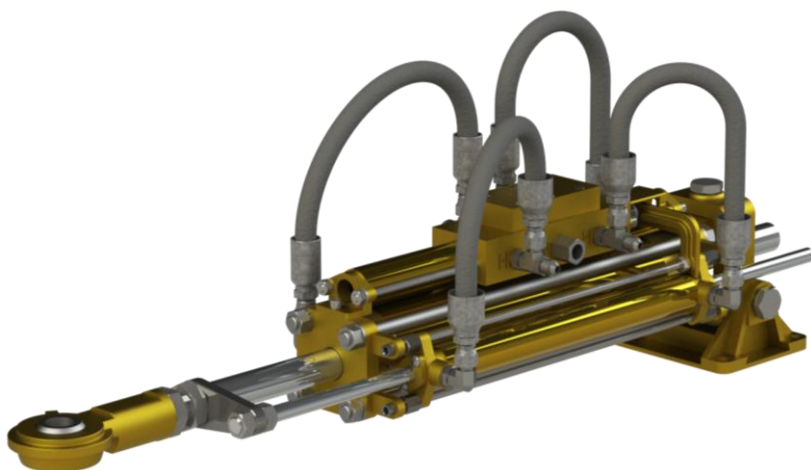




7065-SBXX Power Assist Cylinder

Owner's Manual



April 2021

NOTES:

[illegible]

RECORD DATA BEFORE INSTALLATION FOR FUTURE REFERENCE	
Model #:	
Serial #:	
Date of purchase:	
Date of installation:	
Motor brand and part #:	

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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	<p>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.</p>
 WARNING	<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.
NOTICE	<p>To ensure the product does not get damaged during storage, transportation and installation:</p> <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.

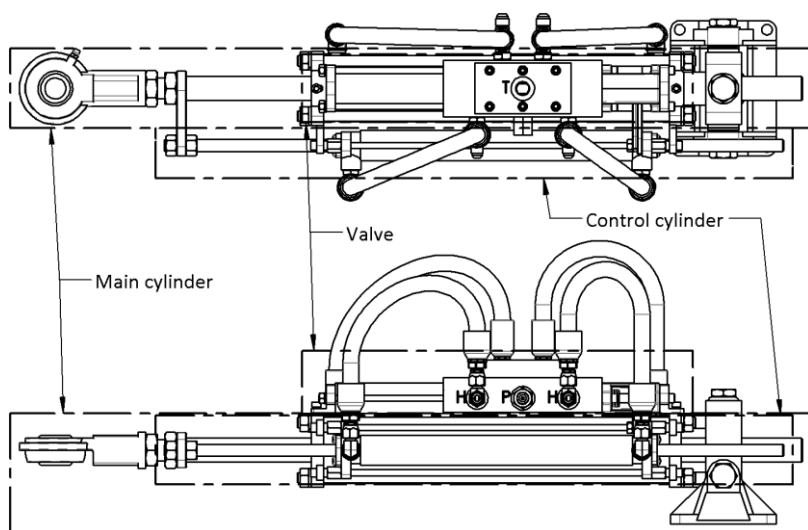


Figure 1 - 7065-SBXX overview diagram

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 #	7065-SB7.5	7065-SB10	7065-SB12	7065-SB16
Stroke ± .02" [.05 cm]	7.50" 19.05 cm	10.00" 25.40 cm	12.00" 30.48 cm	16.00" 40.64 cm
Design pressure	1,500 psi 100 bar			
Working pressure	1,200 psi 83 bar			
Force at working pressure	4,810 lbf 21.4 kN			
Recommended fluid	ISO VG 32, VI 60 hydraulic oil ISO 4406 cleanliness of 20/18/15			
Displacement, main cylinder	30.9 in ³ 507 cc	41.2 in ³ 676 cc	49.5 in ³ 811 cc	66.0 in ³ 1,081 cc
Displacement, control cylinder	4.4 in ³ 72 cc	5.9 in ³ 97 cc	7.1 in ³ 116 cc	9.4 in ³ 154 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 #	7065-SB7.5	7065-SB10	7065-SB12	7065-SB16
Torque, 35° tiller at max angle	2147 lbf-ft 297 kg·m	2863 lbf-ft 396 kg·m	3435 lbf-ft 475 kg·m	4580 lbf-ft 633 kg·m
Torque, 45° tiller at max angle	-	2004 lbf-ft 277 kg·m	2405 lbf-ft 333 kg·m	3207 lbf-ft 443 kg·m

*7065-SB7.5 cannot be used with 45° tillers.

3 INSTALLATION

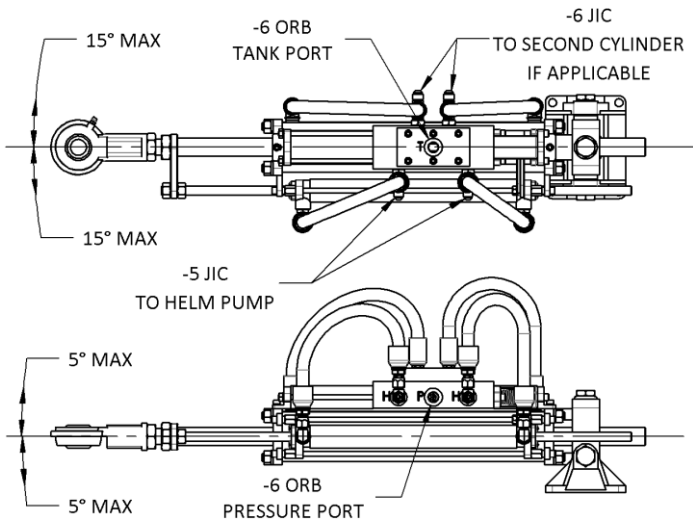


Figure 2 - 7065-SBXX rotation extents and hydraulic connections

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.

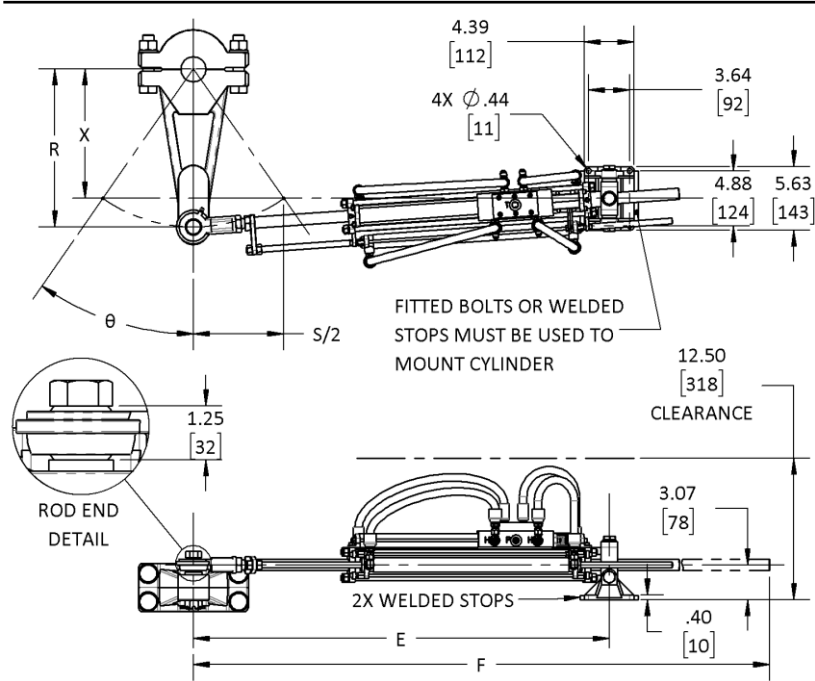


Figure 3 - 7065-SBXX installed dimensions

Table 3 - 7065-SBXX dimensions for 35° (θ) rudders

Model	Stroke (S)	R	X	E	F
7065-SB7.5	7.5" 191 mm	6.54" 166.1 mm	5.36" 136 mm	20.28" 515.1 mm	26.06" 662 mm
7065-SB10	10" 254 mm	8.72" 221.4 mm	7.14" 182 mm	22.78" 578.6 mm	31.06" 789 mm
7065-SB12	12" 304.8 mm	10.46" 265.7 mm	8.57" 217.7 mm	24.78" 629.4 mm	35.06" 890.6 mm
7065-SB16	16" 406.4 mm	13.95" 354.3 mm	11.43" 290.2 mm	28.78" 731 mm	43.06" 1094 mm

Table 4 - 7065-SBXX dimensions for 45° angle (θ) rudders*

Model	Stroke (S)	R	X	E	F
7065-SB10	10" 254 mm	7.07" 179.6 mm	5.00" 127 mm	22.78" 578.6 mm	31.06" 789 mm
7065-SB12	12" 304.8 mm	8.49" 215.5 mm	6.00" 152.4 mm	24.78" 629.4 mm	35.06" 890.6 mm
7065-SB16	16" 406.4 mm	11.31" 287.4 mm	8.00" 203.2 mm	28.78" 731 mm	43.06" 1094 mm

*7065-SB7.5 cannot be used with 45° rudders.

3.2 HYDRAULIC



Exercise safety precautions pertaining to hydraulics including:

- 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.

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.

NOTICE

Failure to flush the system can result in premature failure of cylinder components and seals.

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	7065-SBRK	Repair kit

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

6 PARTS LISTS

6.1 TOP-LEVEL ASSEMBLY

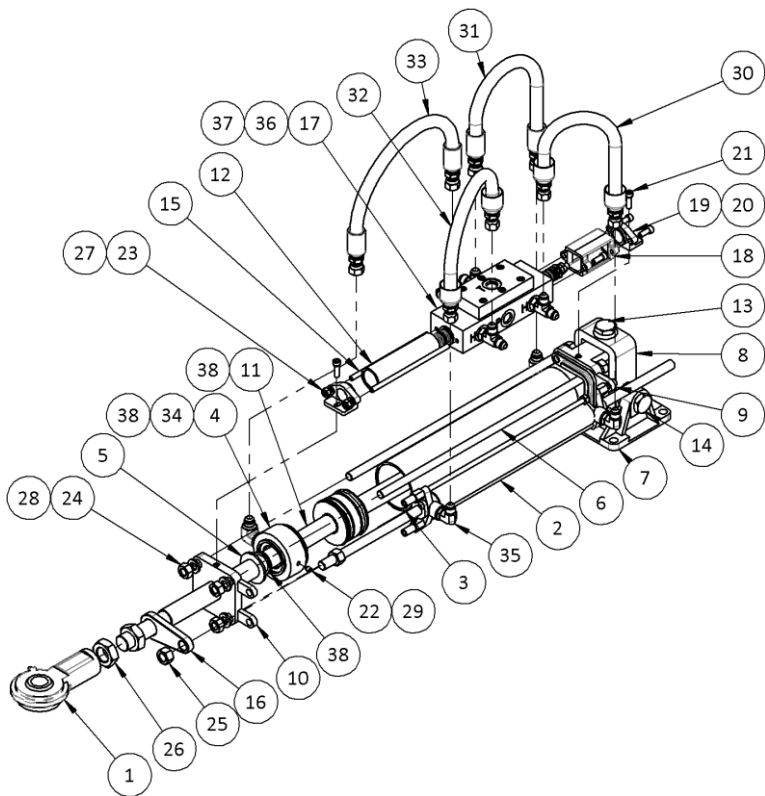


Figure 4 - 7065-SBXX top level assembly parts diagram

Table 6 - 7065-SBXX top level assembly parts list

Item	Quantities				Part Number	Description
	7065-SB7.5	7065-SB10	7065-SB12	7065-SB16		
1	1	1	1	1	7065-0004	Rod end assembly
2	1	-	-	-	7065-SUB-7.5	Control cylinder
2	-	1	-	-	7065-SUB-10	Control cylinder
2	-	-	1	-	7065-SUB-12	Control cylinder
2	-	-	-	1	7065-SUB-16	Control cylinder
3	1	-	-	-	7065-7506	Cylinder tube
3	-	1	-	-	7065-1006	Cylinder tube
3	-	-	1	-	7065-1206	Cylinder tube
3	-	-	-	1	7065-1606	Cylinder tube
4	2	2	2	2	7065-0007	Rod guide
5	2	2	2	2	7065-0011	Seal retainer
6	4	-	-	-	7065-7512	Tie rod, main cylinder
6	-	4	-	-	7065-1012	Tie rod, main cylinder
6	-	-	4	-	7065-1212	Tie rod, main cylinder
6	-	-	-	4	7065-1612	Tie rod, main cylinder
7	1	1	1	1	7065-0017	Foot
8	1	1	1	1	7065-0018	Swivel
9	1	1	1	1	7065-0019	End cap, swivel end
10	1	1	1	1	7065-0020	End cap, rod end
11	1	-	-	-	7065-7523-SUB	Piston-rod assembly
11	-	1	-	-	7065-1023-SUB	Piston-rod assembly
11	-	-	1	-	7065-1223-SUB	Piston-rod assembly
11	-	-	-	1	7065-1623-SUB	Piston-rod assembly
12	1	-	-	-	7065-7525	Valve spacer
12	-	1	-	-	7065-1025	Valve spacer
12	-	-	1	-	7065-1225	Valve spacer
12	-	-	-	1	7065-1625	Valve spacer
13	2	2	2	2	7065-0026	Shoulder bolt
14	2	2	2	2	7065-0027	Shoulder bolt

Continued on next page...

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Item	Quantities				Part Number	Description
	7065-SB7.5	7065-SB10	7065-SB12	7065-SB16		
15	2	-	-	-	7065-7529	Tie rod, valve spacer
15	-	2	-	-	7065-1029	Tie rod, valve spacer
15	-	-	2	-	7065-1229	Tie rod, valve spacer
15	-	-	-	2	7065-1629	Tie rod, valve spacer
16	1	1	1	1	7065-1021	Linkage
17	1	1	1	1	7247-SAC	Valve assembly
18	1	1	1	1	7147-0008	Spring cover
19	2	2	2	2	7147-0009-C	Valve mount
20	4	4	4	4	1002-1010	Screw, socket head
21	2	2	2	2	1002-1012	Screw, socket head
22	2	2	2	2	1016-1003	Set screw
23	2	2	2	2	1022-0110	Nut, hex
24	8	8	8	8	1022-0163	Nut, hex
25	2	2	2	2	1022-0164	Nut, hex
26	2	2	2	2	1022-0268	Nut, hex jam
27	2	2	2	2	1023-0310	Lock washer
28	8	8	8	8	1023-0313	Lock washer
29	2	2	2	2	1301-0005	Ball
30	1	1	1	1	1340-38X14-516	Hose assembly
31	1	1	1	1	1340-38X-38	Hose assembly
32	1	1	-	-	1340-38X16-38	Hose assembly
32	-	-	1	-	1340-38X18-38	Hose assembly
32	-	-	-	1	1340-38X21-38	Hose assembly
33	1	1	-	-	1340-38X14-516	Hose assembly
33	-	-	1	-	1340-38X17-516	Hose assembly
33	-	-	-	1	1340-38X18-516	Hose assembly
34	2	2	2	2	7039-0204	Hydraulic fitting
35	2	2	2	2	7039-0221	Hydraulic fitting
36	2	2	2	2	7039-0422	Hydraulic fitting
37	2	2	2	2	7039-0423	Hydraulic fitting
38	1	1	1	1	7065-SBRK	Repair kit

6.2 CONTROL CYLINDER PARTS LIST

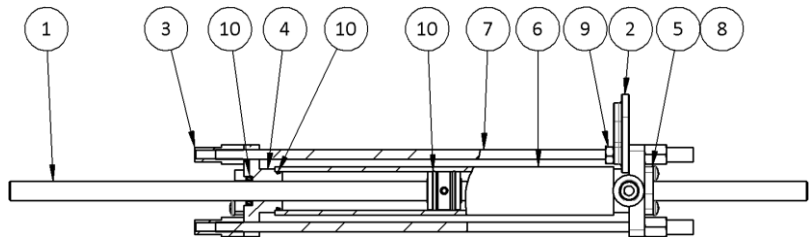


Figure 5 - 7065-SUB-XX control cylinder parts diagram

Table 7 - 7065-SUB-XX control cylinder parts list

Quantities					Part Number	Description
Item	7065-SUB-7.5	7065-SUB-10	7065-SUB-12	7065-SUB16		
1	1	-	-	-	7065-7524-SUB	Piston-rod assembly
1	-	1	-	-	7065-1024-SUB	Piston-rod assembly
1	-	-	1	-	7065-1224-SUB	Piston-rod assembly
1	-	-	-	1	7065-1624-SUB	Piston-rod assembly
2	1	1	1	1	7065-0022	Linkage
3	4	4	4	4	7065-0028	Nut, custom
4	2	2	2	2	7147-0006	End cap
5	2	2	2	2	7147-0006B	Seal retainer
6	1	-	-	-	7147-7518	Cylinder tube
6	-	1	-	-	7147-1018	Cylinder tube
6	-	-	1	-	7147-1218	Cylinder tube
6	-	-	-	1	7147-1618	Cylinder tube
7	1	-	-	-	7147-7521	Tie rod, control cylinder
7	-	1	-	-	7147-1021	Tie rod, control cylinder
7	-	-	1	-	7147-1221	Tie rod, control cylinder
7	-	-	-	1	7147-1621	Tie rod, control cylinder
8	4	4	4	4	1012-0808	Screw, pan head Philips
9	1	1	1	1	1022-0160	Nut, hex
10	1	1	1	1	7065-SBRK	Repair kit

6.3 VALVE ASSEMBLY PARTS LIST

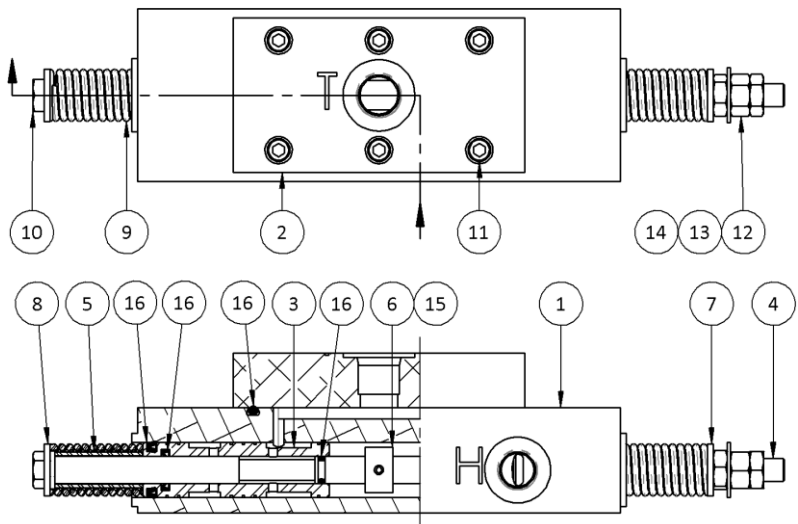


Figure 6 - 7247-SAC valve parts diagram

Table 8- 7247-SAC valve parts list

Item	Quantity	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	1	1001-1008	Screw, hex head
11	6	1002-0812	Screw, socket head
12	1	1022-0161	Nut, hex
13	2	1022-0261	Nut, hex jam
14	1	1023-0237	Washer
15	1	1024-0510	Spring pin
16	1	4605-SBRK	Repair kit

7 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, 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.

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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