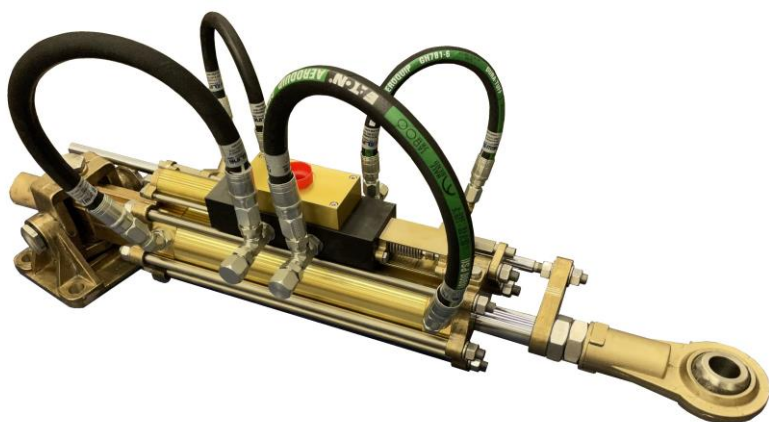




7085-S Power Assist Cylinder

Owner's Manual



March 2023

Kobel Manufacturing Co. Ltd

NOTES:

[illegible]

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

TABLE OF CONTENTS

1	Introduction	3
1.1	Contact	3
1.2	Safety.....	3
2	Product Description.....	5
2.1	Technical Data	6
3	Installation	7
3.1	Mechanical	7
3.2	Hydraulic.....	9
4	Commissioning	10
4.1	Flushing	10
4.2	Inspection and Function Test.....	10
5	Maintenance and Service.....	11
5.1	Preventative Maintenance	11
5.2	Recommended Spare Parts.....	11
6	Parts Lists	12
6.1	Top-Level Assembly	12
6.2	Control Cylinder Parts List	15
6.3	Valve Assembly Parts List.....	16
7	Warranty.....	17

1 INTRODUCTION

1.1 CONTACT

Kobelt Manufacturing Co. Ltd.

8238 129th Street
Surrey, British Columbia
Canada, V3W 0A6

Sales Tel: +1-604-572-3935

Fax: +1-604-590-8313

Email: sales@kobelt.com

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 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 7085-S 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. 7085-S cylinders consist of three main subunits which are the main cylinder, the control cylinder, and the valve and are identified in Figure 1 below.

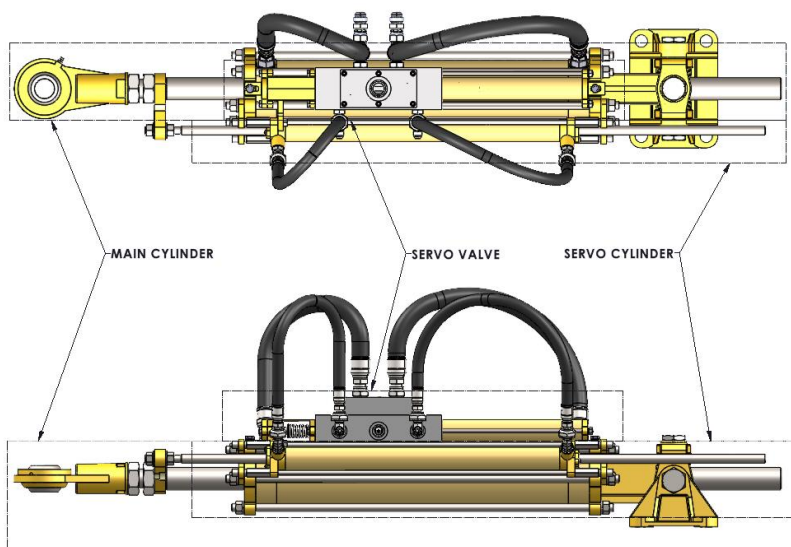


Figure 1 - 7085-SB overview diagram

This product comes in balanced and unbalanced model. Both models cylinder comes in stroke configurations of 10, 12, 16 and 20 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 and Table 3.

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 you local Kobelt partner to review this information.

2.1 TECHNICAL DATA

Table 1 - Cylinder technical specifications

Model #	7085-SX10	7085-SX12	7085-SX16	7085-SX20
Stroke ± .02" [.05 cm]	10.00" 25.40 cm	12.00" 30.48 cm	16.00" 40.64 cm	20.00" 50.80 cm
Design pressure	1,000 psi 69 bar			
Working pressure	800 psi 55 bar			
Force at working pressure - Bal.	6,283 lbf 27.9 kN			
Force at working pressure - Unbal. *	13,980 lbf 62.2 kN			
Recommended fluid	ISO VG 32, VI 60 hydraulic oil ISO 4406 cleanliness of 20/18/15			
Displacement, main cylinder - Bal.	78.5 in ³ 1,287 cc	94.2 in ³ 1,544 cc	125.7 in ³ 2,059 cc	157.1 in ³ 2,574 cc
Displacement, main cylinder - Unbal. *	174.8 in ³ 2,864 cc	209.7 in ³ 3,436 cc	279.6 in ³ 4,582 cc	349.5 in ³ 5,727 cc
Displacement, control cylinder	9.2 in ³ 151 cc	11.0 in ³ 181 cc	14.7 in ³ 241 cc	18.4 in ³ 302 cc
Ambient temperature	14 to 122 °F -10 to 50 °C			

*Data expressed for paired configuration.

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 – Balanced cylinder torque output*

Model #	7085-SB10	7085-SB12	7085-SB16	7085-SB20
Torque, 35° tiller at max angle	3,739 lbf-ft 517 kg-m	4,487 lbf-ft 620 kg-m	5,982 lbf-ft 827 kg-m	7,478 lbf-ft 1,034 kg-m
Torque, 45° tiller at max angle	-	-	4,189 lbf-ft 579 kg-m	5,236 lbf-ft 724 kg-m

*7085-SB10 & -SB12 cannot be used with 45° tillers.

Table 3 – Pair of unbalanced cylinder torque output*

Model #	7085-SU10	7085-SU12	7085-SU16	7085-SU20
Torque, 35° tiller at max angle	8,319 lbf-ft 1150 kg-m	9,983 lbf-ft 1380 kg-m	13,310 lbf-ft 1840 kg-m	16,638 lbf-ft 2,300 kg-m
Torque, 45° tiller at max angle	-	-	9,320 lbf-ft 1,289 kg-m	11,650 lbf-ft 1,611 kg-m

*7085-SU10 & -SU12 cannot be used with 45° tillers.

3 INSTALLATION

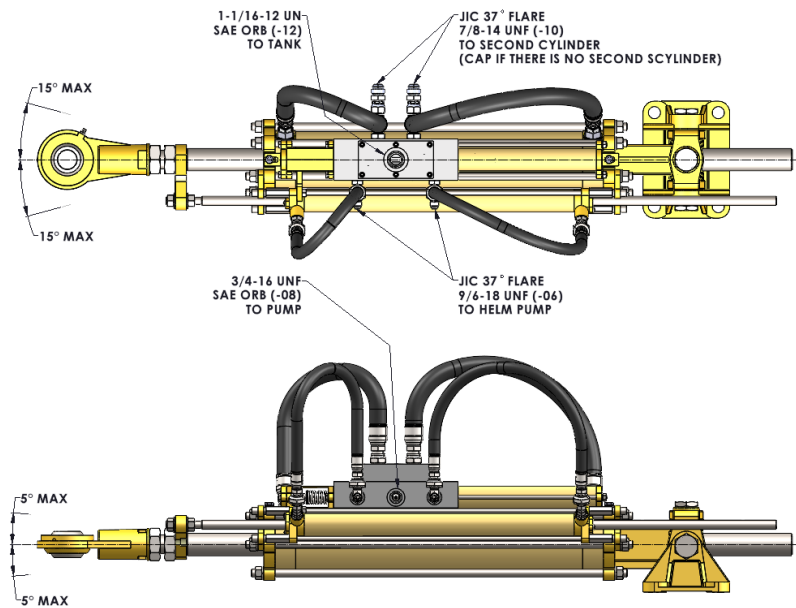


Figure 2 - 7085-S rotation extents and hydraulic connections

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.

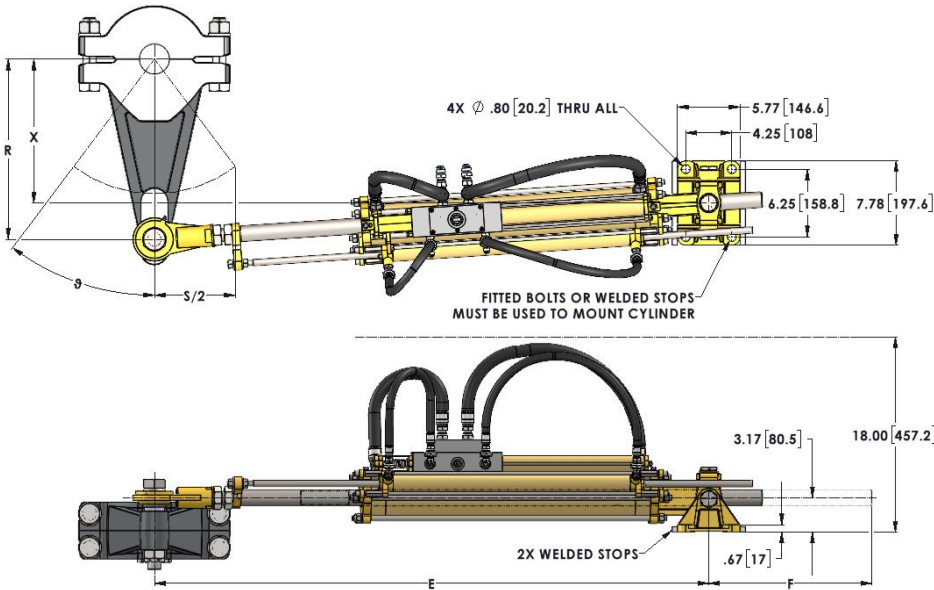


Figure 3 - 7085-SXXX installed dimensions.

Table 4 - 7085-SXXX dimensions for 35° (θ) rudders

Model	Stroke (S)	R	X	E	F*
7085-SX10	10"	8.72"	7.14"	36.19"	5.06"
	254 mm	221.4 mm	181.4 mm	919.2 mm	128.5 mm
7085-SX12	12"	10.46"	8.57"	39.19"	7.06"
	304.8 mm	265.7 mm	217.6 mm	995.4 mm	179.3 mm
7085-SX16	16"	13.95"	11.43"	45.19"	11.06"
	406.4 mm	354.3 mm	290.2 mm	1147.8 mm	280.9 mm
7085-SX20	20"	17.43"	14.28"	51.19"	15.06"
	508 mm	442.8 mm	362.7 mm	1300.2 mm	382.5 mm

*F is not applicable for unbalanced model.

Table 5 - 7085-SBXX dimensions for 45° angle (θ) rudders**

Model	Stroke (S)	R	X	E	F*
7085-SX16	16"	11.31"	8.00"	45.19"	11.06"
	406.4 mm	287.4 mm	203.2 mm	1147.8 mm	280.9 mm
7085-SX20	20"	14.14"	10.00"	51.19"	15.06"
	508 mm	359.2 mm	254.0 mm	1300.2 mm	382.5 mm

*F is not applicable for unbalanced model.

**7085-SX10 and 7085-SX12 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. For balanced model If required, a secondary slave cylinder can be connected to the valve which allows for additional rudder torque. For unbalanced model system should have a secondary slave cylinder. 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 6 - Recommended spares

Quantity	Part Number	Description
1	7085-SB-RK	Balanced model repair kit
1	7085-SU-RK	Unbalanced model Repair kit

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

6 PARTS LISTS

6.1 TOP-LEVEL ASSEMBLY

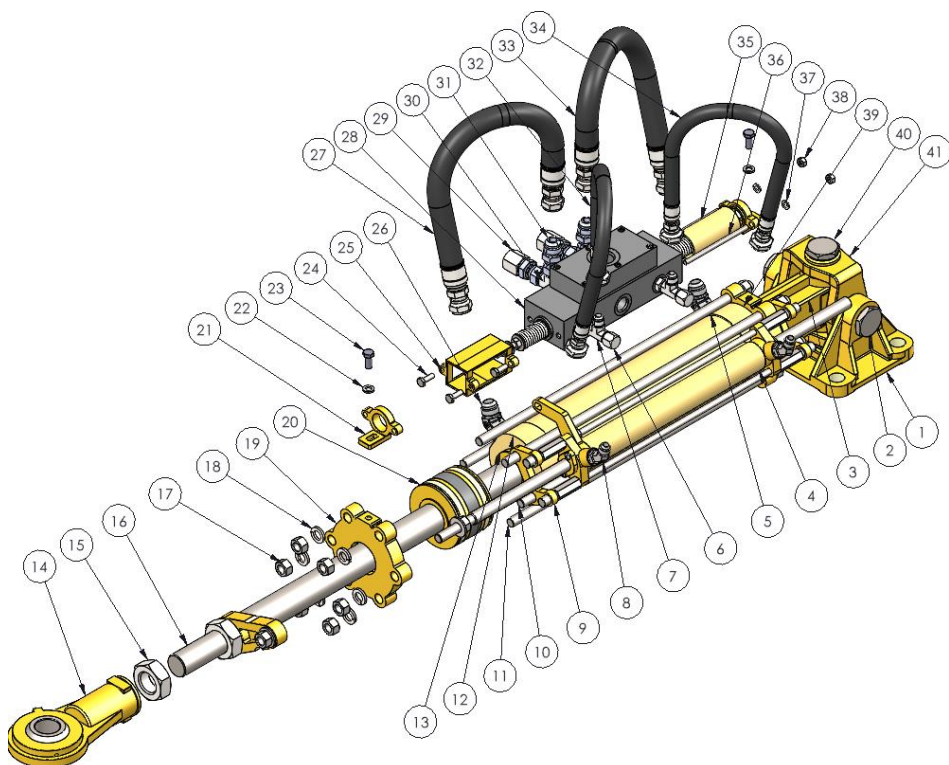


Figure 4 - 7085-SXXX top level assembly parts diagram

Table 7 - 7085-SXXX top level assembly parts list

Item	Part Number								Description
	7085-SB10	7085-SU10	7085-SB12	7085-SU12	7085-SB16	7085-SU16	7085-SB20	7085-SU20	
1	1	1	1	1	1	1	1	1	7085-0001 Foot
2	2	2	2	2	2	2	2	2	7085-0029 Shoulder bolt-long
3	1	1	1	1	1	1	1	1	7085-0003 End cap, swivel end
4	1	1	-	-	-	-	-	-	7085-S10 Control cylinder
4	-	-	1	1	-	-	-	-	7085-S12 Control cylinder
4	-	-	-	-	1	1	-	-	7085-S16 Control cylinder
4	-	-	-	-	-	-	1	1	7085-S20 Control cylinder
5	1	1	-	-	-	-	-	-	7085-1018 Cylinder tube
5	-	-	1	1	-	-	-	-	7085-1218 Cylinder tube
5	-	-	-	-	1	1	-	-	7085-1618 Cylinder tube
5	-	-	-	-	-	-	1	1	7085-2018 Cylinder tube
6	2	2	2	2	2	2	2	2	7039-0623 Hydraulic fitting
7	2	2	2	2	2	2	2	2	7039-0423 Hydraulic fitting
8	2	2	2	2	2	2	2	2	7039-0322 Hydraulic fitting
9	2	2	2	2	2	2	2	2	7085-0013 Bracket
10	2	2	-	-	-	-	-	-	7085-1032 Main tie rod-long
10	-	-	2	2	-	-	-	-	7085-1232 Main tie rod-long
10	-	-	-	-	2	2	-	-	7085-1632 Main tie rod-long
10	-	-	-	-	-	-	2	2	7085-2032 Main tie rod-long
11	4	4	-	-	-	-	-	-	7085-1033 Main tie rod-short
11	-	-	4	4	-	-	-	-	7085-1233 Main tie rod-short
11	-	-	-	-	4	4	-	-	7085-1633 Main tie rod-short
11	-	-	-	-	-	-	4	4	7085-2033 Main tie rod-short
12	2	1	2	1	2	1	2	1	7085-0015 Main shaft guide
13	2	1	2	1	2	1	2	1	7085-0016 Seal retainer
14	1	1	1	1	1	1	1	1	7085-0004 Rod end assembly
15	2	2	2	2	2	2	2	2	1022-0273 Nut, hex jam
16	1	-	-	-	-	-	-	-	7085-B10-SUB Piston-rod assembly
16	-	1	-	-	-	-	-	-	7085-U10-SUB Piston-rod assembly
16	-	-	1	-	-	-	-	-	7085-B12-SUB Piston-rod assembly
16	-	-	-	1	-	-	-	-	7085-U12-SUB Piston-rod assembly
16	-	-	-	-	1	-	-	-	7085-B16-SUB Piston-rod assembly
16	-	-	-	-	-	1	-	-	7085-U16-SUB Piston-rod assembly
16	-	-	-	-	-	-	1	-	7085-B20-SUB Piston-rod assembly
16	-	-	-	-	-	-	-	1	7085-U20-SUB Piston-rod assembly

Continued next page...

Continued from previous page...

Item	Part Number								Description
	7085-SB10	7085-SU10	7085-SB12	7085-SU12	7085-SB16	7085-SU16	7085-SB20	7085-SU20	
17	12	12	12	12	12	12	12	12	1022-0164 Nut, hex
18	12	12	12	12	12	12	12	12	1023-0314 Lock washer
19	1	1	1	1	1	1	1	1	7085-0006 End cap
20	1	-	1	-	1	-	1	-	7085-SB-RK Repair kit
20	-	1	-	1	-	1	-	1	7085-SU-RK Repair kit
21	2	2	2	2	2	2	2	2	7085-0009 Mounting bracket
22	2	2	2	2	2	2	2	2	1023-0311 Lock washer
23	2	2	2	2	2	2	2	2	1001-1112 Screw, hex head
24	4	4	4	4	4	4	4	4	1001-1012 Screw, hex head
25	1	1	1	1	1	1	1	1	7085-0008 Spring cover
26	2	2	2	2	2	2	2	2	7039-0321 Hydraulic fitting
27	1	1	1	1	-	-	-	-	1340-58-20-58 Hose assembly
27	-	-	-	-	1	1	1	1	1340-58-24-58 Hose assembly
28	1	1	1	1	1	1	1	1	7085-SA Valve assembly
29	2	2	2	2	2	2	2	2	7039-0625 Hydraulic fitting
30	2	2	2	2	2	2	2	2	7039-0426 Hydraulic fitting
31	4	4	4	4	4	4	4	4	7039-0181 Hydraulic fitting
32	1	1	1	1	-	-	-	-	1340-38-16-38 Hose assembly
32	-	-	-	-	1	1	-	-	1340-38-21-38 Hose assembly
32	-	-	-	-	-	-	1	1	1340-38-24-38 Hose assembly
33	1	1	1	1	1	1	1	1	1340-58-20-58 Hose assembly
34	1	1	1	1	1	1	1	1	1340-38-16-38 Hose assembly
35	1	1	-	-	-	-	-	-	7085-1017 Valve spacer
35	-	-	1	1	-	-	-	-	7085-1217 Valve spacer
35	-	-	-	-	1	1	-	-	7085-1617 Valve spacer
35	-	-	-	-	-	-	1	1	7085-2017 Valve spacer
36	1	1	-	-	-	-	-	-	7085-1036 Tie rod, valve spacer
36	-	-	1	1	-	-	-	-	7085-1236 Tie rod, valve spacer
36	-	-	-	-	1	1	-	-	7085-1636 Tie rod, valve spacer
36	-	-	-	-	-	-	1	1	7085-2036 Tie rod, valve spacer
37	2	2	2	2	2	2	2	2	1023-0310 Lock washer
38	2	2	2	2	2	2	2	2	1022-0110 Nut, hex
39	-	1	-	1	-	1	-	1	7085-0038 Rear end cap
40	2	2	2	2	2	2	2	2	7085-0028 Shoulder bolt-short
41	1	1	1	1	1	1	1	1	7085-0002 Swivel

6.2 CONTROL CYLINDER PARTS LIST

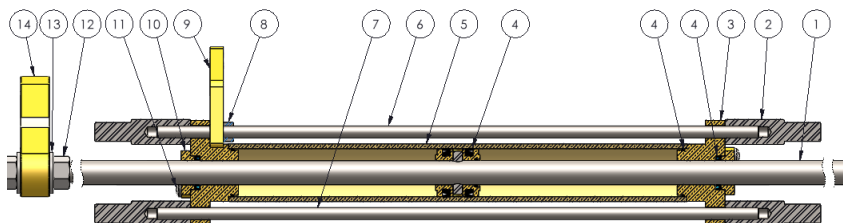


Figure 5 - 7085-SXX control cylinder parts diagram

Table 8 - 7085-SXX control cylinder parts list

Item	Quantities				Part Number	Description
	7085-S10	7085-S12	7085-S16	7085-S20		
1	1	-	-	-	7085-S10-SUB	Piston-rod assembly-10"
1	-	1	-	-	7085-S12-SUB	Piston-rod assembly-12"
1	-	-	1	-	7085-S16-SUB	Piston-rod assembly-16"
1	-	-	-	1	7085-S20-SUB	Piston-rod assembly-20"
2	4	4	4	4	7085-0027	Hex nut
3	2	2	2	2	7085-0012	End cap
4	1	1	1	1	7085-SB(U)-RK	Repair kit
5	1	-	-	-	7085-1019	Cylinder tube-10"
5	-	1	-	-	7085-1219	Cylinder tube-12"
5	-	-	1	-	7085-1619	Cylinder tube-16"
5	-	-	-	1	7085-2019	Cylinder tube-20"
6	1	-	-	-	7085-1034	Tie rod, 10"
6	-	1	-	-	7085-1234	Tie rod, 12"
6	-	-	1	-	7085-1634	Tie rod, 16"
6	-	-	-	1	7085-2034	Tie rod, 20"
7	1	-	-	-	7085-1035	Tie rod, 10"
7	-	1	-	-	7085-1235	Tie rod, 12"
7	-	-	1	-	7085-1635	Tie rod, 16"
7	-	-	-	1	7085-2035	Tie rod, 20"
8	1	1	1	1	1022-0161	Hex nut
9	1	1	1	1	7085-0007	Servo link
10	2	2	2	2	7085-0014	Seal cover
11	4	4	4	4	1012-0808	Screw, pan head Philips
12	2	2	2	2	1022-0164	Hex nut
13	2	2	2	2	1023-0114	Flat washer
14	1	1	1	1	7085-0005	Linkage

6.3 VALVE ASSEMBLY PARTS LIST

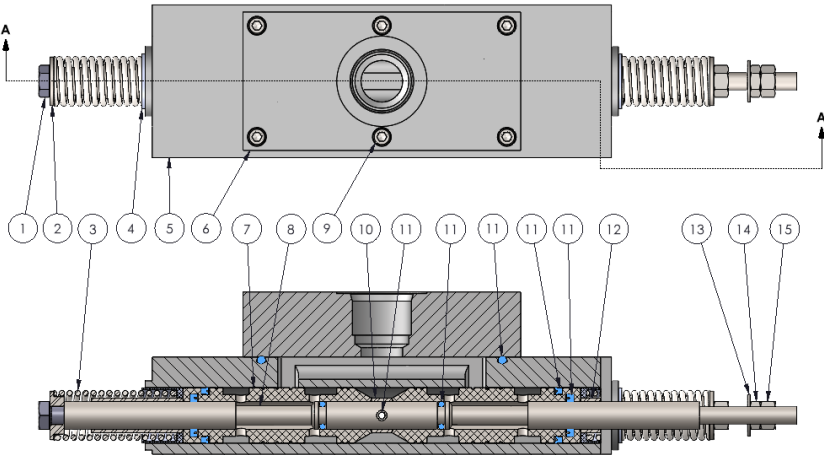


Figure 6 - 7085-SA valve parts diagram

Table 9- 7085-SA valve parts list

Item	Quantity	Part Number	Description
1	1	1001-1112	Screw, hex head
2	2	7085-0037	Washer
3	2	1201-0216	Spring
4	2	7085-0046	Bore protector
5	1	7185-0011	Spool housing block
6	1	7185-0010	Outlet port block
7	2	7085-0025	Outer spool
8	1	7085-0024	Inner spool
9	6	1002-0820	Screw, socket head
10	1	7085-0039	Sleeve
11	1	7085-SA-RK	Repair kit
12	2	7085-0026	Bushing
13	1	1023-0237	Flat washer
14	1	1022-0261	Nut, hex jam
15	2	1022-0161	Nut, hex

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.

Page Intentionally Left Blank



Kobelt Manufacturing Co. Ltd.

8238 129th Street
Surrey, British Columbia,
Canada, V3W 0A6

Sales Tel:	+1-604-572-3935
Fax:	+1-604-590-8313
Email:	<u>sales@kobelt.com</u>
Website:	<u>www.kobelt.com</u>

Made in Canada / Printed in Canada