

KOBELT

7147-HXXC Power Assist Cylinder

Owner's Manual



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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.

Kobel 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

 DANGER	Equipment Starts Automatically: steering systems frequently are controlled remotely and may activate suddenly causing bodily harm. Ensure all power sources are locked out prior to performing work.
 WARNING	Pinch Points: The moving components of the cylinder can generate forces that can cause pinch or crush injuries. Keep body parts clear of the unit when it is operating. Lock out any power sources before working on the unit.
 WARNING	High Pressure Fluids: 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. • Never look for a leak by running your hand/fingers along a pressurized hydraulic line.
NOTICE	To ensure the product does not get damaged during storage, transportation and installation: <ul style="list-style-type: none"> • Store the unit with the cylinder fully retracted. • Ensure all plugs remain in place until the unit is ready to be connected to hydraulics.

2 PRODUCT DESCRIPTION

The 7065-SBXX cylinders are power-assist cylinders that are controlled via inputs from fluid pressurized by a helm pump but are powered by a machine-driven pump. This configuration enables responsive steering while requiring minimal human effort. In the case of a failure of the machine-driven pump the unit automatically switches to manual mode which allows for steering via helm pump pressure only. 7065-SB cylinders consist of three main subunits which are the main cylinder, the control cylinder, and the valve and are identified in Figure 1 below.

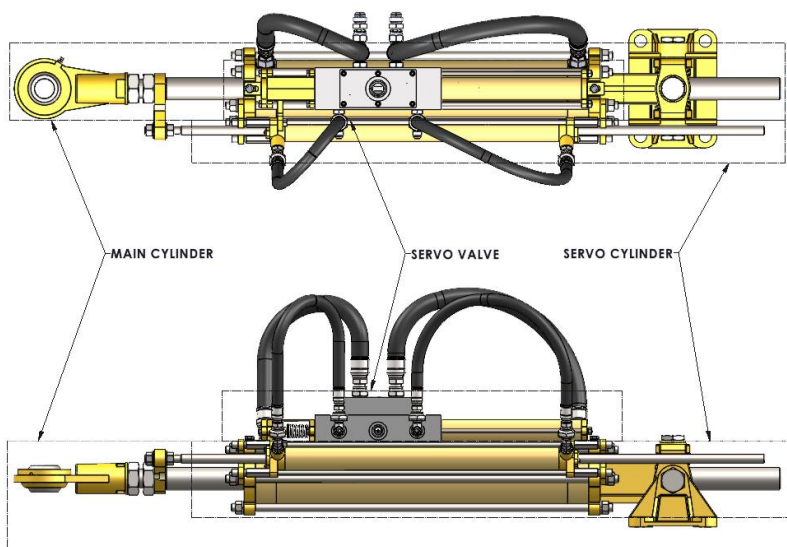


Figure 1 – 7147-HXXC overview diagram

This product comes in cylinder stroke configurations of 7.5, 10, 12, and 16 inches. Technical specifications of the cylinder models can be found in Table 1 on page 6. Expected torque values for 35° and 45° tillers can be found in Table 2.

NOTICE

Before ordering any steering system, it is required that a steering gear torque and rudder calculation be done to ensure the system is appropriately sized and the correct mix of pressure, displacement, stroke, parts, and torque is selected. Contact your local Kobelt partner to review this information.

2.1 TECHNICAL DATA

Table 1 - Cylinder technical specifications

Model #	7147-H7.5C	7147-H10C	7147-H12C
Stroke ± .02" [.05 cm]	7.50" 19.05 cm	10.00" 25.40 cm	12.00" 30.48 cm
Design pressure	1,000 psi 69 bar		
Working pressure	800 psi 55 bar		
Force at working pressure	1,885 lbf 8.4 kN		
Recommended fluid	ISO VG 32, VI 60 hydraulic oil ISO 4406 cleanliness of 20/18/15		
Displacement, main cylinder	17.7 in ³ 290 cc	23.6 in ³ 387 cc	28.3 in ³ 464 cc
Displacement, control cylinder	4.4 in ³ 72 cc	5.9 in ³ 97 cc	7.1 in ³ 116 cc
Ambient temperature	14 to 122 °F -10 to 50 °C		

NOTICE

Operating outside of ambient temperature range and above maximum pressure can result in damage to the unit and reduced operational life and will void the warranty.

Table 2 - Cylinder torque output*

Model #	7147-H7.5C	7147-H10C	7147-H12C
Torque, 35° tiller at max angle	841 lbf-ft 116 kg-m	1122 lbf-ft 155 kg-m	1346 lbf-ft 186 kg-m
Torque, 45° tiller at max angle	-	785 lbf-ft 109 kg-m	942 lbf-ft 130 kg-m

*7147-H7.5C cannot be used with 45° tillers.

3 INSTALLATION

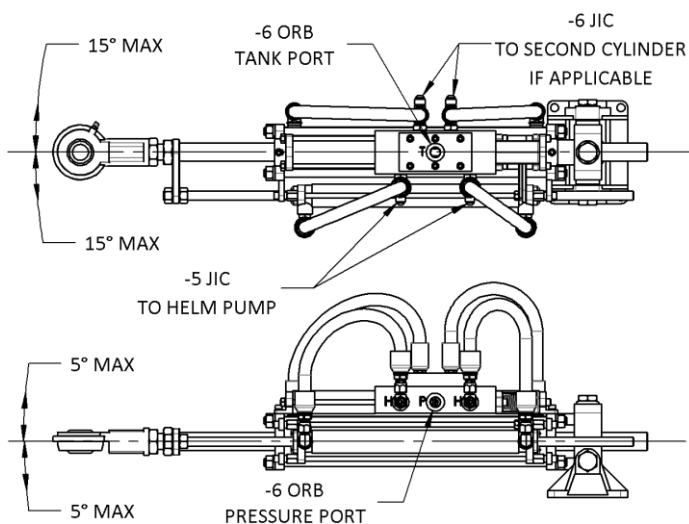


Figure 2 - 7147-HXXC rotation extents and hydraulic connections

3.1 MECHANICAL

NOTICE

Ensure that the unit is mounted to a foundation that is capable of support the loads that it can generate. If this is not taken into consideration, then damage to the mounting structure can occur.

The mounting of the cylinder should precede the connection of the unit to hydraulics if possible. Figure 2 above indicates the rotation limits of the cylinder that should not be exceeded. Also note that the rotation limits must be adhered to through the entire range of motion of the cylinder, not just in the midships position. Dimensions of the cylinder when installed to a tiller arm can be found on Figure 3 on page 8 and the tables that follow it.

WARNING

If the cylinder has already been connected to a hydraulic power source, ensure that pressure has been exhausted and the pressure source has been locked out.

WARNING

The cylinder foot must be mounted with fitted bolts or welded stops must be installed to both ends of the foot. See Figure 3.

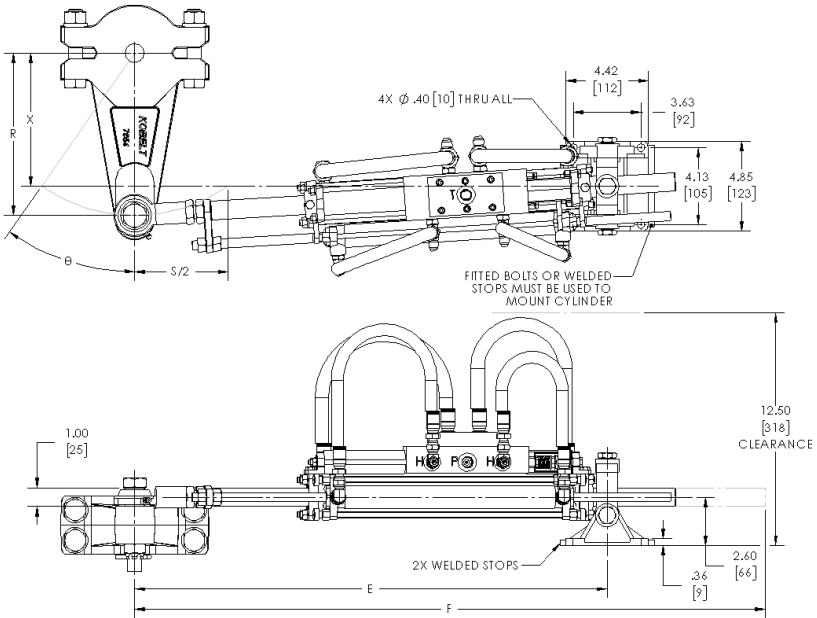


Figure 3 - 7147-HXXC installed dimensions

Table 3 - 7147-HXXC dimensions for 35° (θ) rudders


Model	Stroke (S)	R	X	E	F
7147-H7.5C	7.5" 191 mm	6.54" 166.1 mm	5.36" 136 mm	21.63" 549.4 mm	27.85" 707.4 mm
7147-H10C	10" 254 mm	8.72" 221.4 mm	7.14" 182 mm	25.38" 644.6 mm	34.10" 866.1 mm
7147-H12C	12" 304.8 mm	10.46" 265.7 mm	8.57" 217.7 mm	28.38" 720.8 mm	39.10" 993.1 mm

Table 4 - 7147-HXXC dimensions for 45° angle (θ) rudders*


Model	Stroke (S)	R	X	E	F
7147-H10C	10" 254 mm	7.07" 179.6 mm	5.00" 127 mm	25.38" 644.6 mm	34.10" 866.1 mm
7147-H12C	12" 304.8 mm	8.49" 215.5 mm	6.00" 152.4 mm	28.38" 720.8 mm	39.10" 993.1 mm

*7147-H7.5C cannot be used with 45° rudders.

3.2 HYDRAULIC

	<p>Exercise safety precautions pertaining to hydraulics including:</p> <ul style="list-style-type: none">• Wearing safety glasses.• Exhausting pressure and locking out the pressure source.• Being qualified to work on hydraulics.• Never look for a leak by running your hand/fingers along a pressurized hydraulic line.
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Before connecting the hydraulic lines to the cylinder ensure that all the hydraulic lines in the steering system have been flushed and that the hydraulic oil is free of any contamination. The cleanliness of the system must be at an ISO 4406 rating of 20/18/15 or better.

	<p>Failure to flush the system can result in premature failure of cylinder components and seals.</p>
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All connections are made to the valve. Hydraulic connections are specified in Figure 2 on page 7. The pressure line should have a minimum pressure rating of 2250 psi. Pressure and tank lines should also have an isolation valve. If required, a secondary slave cylinder can be connected to the valve which allows for additional rudder torque. Secure the piping against vibration with pipe clamps spaced every 3 feet (1 m).

ISO VG 32 is recommended for most steering system installations. If the environment is exceptionally warm or cold, then viscosity grades 46 or 22 should be considered, respectively. Do not use transmission or brake oil.

4 COMMISSIONING

4.1 FLUSHING

Before subjecting the steering system to full hydraulic pressure, the lines must be flushed to an ISO 4406 cleanliness rating of 20/18/15.

4.2 INSPECTION AND FUNCTION TEST

Prior to putting the vessel into service perform a quick inspection and function test of the unit:

1. Check that the mounting bolts are properly installed.
2. Check that all hydraulic connections are tight and are not leaking.
3. Check cylinder and tiller position against general arrangement drawing.
4. Check the tiller bolt installation.

5 MAINTENANCE AND SERVICE

5.1 PREVENTATIVE MAINTENANCE

- Monthly (12 times per year)
 - Inspect connections for leaks.
- Quarterly (4 times per year)
 - Verify adequate oil level.

NOTICE

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

5.2 RECOMMENDED SPARE PARTS

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

Table 5 - Recommended spares

Quantity	Part Number	Description
1	7147-RK	Repair kit
1	7247-SAC	Servo spool assembly

For detailed parts lists see section 6 *Parts Lists* of this manual.

6 PARTS LISTS

6.1 TOP-LEVEL ASSEMBLY

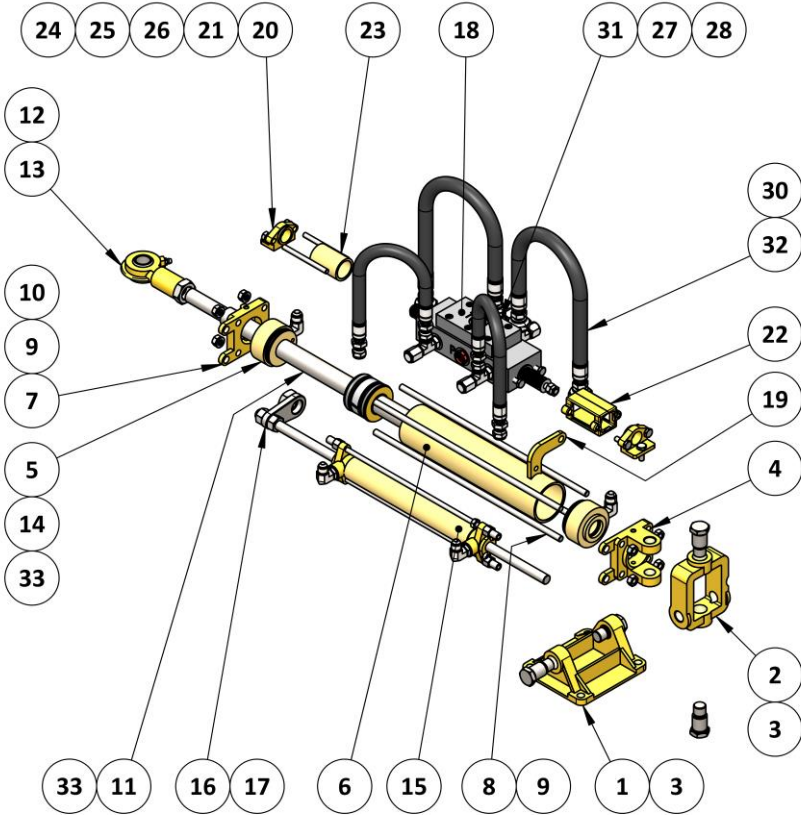


Figure 4 - 7147-HXXC top level assembly parts diagram

Table 6 - 7147-HXXC top level assembly parts list

Item	Qty	Part Number				Description
		Prefix	7147-H7-5C	7147-H10C	7147-H12C	
1	1	7147-0001				FOOT
2	1	7147-0002				SWIVEL
3	4	7147-0026				SHOULDER BOLT
4	1	7147-0003				END CAP – SWIVEL END
5	2	7147-0019				MAIN SHAFT GUIDE
6	1	7147-	7517	1017	1217	MAIN CYLINDER
7	1	7147-0004				END CAP
8	4	7147-	7520	1020	1220	TIE ROD
9	8	1022-0161				HEX NUT – 5/16 UNC
10	4	1023-0311				LOCK WASHER – 5/16 DIA
11	1	7147-	7535	1035	1235	PISTON ROD ASSEMBLY
12	2	1022-0267				JAM NUT
13	1	7147-0012				ROD END ASSEMBLY
14	2	7039-0203				ELBOW
15	1	7147-SUB-	7.5	10	12	SERVO CYLINDER ASSEMBLY
16	1	7147-0005				LINK ARM
17	2	1022-0164				HEX NUT – ½ UNC
18	1	7247-SAC				SERVO VALVE ASSEMBLY
19	1	7147-0007-C				SERVO LINK
20	2	7147-0009-C				SERVO BRACKET
21	6	1001-1012				HEX HEAD SCREW
22	1	7147-0008				SPRING COVER
23	1	7147-	7525	1025	1225	SPACER
24	2	7147-	7530	1030	1230	SPACER TIE ROD
25	2	1023-0310				LOCK WASHER – 1/4
26	2	1022-0110				HEX NUT – ¼ UNC
27	2	7039-0422				TEE FITTING; -05 JIC
28	2	7039-0622				CAP; -05 JIC
29	2	7039-0423				TEE FITTING; -06 JIC
30	2	7039-0623				CAP; -06 JIC
31	1	1340-38X14-516				HOSE; 5/16 DIA X 14 LG
32	1	1340-38X18-38				HOSE; 3/8 DIA X 18 LG
33	1	7147-RK				REPAIR KIT

6.2 CONTROL CYLINDER PARTS LIST

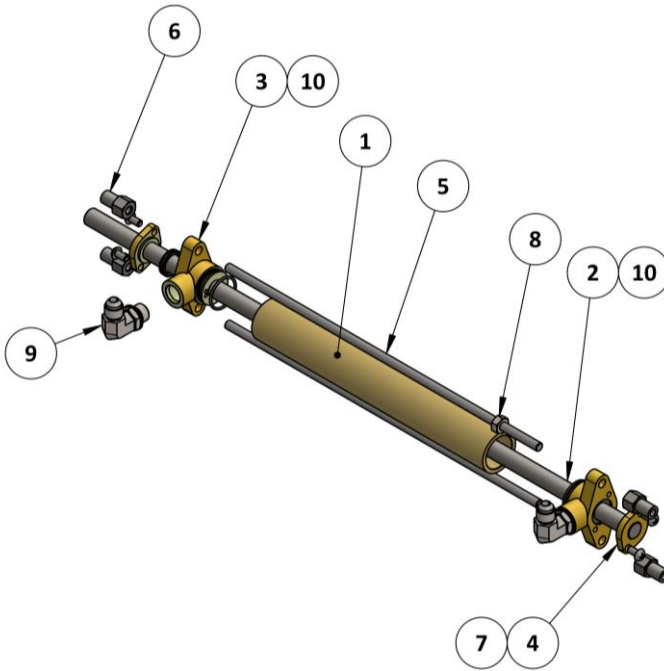


Figure 5 - 7147-SUB-XX control cylinder parts diagram

Table 7 - 7147-SUB-XX control cylinder parts list

Item	Qty	Part Number				Description
		Prefix	7147-H7.5C	7147-H10C	7147-H12C	
1	1	7147-	7518	1018	1218	SERVO TUBE
2	1	7147-	7546	1046	1246	SERVO PISTON ROD
3	2	7147-0006				SERVO END CAP
4	2	7147-0006B				SEAL COVER
5	2	7147-	7521	1021	1221	SERVO TIE ROD
6	4	7147-0027				TRUNNION NUTS
7	4	1010-0806				MACHINE SCREW - #10
8	1	1022-0160				HEX NUT - 1/4 UNC
9	2	7039-0221				ELBOW; -05 JIC
10	1	7147-SUB-RK				REPAIR KIT

6.3 VALVE ASSEMBLY PARTS LIST

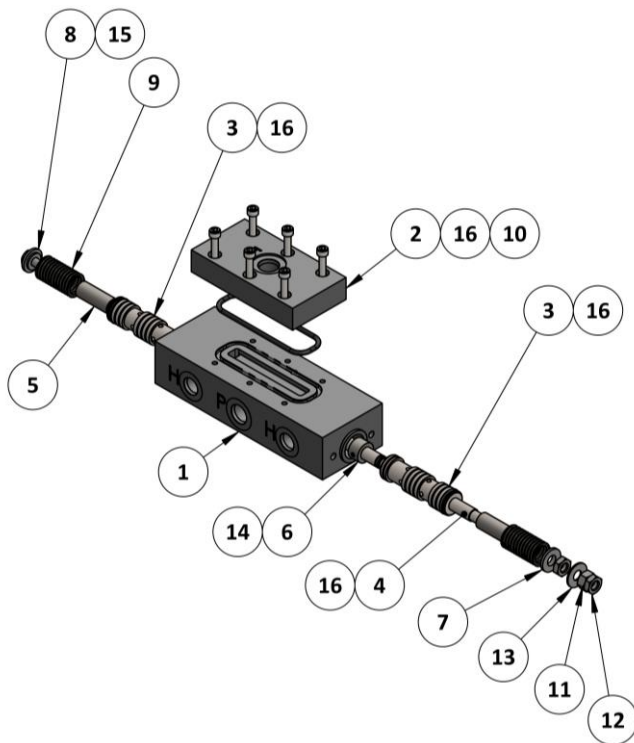


Figure 6 - 7247-SAC valve parts diagram

Table 8- 7247-SAC valve parts list

Item	Qty	Part Number	Description
1	1	7247-0011	Spool housing block
2	1	7247-0010	Outlet port block
3	2	7147-0022	Outer spool
4	1	7147-0023	Inner spool
5	2	7147-0024	Bushing
6	1	7147-0050	Spacer
7	1	7147-0058-A	Spring collar, 5/16"
8	1	7147-0058-B	Spring collar, 1/4"
9	2	1201-0207	Spring
10	6	1002-0812	Screw, socket head
11	1	1022-0161	Nut, hex
12	2	1022-0261	Nut, hex jam
13	1	1023-0237	Washer
14	1	1024-0510	Spring pin
15	1	1001-1008	Hex head screw – ¼ unc
16	1	4605-SBRK	Repair kit

7 WARRANTY

Kobel Manufacturing Co. Ltd. ("Kobel") warrants the Products and Parts manufactured by Kobel 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 Kobel recommendations
- The equipment is installed according to equipment diagrams, specifications and recommendations which Kobel 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 Kobel representative.

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

If any part is found to be defective, Kobel will replace said part FOB the Kobel factory provided that any such defective part is returned by the Buyer with freight and applicable forwarding charges prepaid by the Buyer. Kobel'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 Kobel warranty does not cover labour charges, travel or any other associated expenses.

All Products and Parts manufactured by Kobel, with the exception of brake discs and pads, 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. Thrusters and brake discs are subject to a one (1) year warranty period, and brake pads and linings are not covered by warranty.

Kobel will be responsible for all Products or Parts sold by Kobel 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 Kobel warranty.

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