the operating environment of the vessel.
 2. Apply the epoxy barrier coat to the inner diameter of the thruster tube. Refer to the information provided by the epoxy manufacturer for application procedures, recommended thickness, and drying time.
 3. Apply the antifouling paint to the inner diameter of the thruster tube. Refer to the information provided by the paint manufacturer for application procedures, recommended thickness, and drying time.

NOTICE

Paint and coatings can be applied to the thruster as well, however, **nothing should be applied to the zinc anode or the surface on which the anode mounts to.**

8. Apply a generous amount of 3M 5200 marine adhesive sealant (standard or fast cure) on the surfaces where the bottom of the saddle and tube contact each other and the 6x mounting holes. Reinsert the thruster assembly into the tube. Apply a liberal amount of 3M 5200 to the provided mounting bolt kit fasteners and secure the thruster to the tube (hand tight). See image below for fastener orientation.



9. Reinstall the propeller. Check for tip clearance by using wooden shims between the propeller blades and the inner surface of the tube to centre and position the thruster.
10. Tighten the 6x mounting nuts to 5-10 lbf-ft and remove the shims. Allow for 48 hours for the sealant to cure.
11. After the sealant has cured, torque the 6x nuts to 20-25 lbf-ft. The mechanical installation of the thruster to the tube is now complete.

3.2 TRANSOM MOUNTED THRUSTER LOCATION AND INSTALLATION

3.2.1 Locating the Transom Mounted Thruster on your Vessel

Consider the following when selecting a location to install the thruster:

- The propeller's midline should be located as close to the centreline of the vessel as possible.¹
- Account for the space the saddle, motor, and any hydraulic fittings and hoses will take up within the vessel. See Figure 23 on page 38 for the thruster's dimensions.
- Insufficient submersion can cause air to be sucked into the thruster which can result in excessive noise and vibration, decreased thrust, and damage to the thruster. The top of the tube should be at least one tunnel diameter deep from the *lightest* waterline (i.e. T should be greater than D in Figure 6). Additionally, for vessels operating in open seas, an allowance for pitch, roll, and wave action should be added to the minimum submersion recommendation.
- Submerging the thruster too deep to where the tube extends past the bottom edge of the transom is permissible but can cause increased drag during regular ahead travel.
- In cases where the minimum submersion cannot be achieved the tube can be modified as shown in Figure 7 on page 15 to encourage flow from the bottom of the tube rather than the top.
- The transom needs to be flat in the location the thruster mount plate will be fixed to. Curved surfaces may cause the seal between the mount plate and hull to fail causing an ingress of water into the vessel.

If you find it challenging to fit the standard tube offering to your vessel, please contact Kobelt Manufacturing and we will try to come up with a custom solution that will work for you.

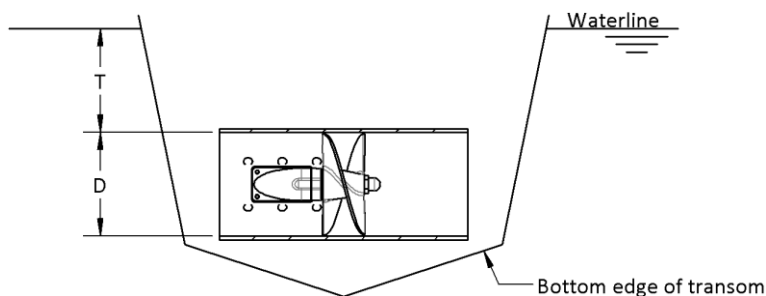


Figure 6 - Transom mounted thruster submersion recommendation

¹ If having to choose between sufficient submersion or centering the propeller athwartships, the installation location that ensures more submersion should be used.

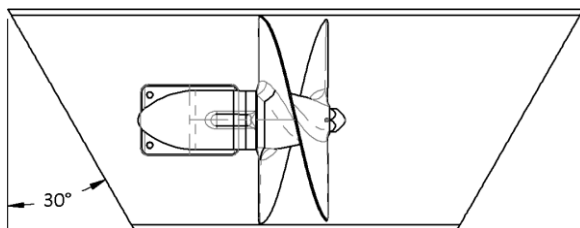


Figure 7 - Tube modification for insufficient submersion applications

3.2.2 Tube Preparation

It is recommended to apply a marine barrier coat and antifouling paint to the thruster tube before installing the thruster unit to the transom. The steps below will guide you through that process.

1. Remove the tube as described in section 4.4 on page 21.
2. Obtain marine barrier epoxy and antifouling paint that is appropriate for the operating environment of the vessel.
3. Apply the epoxy barrier coat to the entirety of the thruster tube. Refer to the information provided by the epoxy manufacturer for application procedures, recommended thickness, and drying time.
4. Apply the antifouling paint to the entirety of the thruster tube. Refer to the information provided by the paint manufacturer for application procedures, recommended thickness, and drying time.

NOTICE

Paint and coatings can be applied to the thruster as well, however, **nothing should be applied to the zinc anode or the surface on which the anode mounts to.**

5. Reinstall the tube as described in section 4.4 on page 21.

3.2.3 Cutting the Transom

This section has been prepared to assist the owner and installer in understanding the installation of transom mounted thrusters. All work should be performed by a professional who is competent in marine mechanical installations. It is recommended to prep the tube as per instructions in the previous section prior to beginning the installation of thruster.

When a suitable location has been selected (see section 3.2.1 on page 14) for the thruster proceed with the next steps to cut the opening in the transom.

1. Place the stern thruster backing plate to the desired position and trace the central opening (see Figure 8).
2. Remove the plate from the transom and cut the transom in the shape of the trace.
3. From outside the vessel, fit the thruster-tube assembly through the newly cut hole and from inside the vessel fit the backing plate over the motor. When the placement is satisfactory, remove the thruster and match drill 13/32" size holes through the 16 mounting holes in the backing plate.

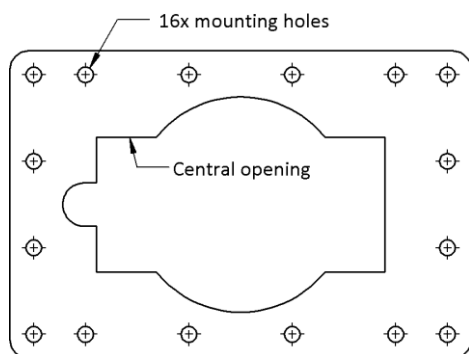


Figure 8 - Backing plate for transom-mount thrusters

3.2.4 Installing the Thruster to the Transom

This section has been prepared to assist the owner and installer in understanding the installation of transom mounted thrusters. All work should be performed by a professional who is competent in marine mechanical installations.

- Figure 9 illustrates this step. Carry out a dry installation to ensure that the mounting plates and thruster assembly properly fit together on the transom. The mounting plate is already bolted and sealed to the thruster assembly. From the outside of the hull, fit the motor end of the thruster through the central opening with the mounting plate placed against the transom. Fit the backing plate over the motor from the inside of the hull, sandwiching the transom between the two plates. Fasten this into place with 3/8" fasteners (316 stainless steel is recommended). Once the dry installation has yielded satisfactory results (plate lies flat on transom and there is no interference with other vessel components) remove the thruster from the transom and continue to next step.

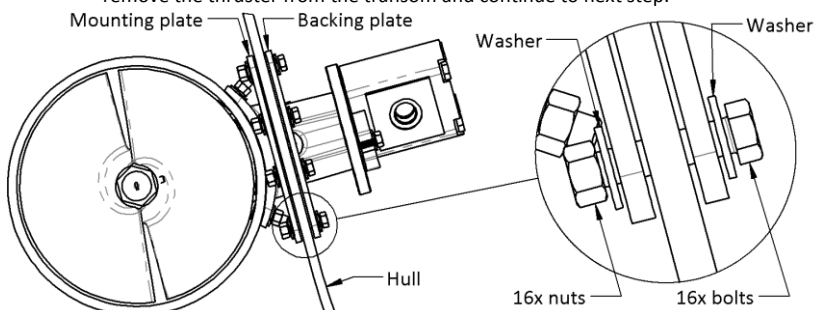


Figure 9 - Thruster fitted onto transom

- Repeat step 1, but this time apply 3M™ 5200 (regular or fast cure) marine adhesive sealant between the mount plate and the vessel's hull, the fasteners used to fasten the thruster to the transom, and the mounting holes. Allow 48 hours for the sealant to cure. At this point the mechanical installation of the thruster to the vessel can be regarded as complete.

3.3 LUBRICATING OIL SYSTEM

The thruster needs to be connected to a reliable source of oil to provide lubrication to the thruster gears, bearings, and seals. This can be achieved by either connecting the thruster to an elevated header tank (subsection 3.3.1) or pumping lubricant through the thruster assembly (subsection 3.3.2) The instructions in this section refer to ports A & B which are defined in the figure below.

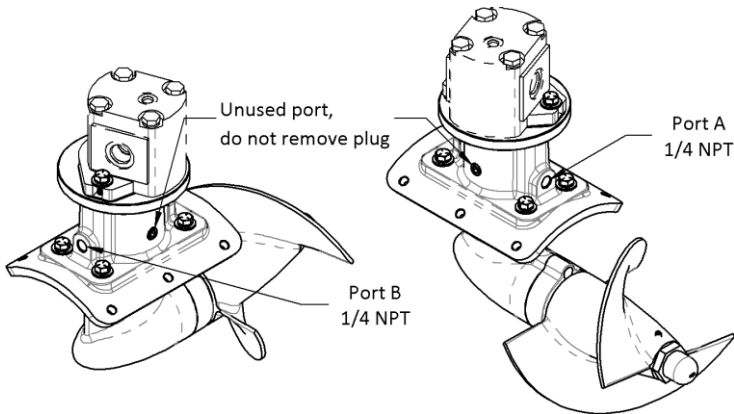


Figure 10 - Lubricant Ports

3.3.1 Header Tank Location and Oil Fill Instructions

The distance between the bottom of the header tank and the centreline of the thruster should be 1.25 times the distance between the *heaviest* water line and the centreline of the thruster (see figure below); this ensures there is positive pressure within the thruster that prevents the ingress of seawater should a seal failure occur. The header tank can be connected to either port A or B. Continue from step 2 in the instructions in section 4.7.1 on page 24 to complete the oil fill for the thruster.

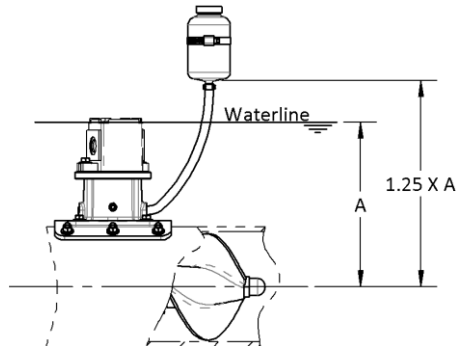


Figure 11 - Required elevation of header tank over the waterline

3.3.2 Circulating Oil Method

Instead of connecting the thruster to a header tank it can be connected to a pump that circulates oil through the thruster. This lubrication method is recommended for station-keeping and other severe commercial applications. In this case port A must be the inlet port (connected to the pump) and port B must be the outlet port (connected to the tank). Kobelt manufactures a pump (part number: KP426-B) specifically designed for this application that is available for purchase.

4 MAINTENANCE AND SERVICE

4.1 PREVENTATIVE MAINTENANCE

- Header tank level should be checked daily.
- Check amount of material remaining on zinc anode. Anodes with less than 50% of the original material remaining should be replaced. The interval can vary greatly depending on the operating conditions of the vessel. A vessel in warm water that docks in busy marinas can go through an anode in a week while a vessel in cold unoccupied waters might take a couple months before replacement is required.
- Replace shaft seal as described in section 4.8 on page 24.
 - 5 years for pleasure boats.
 - 2 years for commercial vessels, parking application.
 - 1000 thruster hours for commercial vessels, station-keeping.
- Replace the oil in the vessel as described in section 4.7 on page 24.
 - The lower of 5 years or 2,000 boat hours, pleasure craft.
 - The lower of 2 years or 1,500 boat hours, commercial boats using the thruster for parking only.
 - 500 thruster hours, commercial boats using the thruster for station keeping.

NOTICE

It is recommended that any required service work on a Keypower thruster be performed by a qualified individual. Please contact the nearest Kobelt authorized distributor for assistance.

4.2 RECOMMENDED SPARE PARTS

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

Table 4: Recommended Spares

Quantity	Part Number	Description
1	KP08X-RK	Repair kit
3	KP12-A-005	Zinc anode

For detailed parts lists see section 5 *Parts Lists* of this manual.

4.3 PROPELLER INSTALLATION AND REMOVAL

Remove the propeller by following the instructions in Figure 12 below. You will need a 1-1/2" wrench to remove the prop nut and a 1/8" hex key to loosen the set screw.

NOTICE

Do not use undue force or blows to the propeller to remove it.

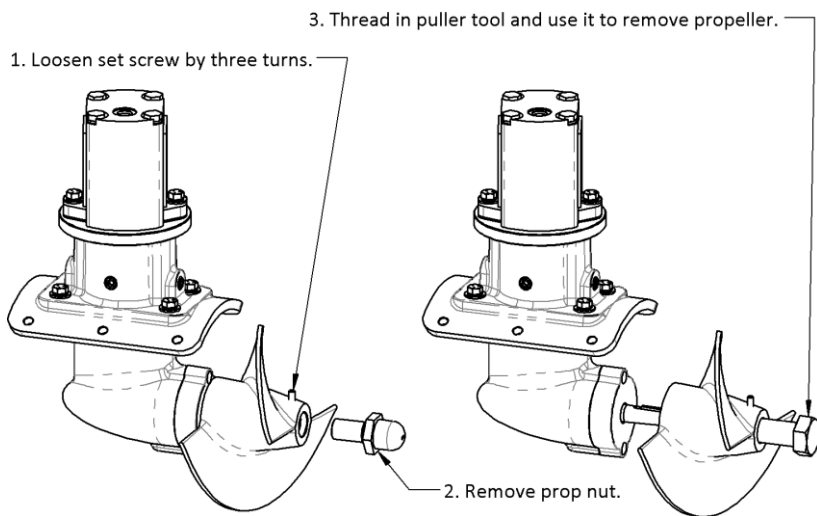


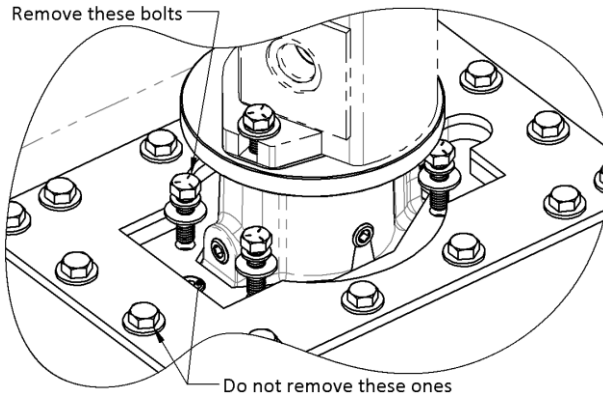
Figure 12 - Propeller removal instructions

To reinstall the propeller replace it on the thruster. Check for tip clearance by rotating the propeller once and ensuring it does not bind anywhere. Next replace the prop nut and torque it to 20 lbf-ft. Lastly, torque the set screw to 65 lbf-in. Rotate the propeller once more to again ensure clearance between the propeller blades and the tunnel.

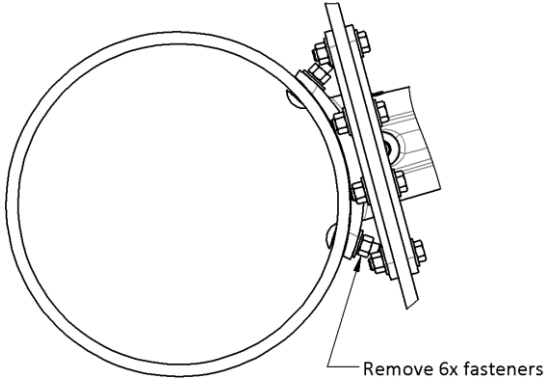
4.4 TRANSOM MOUNT THRUSTER TUBE REMOVAL AND INSTALLATION

The following steps describe how to remove the tube from the thruster assembly:

1. Remove the propeller as described in section 4.3 on page 20.
2. *This step is applicable only if the thruster is already installed to the vessel.* Remove the leg by removing the four hex bolts holding it to the saddle. Do not loose the three O-rings that seal between the saddle and leg.



3. Loosen and remove the six nuts that fix the tube to the thruster assembly.



4. The tube can now be slipped off.

To reinstall the tube:

1. Replace the tube onto the thruster and loosely refasten in six places. The heads of the carriage should be on the inside of the tunnel (see Figure 13 below).
2. *Step does not apply if leg is already installed to the saddle.* Reinstall the leg to the saddle. Do not forget the 3 O-rings that seal the saddle-leg contact surfaces. Apply silicone sealant to the four fasteners and torque them to 17 lbf-ft.
3. Reinstall the propeller as described in section 4.3 on page 20.
4. With the tube aligned in a position that ensures proper tip clearance, tighten the six fasteners holding the tube to the saddle.
5. Rotate the propeller once again to ensure propeller clearance.

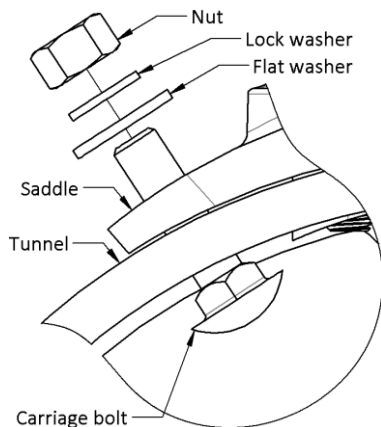


Figure 13 - Tube mounting hardware orientation.

If you are **installing a new tube**, you will have to make a cut out for the thruster leg and drill new holes for the mounting hardware. Follow the instructions in section 3.1.4 *Installing the Thruster to the Tube* starting on page 12 up to and including step 6. Complete the installation by continuing from section 3.2.2. You also will likely have to remove the saddle (see Figure 14 for applicable fasteners) from the mount plate to re-drill the mounting holes; doing so will break the seal between the saddle and the mount plate. Remember to clean and reapply 3M 5200 marine adhesive sealant (regular or fast cure) to the surface between the mount plate and saddle, and to the fasteners which hold the mount plate to the saddle. There is no need to remove the mount plate from the vessel's hull at any point.

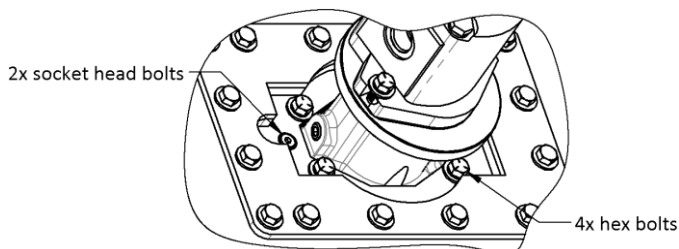


Figure 14 - Fasteners for mounting saddle to mounting plate

4.5 SETTING COUPLING DISTANCE

The coupling connecting the motor output shaft and thruster input shaft are already set to the correct positions when you receive your thruster, however, if ever during the life of your thruster you must remove the coupling from either of the shafts you must reinstall the coupling correctly. Complete the following steps:

1. Make sure that there is a $\frac{1}{16}$ " clearance between the spider pins and the coupling jaws (shown in Figure 15 below).
2. Torque the set screws to 78-87 lbf-in.

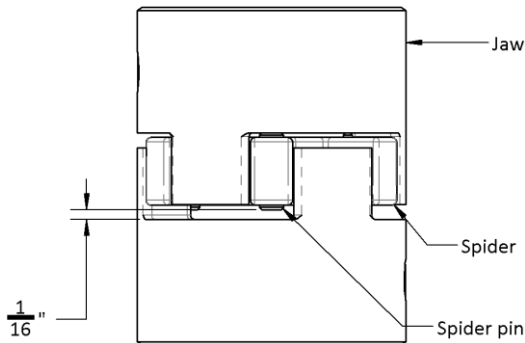


Figure 15 - Jaw coupling installation.

4.6 BEARING CAP REMOVAL & OIL DRAIN

The instructions below describe how the bearing cap is removed. Note doing this requires you to replenish the oil that is lost during the procedure.

1. If connected to an oil circulation system, make sure the lube pump is off before commencing any work.
2. Remove the propeller (see section 4.3 *Propeller Installation and Removal* on page 20).
3. Remove the two socket head screws from the bearing cap.
4. Slowly pull the bearing cap and shaft assembly out. Oil will flow out. Also retain any shims that come out.
5. It's a good idea to use this as an opportunity to inspect the gears, bearings, and seals.
6. Complete any tasks you intended on doing (e.g. replacing the shaft seals).
7. Reinstall in this order:
 - a. Any shims that came out.
 - b. The shaft sub assembly.
 - c. The bearing cap and its screws (torque to 130 lbf-in).
 - d. Propeller (see section 4.3 on page 20 for instructions).
8. *This step is applicable to thrusters that are lubricated via header tank (not via circulating oil).* Continue from step 2 in the instructions in section 4.7.1 on page 24 to refill the oil in the thruster.

4.7 OIL CHANGES

4.7.1 Header Tank Fill Method

1. *Note that this step should be skipped for first-time thruster installation.* Remove the bearing cap from the thruster (instructions are in section 4.6 on page 23) and allow the oil to drain. Reinstall the bearing cap.
2. Remove the 1/4" NPT plug in the port opposite of the one which the header tank is connected to (it will be either port A or B in Figure 10 on page 17).
3. Fill the header tank with SAE75W-90 synthetic gear oil. Fill until oil starts coming out of the hole found in step 2 then reinstall the plug.
4. Continue filling the header tank until it is two thirds full, then replace its cap.

4.7.2 Pump Out Method

This method allows for replacing the lubricating oil without removing the bearing cap and without taking the boat out of the water. This method can be used when it is not necessary to replace the shaft seal.

1. Disconnect the header tank from the thruster and connect it to a manual pump
2. In the saddle opposite to the port the pump is connected to (either port A or B in Figure 10 on page 17) there is a plug that should be removed. Connect that port to some sort of receptacle that will allow you to collect and examine the oil.
3. Manually pump SAE75W-90 oil into the thruster until clean oil starts coming out of the non-pump port then reinstall the plug.
4. Reconnect the header tank and fill it until it's two thirds full and replace its cap.

4.8 SHAFT SEAL REPLACEMENT

Removing the shaft seal requires removing the bearing cap for which instructions can be found in section 4.6 on page 23. When replacing the shaft seals of the thruster you must orient them face-to-face and you must replace the spring on the outer shaft seal with a -018 O-ring. All the required components are included in the KP08X-RK repair kit. See Figure 16 below for an illustration.

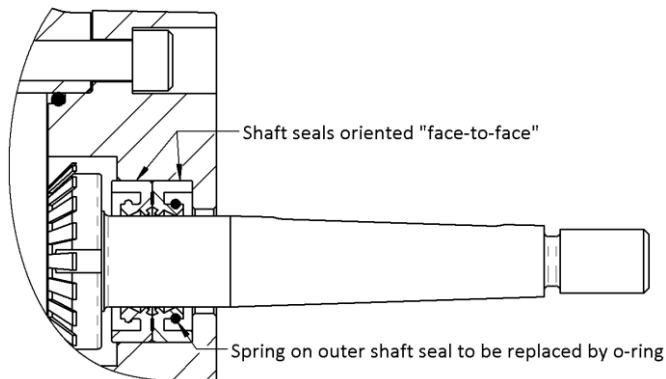


Figure 16 - Shaft seal replacement details

5 PARTS LISTS

5.1 STANDARD THRUSTER TOP-LEVEL ASSEMBLY

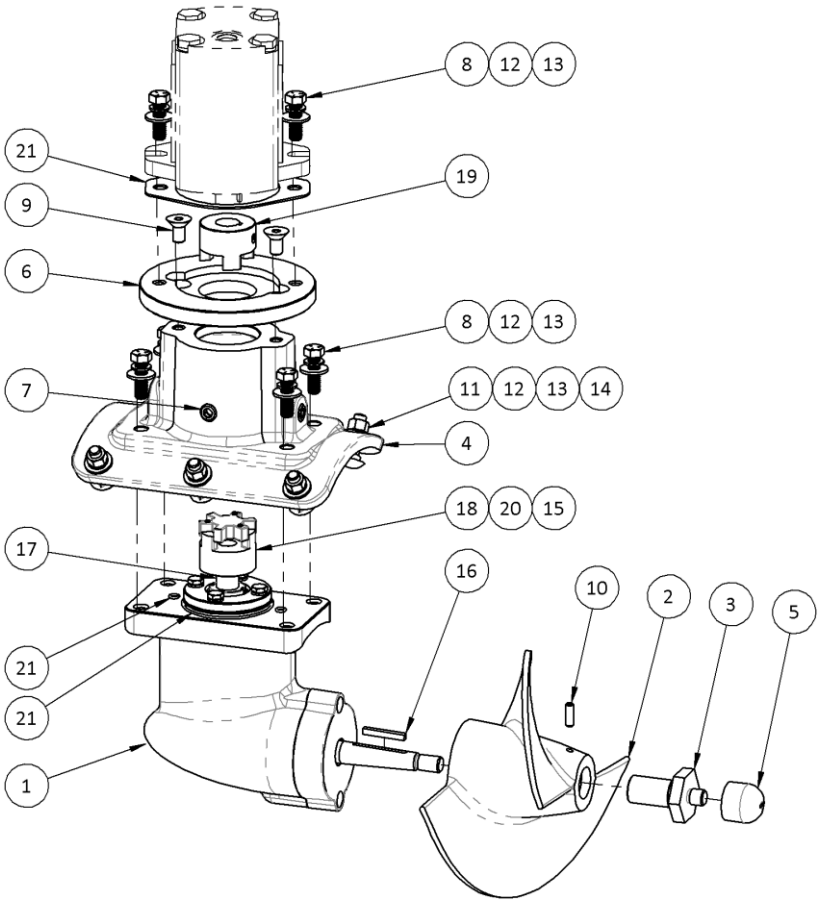


Figure 17 – Standard KP08/KP10 Hydraulic Thruster Parts List Diagram

Table 5 - KP08 & KP10 Hydraulic Thrusters' Parts List

Item	Quantities				Part Number	Description	Notes (page 35)
	KP10A-H-TH	KP10B-H-TH	KP08A-H-TH	KP08B-H-TH			
*	1	1	1	1	-	Motor	1
1	1	-	-	-	KP10A-LEG	Leg assembly	2, 3, 10
1	-	1	-	-	KP10B-LEG	Leg assembly	2, 3, 10
1	-	-	1	-	KP08A-LEG	Leg assembly	2, 3, 10
1	-	-	-	1	KP08B-LEG	Leg assembly	2, 3, 10
2	1	-	-	-	KP10-D-024-AN	Propeller	3
2	-	1	-	-	KP10-D-025	Propeller	3
2	-	-	1	-	KP08A-001-AN	Propeller	3
2	-	-	-	1	KP10-A-002	Propeller	3
3	1	-	-	-	KP11-A-017-AN	Prop nut	3
3	-	1	-	-	KP11-A-018	Prop nut	3
3	-	-	1	-	KP11-A-001-AN	Prop nut	3
3	-	-	-	1	KP11-A-002	Prop nut	3
4	1	-	-	-	KP19-D-027-AN	Saddle	4, 6
4	-	1	-	-	KP19-D-028	Saddle	4, 6
4	-	-	1	-	KP19-A-001-AN	Saddle	4, 6
4	-	-	-	1	KP19-A-002	Saddle	4, 6
5	1	1	1	1	KP12-A-005	Zinc	5
6	1	1	1	1	KP45-A-003	Adaptor	6

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Item	Quantities				Part Number	Description	Notes (page 35)
	KP10A-H-TH	KP10B-H-TH	KP08A-H-TH	KP08B-H-TH			
7	3	3	3	3	KP36-A-002	Fitting	-
8	6	6	6	6	1001-1220	Bolt, hex head	7
9	2	2	2	2	1015-1212	Bolt, flat	8
10	1	1	1	1	1016-1012	Set screw	3
11	6	6	6	6	1022-0112	Nut, hex	9
12	12	12	12	12	1023-0112	Washer	-
13	12	12	12	12	1023-0312	Lock washer	-
14	6	6	6	6	KP30-A-027	Bolt, carriage	9
15	1	1	1	1	1305-5110-BF	Key	10
16	1	1	1	1	1305-5222-BE	Key	3
17	1	1	1	1	1310-1822-5	Coupling spacer	10
18	1	1	1	1	KP44-A-015	Coupling hub	10
19	1	1	1	1	KP44-A-016	Coupling hub	10
20	1	1	1	1	KP44-A-017	Coupling spider	10
21	1	1	1	1	KP08X-RK	Repair kit	-

5.2 TRANSOM MOUNTED THRUSTER TOP-LEVEL ASSEMBLY

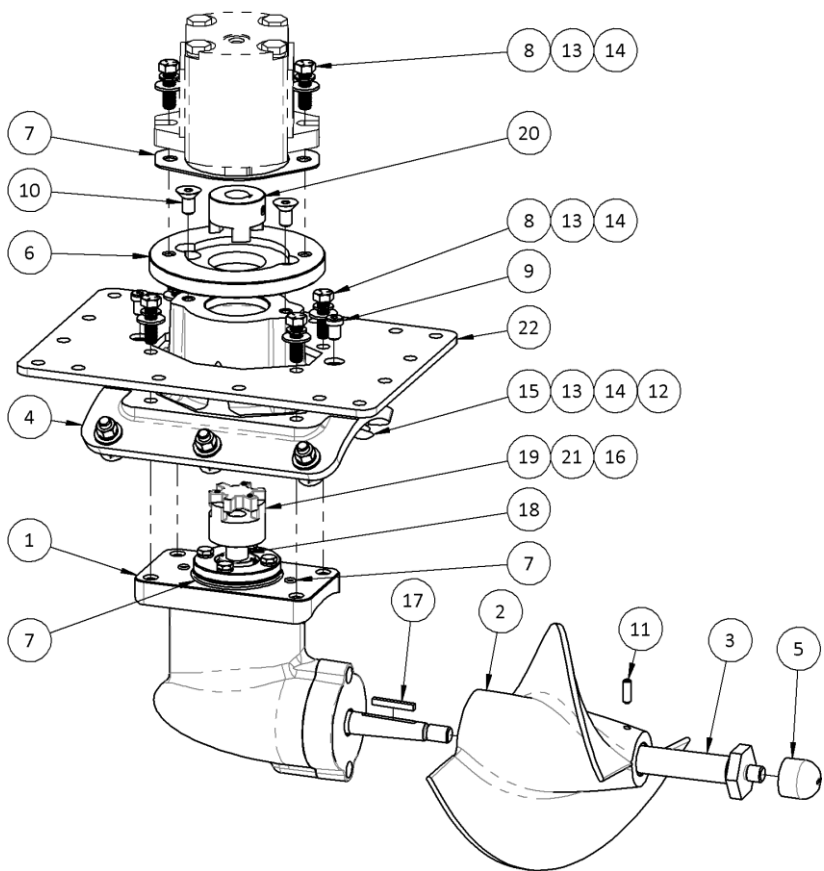


Figure 18 – Transom Mounted KP08/KP10 Hydraulic Thruster Parts List Diagram

Table 6 - KP08 & KP10 Transom Mounted Hydraulic Thrusters' Parts List

Quantities							
Item	KP10A-H-ST	KP10B-H-ST	KP08A-H-ST	KP08B-H-ST	Part Number	Description	Notes (page 35)
*	1	1	1	1	-	Motor	1
1	1	-	-	-	KP10A-LEG	Leg assembly	2, 3, 10
1	-	1	-	-	KP10B-LEG	Leg assembly	2, 3, 10
1	-	-	1	-	KP08A-LEG	Leg assembly	2, 3, 10
1	-	-	-	1	KP08B-LEG	Leg assembly	2, 3, 10
2	1	-	-	-	KP10-D-024-AN	Propeller	3
2	-	1	-	-	KP10-D-025	Propeller	3
2	-	-	1	-	KP08A-001-AN	Propeller	3
2	-	-	-	1	KP10-A-002	Propeller	3
3	1	-	-	-	KP11-A-017-AN	Prop nut	3
3	-	1	-	-	KP11-A-018	Prop nut	3
3	-	-	1	-	KP11-A-001-AN	Prop nut	3
3	-	-	-	1	KP11-A-002	Prop nut	3
4	1	-	-	-	KP19-D-027-S	Saddle	6, 11, 12
4	-	1	-	-	KP19-D-028-S	Saddle	6, 11, 12
4	-	-	1	-	KP19-A-001-S	Saddle	6, 11, 12
4	-	-	-	1	KP19-A-002-S	Saddle	6, 11, 12
5	1	1	1	1	KP12-A-005	Zinc	5
6	1	1	1	1	KP45-A-003	Adaptor	6
7	1	1	1	1	KP08X-RK	Repair kit	-
8	6	6	6	6	1001-1220	Bolt, hex head	7
9	2	2	2	2	1002-1208-L	Bolt, low socket head	13
10	2	2	2	2	1015-1212	Bolt, flat	8
11	1	1	1	1	1016-1012	Set screw	3
12	6	6	6	6	1022-0112	Nut, hex	-
13	12	12	12	12	1023-0112	Washer	-
14	12	12	12	12	1023-0312	Lock washer	-
15	6	6	6	6	KP30-A-027	Bolt, carriage	-
16	1	1	1	1	1305-5110-BF	Key	10
17	1	1	1	1	1305-5222-BE	Key	3
18	1	1	1	1	1310-1822-5	Coupling spacer	10

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Item	Quantities				Part Number	Description	Notes (page 35)
	KP10A-H-ST	KP10B-H-ST	KP08A-H-ST	KP08B-H-ST			
19	1	1	1	1	KP44-A-015	Coupling hub	10
20	1	1	1	1	KP44-A-016	Coupling hub	10
21	1	1	1	1	KP44-A-017	Coupling spider	10
22	1	1	1	1	KP10-STERNPL-MP	Mounting plate	11, 14
23	1	1	-	-	.TUBE-FG-1002	Thruster tube	12
23	-	-	1	1	.TUBE-FG-0802	Thruster tube	12
24	1	1	1	1	KP10-STERNPL-BP	Back plate	15
25	3	3	3	3	KP36-A-002	Fitting	15

5.3 LEG SUBASSEMBLY

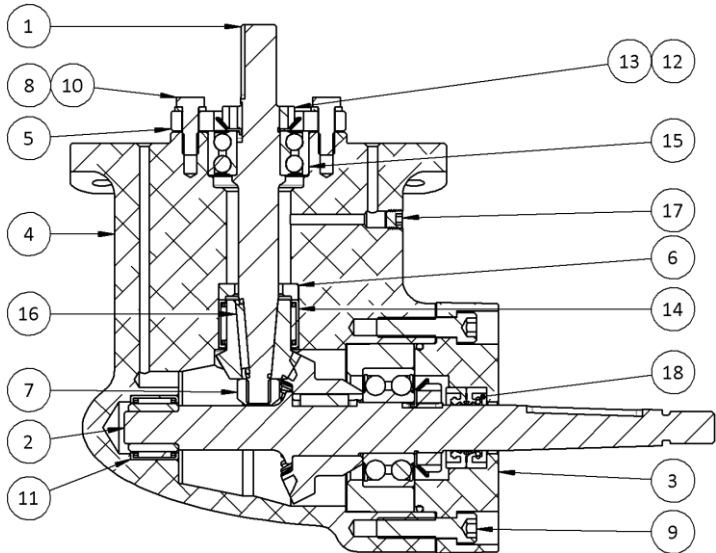


Figure 19 - KP08/KP10 Leg Subassembly Parts List

Table 7 - KP08 & KP10 Leg Subassemblies' Parts Lists

Item	Quantities				Part Number	Description	Notes (page 35)
	KP08B-LEG	KP08A-LEG	KP10B-LEG	KP10A-LEG			
1	1	1	-	-	KP13-A-001	Pinion shaft	17
1	-	-	1	1	KP13-D-022	Pinion shaft	17
2	1	1	1	1	KP13-S8-SUB	Shaft subassembly	18
3	1	-	1	-	KP15-A-002	Bearing cap	-
3	-	1	-	1	KP15-A-001-AN	Bearing cap	-
4	1	-	-	-	KP17-A-002	Leg	17
4	-	1	-	-	KP17-A-001-AN	Leg	17
4	-	-	1	-	KP17-D-028	Leg	17
4	-	-	-	1	KP17-D-023-AN	Leg	17
5	1	1	1	1	KP18-A-001	Retainer ring	-
6	1	1	1	1	KP18-A-008	Backup ring	-
7	1	1	1	1	KP43-A-001	Lock nut	-
8	4	4	4	4	1023-0310	Lock washer	-
9	2	2	2	2	1002-1120	Screw	19
10	4	4	4	4	1001-1012	Screw	20
11	1	1	1	1	KP33-M-003	Bearing	-
12	1	1	1	1	KP33-A-011	Bearing lock washer	21
13	1	1	1	1	KP33-A-010	Bearing lock nut	21
14	1	1	1	1	KP33-A-002	Bearing	-
15	1	1	1	1	KP33-A-001	Bearing	-
16	1	1	1	1	1305-5116-BD	Key	-
17	1	1	1	1	KP36-A-001	Plug	22
18	2	2	2	2	KP08X-RK	Repair kit	23

Also see note 16 on page 35 which is applicable to the entire leg assembly.

5.4 SHAFT SUBASSEMBLY

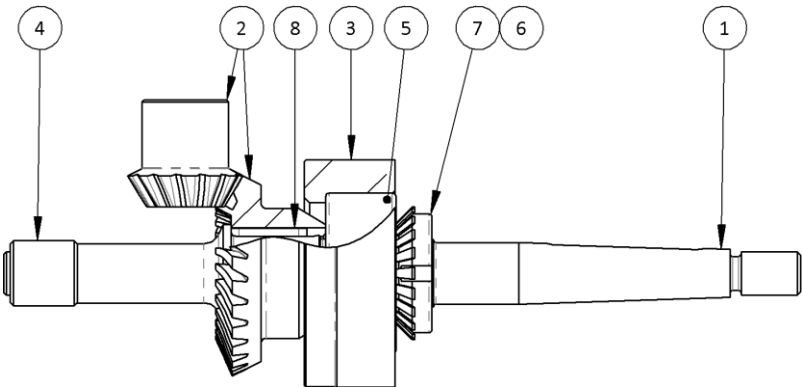


Figure 20 - Shaft subassembly parts list diagram

Table 8 - Shaft subassembly parts list

Item	Qty	Part #	Description	Notes (page 35)
1	1	KP13-A-002	Propeller shaft	-
2	1	KP14-A-002	Gear set	17
3	1	KP18-A-002	Bearing sleeve	17
4	1	KP33-A-004	Bearing race	-
5	1	KP33-A-005	Bearing	-
6	1	KP33-A-021	Bearing lock washer	24
7	1	KP33-A-022	Bearing lock nut	24
8	1	1305-5214-F	Key	-

5.5 ACCESSORIES

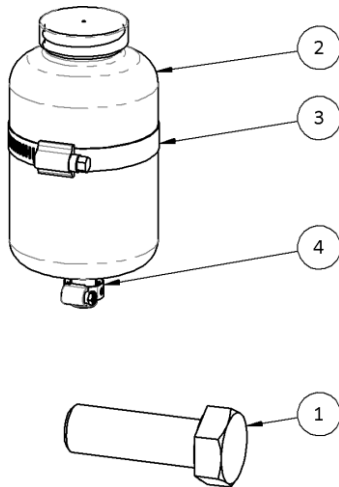


Figure 21 - Other KP thruster components

Table 9 - Accessory parts

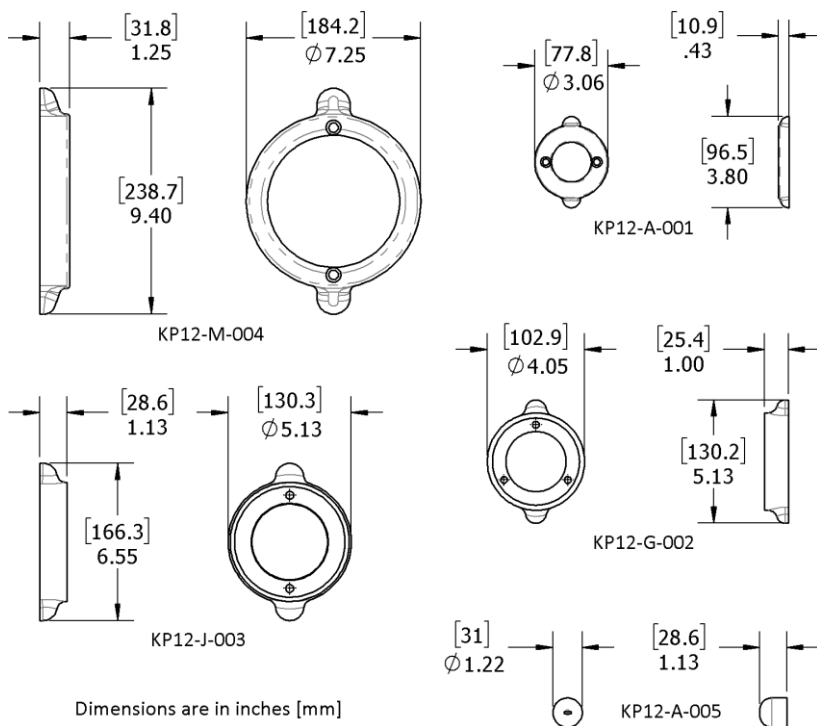
Item	Qty	Part #	Description
1	1	1041-001630	Puller tool*
2	1	KP-30114	Header tank
3	1	KP-30117	Header tank mounting bracket
4	1	KP-30123	Hose clamp

*The puller tool is simply a 1"-8 UNC X 3" long hex bolt.

5.6 PARTS LISTS NOTES

1. Note that the motor is not standard across thruster installations and is typically selected to best fit your existing hydraulic system. Therefore, there is no standard part number for ordering a motor replacement. If a replacement motor is needed, read the manufacturer and part number information on the pump and provide it to your nearest authorized Kobelt distributor for further assistance.
2. Leg assembly parts lists are on page 31.
3. See section 4.3 on page 20 for propeller removal and installation instructions.
4. For standard thrusters, saddle reinstallation requires resealing the saddle to the tube (section 3.1.4 on page 12) and resetting the coupling distance (section 4.5 on page 23). Note that the tunnel mounting holes may need some modifying as well.
5. The zinc for the KP08 and KP10 have gone through several design iterations. If your zinc looks different than the one in the parts list diagram, see section 6 *Zinc Anode Identification* on page 36 for further instructions.
6. Apply silicone sealant to contact surfaces between adaptor and saddle.
7. Fastening instructions:
 - a. Torque fasteners for mounting motor to 19 lbf-ft.
 - b. Apply silicone sealant to fasteners which mount leg assembly and torque them to 17 lbf-ft.
8. Torque to 19 lbf-ft.
9. Apply 3M 5200 marine adhesive sealant (regular or fast cure) to fasteners and torque them to 19 lbf-ft. Allow 48 hours for the sealant to cure.
10. See section 4.5 on page 23 for instructions for setting coupling distance.
11. Clean contact surfaces between saddle and mounting plate and reapply 3M 5200 sealant (regular or fast cure). Allow 48 hours for the sealant to cure. Mounting holes in thruster tube might also need modifying.
12. See section 4.4 on page 21 for instructions of how to remove and install the tube.
13. Apply 3M 5200 marine sealant and torque to 9 lbf-ft.
14. Replacing the mount plate requires resealing the surface between the plate and the hull of the vessel with 3M 5200 marine adhesive sealant.
15. Part not shown in parts list diagram.
16. When taking apart the leg assembly be careful to not lose any shims you may find and do not forget to reinstall them when putting the unit back together. Failure to do so can cause the gears to mesh improperly reducing their life.
17. Replacing this part requires re-shimming of the gear set. Please consult your nearest authorised Kobelt representative for further assistance.
18. If replacing the entire shaft subassembly then note 17 above applies. For individual parts see shaft subassembly's parts list on page 33.
19. Torque to 130 lbf-in.
20. Torque to 63 lbf-in.
21. Lock nut is 1.13"/29mm in diameter and requires hook-type spanner wrench to tighten. Bend lock washer tab into lock nut slot after tightening the lock nut.
22. Apply Loctite 243 to threads.
23. Outer most shaft seal's spring gets replaced by an O-ring (see section 4.8 on page 24 for detailed instructions). All are provided in the repair kit.
24. Lock nut is 1.38"/35mm in diameter and requires hook-type spanner wrench to tighten. Bend lock washer tab into lock nut slot after tightening the lock nut.

6 ZINC ANODE IDENTIFICATION



Model	Anode Part Number
KP08*	KP12-A-001 or KP12-A-005
KP10*	KP12-A-001, KP12-A-005 or KP12-G-002
KP12	KP12-G-002
KP14	KP12-G-002
KP16	KP12-J-003
KP18	KP12-J-003
KP22	KP12-M-004
KP26	KP12-M-004

*The zinc for the KP08 and KP10 can vary depending on when the thruster was purchased. Compare your zinc to the ones in the figure above to ensure that you order the correct one.

7 TECHNICAL DRAWINGS

7.1 STANDARD HYDRAULIC THRUSTERS

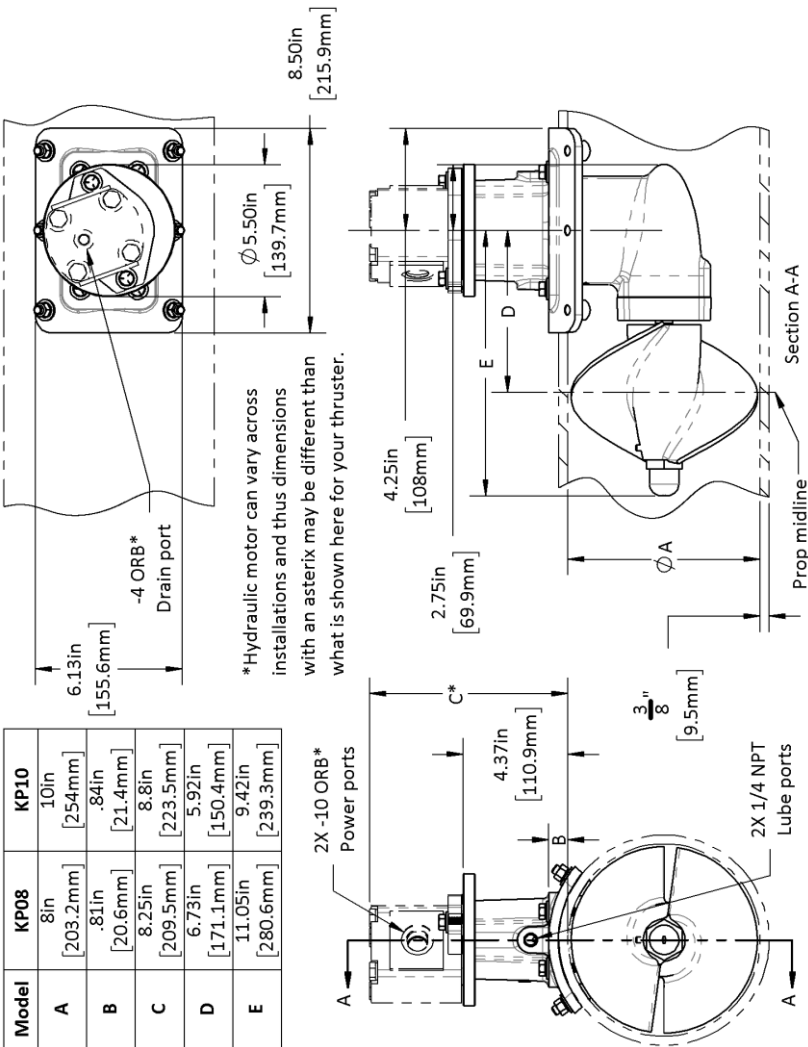


Figure 22 - Standard KP08 & KP10 Hydraulic Thrusters Dimensions

7.2 TRANSOM-MOUNTED HYDRAULIC THRUSTERS

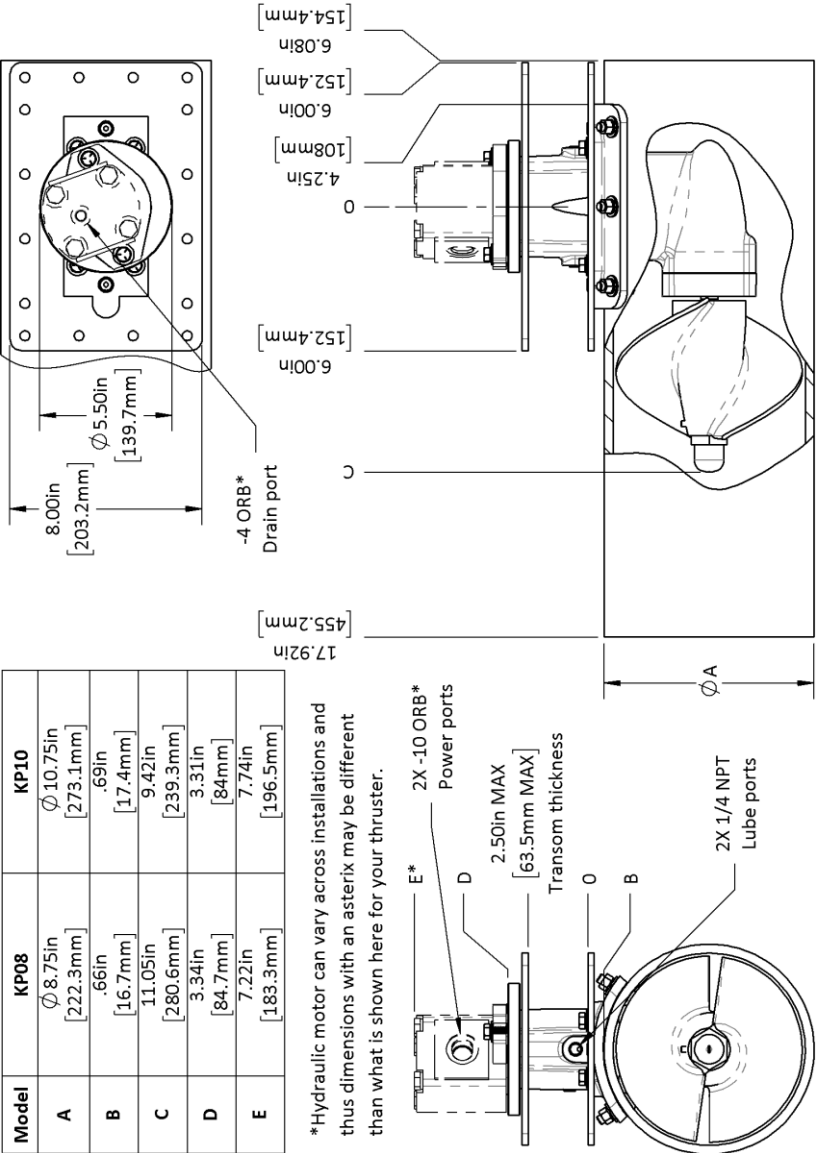


Figure 23 - Transom mounted KP08 & KP10 Hydraulic Thrusters' dimensions*

***Note:** Figure depicts standard tube offering. If it is incompatible with your vessel, please contact Kobelt Manufacturing and we can try to come up with a custom solution for you.

8 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 one (1) 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.

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