



CG Series Grapples



Models

CG07

CG10

CG15

CG22

CG30

CG40



Parts & Operator's Manual CG-Series
Parts, Safety, Operation & Maintenance



Part #CGE00018

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Table 1.1 About this manual

Document ID No.	CGE00018
Type	Parts, Safety, Operation and Maintenance
Release Date	October 2021
Product Name	Hydraulic Grapple
Series	CG
Applicable Models	CG07/CG10/CG15/CG22/CG30 CG40
Years of Manufacture	2020 & above

Safety Information

Safety Statements and Hazard Alerts

Within this manual, you will find important safety information. The information will include specific information related to the Connect Work Tools attachment as well as the carrier. It is imperative that operators, maintenance personnel, or individuals loading or transporting the equipment read and understand the safety contents of this manual, as well as all safety decals and labels. Safety decals and labels must be kept legible and intact on the attachment. Replace damaged, missing or illegible safety labels or decals.

Purpose of Safety Messages

The reason safety messages and information has been included in this manual is most importantly to protect you and those individuals in the work area. Additionally, it is provided to eliminate damage to surroundings, attachments and the carrier due to incorrect operation and use or lack of maintenance of the equipment.

Key Points before operating equipment

1. Know your surroundings, survey the area prior to operation.
2. Know where the potential hazards are within the work area and notify personnel of those hazards.

Safety messages provide the following information:

1. **Alert** personnel to potential hazards
2. **Identify** the nature of the hazard
3. **Describe** the severity of the hazard, if encountered
4. **Instruct** how to avoid the hazard

ATTENTION, BECOME ALERT, YOUR SAFETY IS INVOLVED.

Signal Words

Safety symbols and signal words, as shown below, are used to emphasize all operator, maintenance and repair actions which, if not strictly followed, could result in a life-threatening situation, bodily injury or damage to equipment.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



This safety alert and signal word indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



This safety alert and signal word indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



This safety alert and signal word indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



This signal word indicates a potentially hazardous situation which, if not avoided, may result in property damage or damage to the equipment.



This signal word indicates a situation which, if not avoided, may result in damage to the equipment.

Fig. SI.1 Safety Signal Words

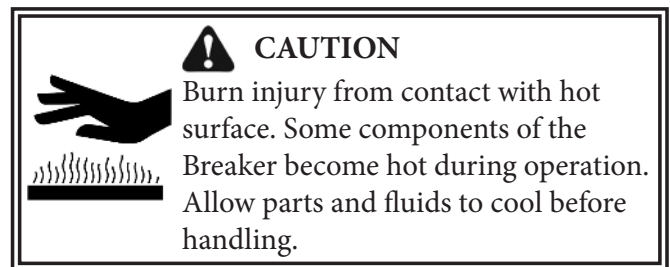


Fig. SI.2 Safety Message

Signal Words Used for Non-Hazard Messages

This manual contains other message types that use the signal words IMPORTANT and NOTE. These are informational messages that provide instructions and are not considered hazardous to workers.

IMPORTANT - Identify instructions that if not followed, may damage the equipment or diminish the service life of components.

NOTE - Highlight suggestions, which will enhance installation, reliability, or operation.





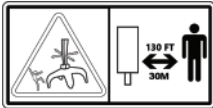



Safety Information

Safety, Information and Identification Labels

Information labels affixed to the Connect Work Tools equipment include safety warnings, identification and instructions important to operation and service. Refer to Figure "L-5" for their location on the equipment.

Keep all safety & identification labels clean. Words and illustrations must be legible.

Before operating this equipment, replace damaged or missing labels. For replacement, refer to the appropriate Parts Manual for identification.

<i>Fig.</i>	<i>Label</i>	<i>Description</i>
Fig. L-1		READ INSTRUCTIONS - Decal directs personnel to the manual for further information/instructions.
Fig. L-2		MODEL - Decal identifies the specific model.
Fig. L-3		CONNECT WORK TOOLS LOGO - This decal is the Connect Work Tools identifier and is a registered trademark of Connect Work Tools.
Fig. L-4		SERIAL PLATE - Contains identifying information about the equipment, including: Manufacturer's name, serial number, model number, product weight, open/close pressure, and rotate pressure.
Fig. L-5		STAY CLEAR - Decal alerts personnel and by-standers to maintain a safe distance from the Grapple while in operation.
Fig. L-6		OPEN/CLOSE - Decal depicts location of hydraulic inlet and outlet ports that open and close the grapple arm assemblies
Fig. L-7		ROTATE - Decal depicts hydraulic inlet and outlet ports for rotation on the grapple
Fig. L-8		GREASE POINT DECAL - Directs personnel where to grease the equipment.

Safety Information

Label Positions

CG Grapple Decal Placement

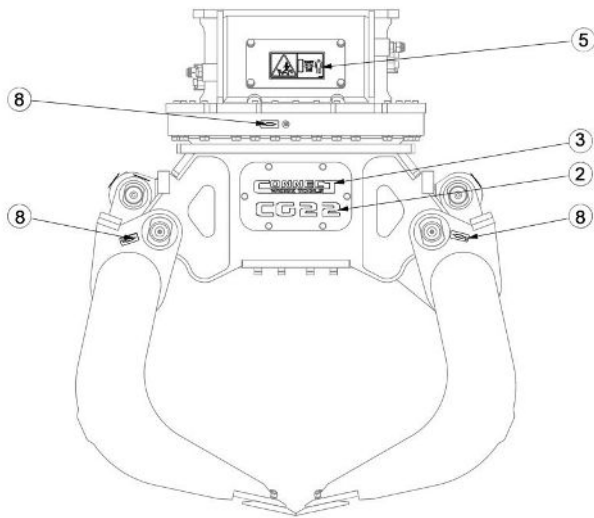


Fig. L9-1

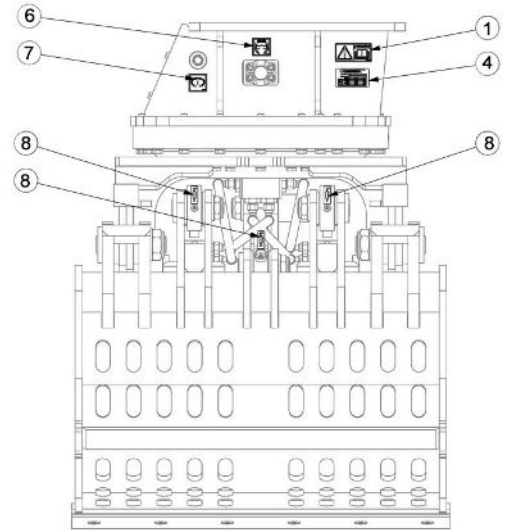


Fig. L9-2

Safety Information

Meaning of Pictograms

Pictograms are used to rapidly communicate information. For the purposes of this manual and labels affixed to the Connect Work Tools equipment, pictograms are defined as follows:

















 <ul style="list-style-type: none"> • <i>Read the Manual</i> • <i>Refer to the manual for further details</i> • <i>Procedures are explained in the manual</i> 	 <p><i>Personnel maintain a safe distance from grapple</i></p>
 <p><i>Read the Service Manual for Additional Information</i></p>	 <p><i>Fragments/debris becoming airborne projectiles</i></p>
 <ul style="list-style-type: none"> • <i>Crush Point</i> 	 <p><i>Protective guards required on cab when operating this work tool</i></p>
 <ul style="list-style-type: none"> • <i>Pinch Point</i> 	 <p><i>Leaking fluid under pressure</i></p>
 <p><i>Moving part (in direction indicated by arrow)</i></p>	 <p><i>Hot Surfaces</i></p>
 <ul style="list-style-type: none"> • <i>Falling object</i> • <i>Unsupported loads</i> 	 <p><i>Gas/Oil under pressure</i></p>
<p><i>Personal Protection Equipment</i></p>	 <p><i>Shut off carrier & remove key before servicing</i></p>
 <ul style="list-style-type: none"> • <i>Hearing Protection</i> 	 <p><i>Identifies lift point</i></p>
 <ul style="list-style-type: none"> • <i>Safety Eyewear</i> 	 <p><i>The check mark is used to indicate correct actions or approved methods that are recommended</i></p>
 <ul style="list-style-type: none"> • <i>Gloves</i> 	
 <ul style="list-style-type: none"> • <i>Safety Shoes</i> • <i>Falling Part</i> 	

Fig. SL3 Meaning of Pictograms

Safety Information

Attention Read the Manual



Improper installation, operation or maintenance of the Connect Work Tools Equipment could result in serious injury or death. Only qualified operators may operate the Connect Work Tools equipment. Personnel responsible for the maintenance of the Connect Work Tools equipment or its systems, including inspection, installation or adjustments must also be qualified. Operators and personnel responsible for the maintenance of this equipment should read this manual. Other manuals, such as those published by the machinery used in support of the Connect Work Tools equipment, should also be read.

General Construction Safety

Always follow procedures that promote safe conditions for workers and bystanders. The standard safety precautions expected and required of those working in construction shall include, but not limited to:

- Locating existing underground service and utility lines
- Establishing pedestrian barriers
- Using personal protection equipment appropriate to working conditions, etc.

Owner's Responsibilities

Ensure that only qualified personnel operate and service the Connect Work Tools equipment.

Ensure personal protection equipment is available to personnel and enforce the use of PPE.

Ensure that carriers are in safe, working order and all guards and safety equipment is installed and in operating condition.

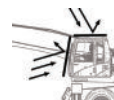
Ensure safety-related materials such as instructions and including this manual are kept in a convenient location so that they are easily accessible to operators and maintenance personnel.

Personal Protective Equipment (PPE)



Personnel operating or nearby the equipment and exposed to the hazard of falling, flying and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases shall use the particular personal protective equipment (PPE) necessary to protect them from the hazard. Such PPE may include safety eyewear, face shield, hearing protection, safety footwear, gloves and dust mask. Supervisors shall review proper PPE selection and ensure PPE is made available to personnel. Personnel are responsible for wearing PPE as directed by the supervisor.

Protective Equipment - Guarding



Construction equipment designed with guards shall have guards in place when equipment is in use. Guards are fitted to the equipment to protect against unsafe situations that could not be eliminated through design measures. Where it was not possible to prevent an unsafe situation by means of a guard, safety messages appear on the equipment, warning personnel of a hazardous condition.

Guards shall not be removed unless for the purpose of inspection and service of components. All guards must be reinstalled after service or adjustments are completed. Do not operate the Connect Work Tools attachments without guards.

Additional guarding, not included with the Connect Work Tools equipment, is necessary at the operator's station to protect the operator and other nearby personnel against flying debris from material being cut or demolished. Do not handle, demolish or cut material overhead without proper guards installed.

To prevent accidental start up, the control switch shall be located in a protected area that is guarded and makes it difficult to accidentally operate the equipment.

Safety Information

Unapproved Modifications



In order to provide and maintain efficient production and reliable service, while ensuring operator safety, the Connect Work Tools equipment may not be modified or used for any other purpose other than, for which it was intended. Use of the Connect Work Tools equipment, other than those specified in this manual, may place personnel at risk of injury and/or may subject the equipment to damage. The Connect Work Tools equipment shall not be modified or used in unapproved applications unless written consent is received from the Connect Work Tools Engineering Department.

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General Information

1. Introduction

Preface



This manual will provide an understanding of the Connect Work Tools Grapple by providing instructions for safe and effective operation and instructions for regular maintenance activities of the compactor in addition to parts information.

Before installation or operation of the grapple for the first time, please read and understand this manual.

The specifications and designs presented in this manual are subject to change without prior notice.

2. Safety Precautions

Operation

- Operate the grapple for its intended purpose only.
- Operate the grapple only when the operator is seated in the cabin with full control of the machine.
- No bystanders are allowed in the vicinity of the grapple when it is operating. Debris can cause serious injury to bystanders.
- Stay clear of the grapple when it is operating.
- Before operating the grapple, read and follow the safety decals located on equipment.
- Be sure that all decals are clearly visible. Clean and replace as necessary.

Protective Equipment

- Always wear the following personal protective equipment: safety glasses, ear protection, protective gloves and protective shoes.



Heat Caution



- Never touch the hot parts and wait for them to cool down first if you have to touch them.
- Hot hydraulic oil can cause burns. Never use your fingers to check for hydraulic fluid leaks and always keep your face away from a possible leak.

1.0 Specification

1.1 Product Overview and Technical Specification

The Connect Work Tools Grapple is designed to handle light demolition work as well as to handle debris.

The Grapple is intended to be used for demolition of wooden structures, sorting materials, and recycling concrete, sand, dirt and rock.

Using the hydraulic rotation unit, the grapple can rotate freely in either direction. It is always possible to optimally position the grapple for the material that is being moved.

2.0 Technical Data

2.1 Technical Data

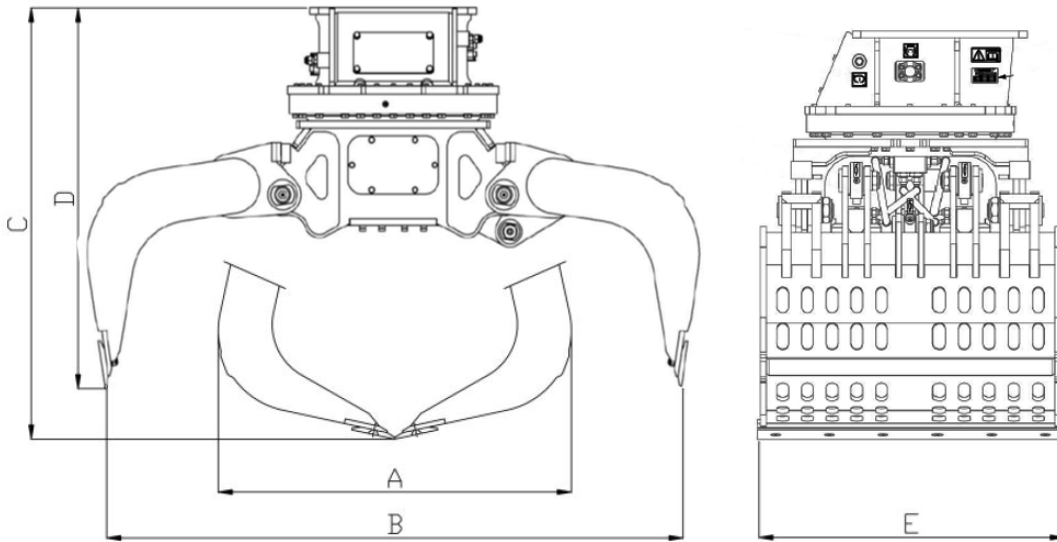


Fig. 2.1 Technical Data

Description		UNIT	CG Grapples					
			CG07	CG10	CG15	CG22	CG30	CG40
Operating Weight*		kg	330	395	1,110	1,500	2,045	2,350
		lbs	727	870	2,447	3,306	4,508	5,180
Capacity		m3	0.15	0.2	0.4	0.7	1	
Dimension	A	mm	951	959	1,074	1,221	1,470	1,567
		in	37.4	37.8	42.3	48.1	57.9	61.7
	B	mm	1,507	1,607	1,697	1,964	2,150	2,389
		in	59.3	63.3	66.8	77.3	84.6	94.1
	C	mm	961	1,018	1,277	1,401	1,462	1,665
		in	37.8	40.1	50.3	55.2	57.6	65.5
	D	mm	863	881	1,113	1,242	1,654	1,464
		in	34	34.7	43.8	48.9	65.1	57.6
	E	mm	477		850	1,050	1,115	1,324
		in	18.8		33.5	41.3	43.9	52.1
Hydraulic Pressure of Cylinder	Pressure	bar	320			350		
		psi	4,641			5,076	5,076	5,076
	Oil Flow	L/min	60		80	100	180	
		US Gal	15.9		21.1	26.4	47.5	47.5
Hydraulic Pressure of Rotator	Pressure	bar	250		140			
		psi	3,626		2,031			
	Oil Flow	L/min	15	30	75			
		US Gal	4	7.9	19.8			
Carrier Weight	Metric ton		5-8	8-12	12-17	17-27	27-38	36-48
	US lbs		11,023-17,637	17,637-26,455	26,455-37,478	37,478-59,525	59,525-83,776	79,366-105,821

The above technical specification can be changed without prior notice

* without top bracket

3.0 Transport

3.1 Transporting Grapple

Transport the Grapple only with a forklift or truck.



Move the fork of the forklift truck under the housing so that the hydraulic attachment cannot tip over.

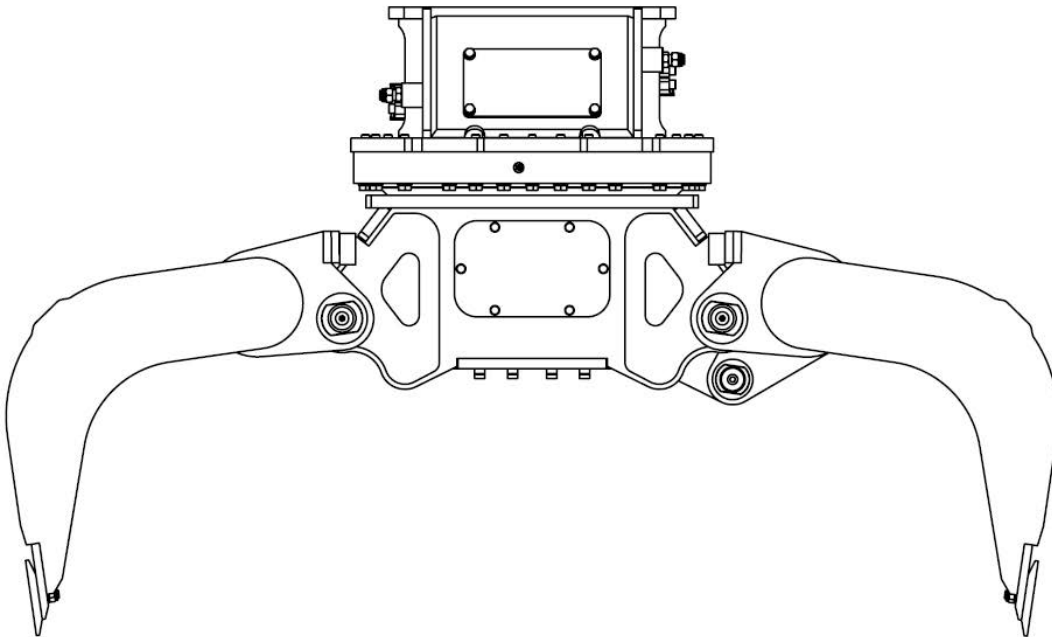


Fig. 3.1 Transport

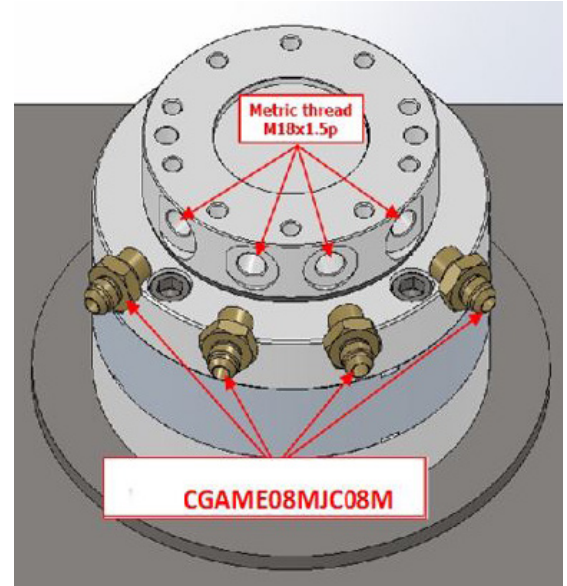
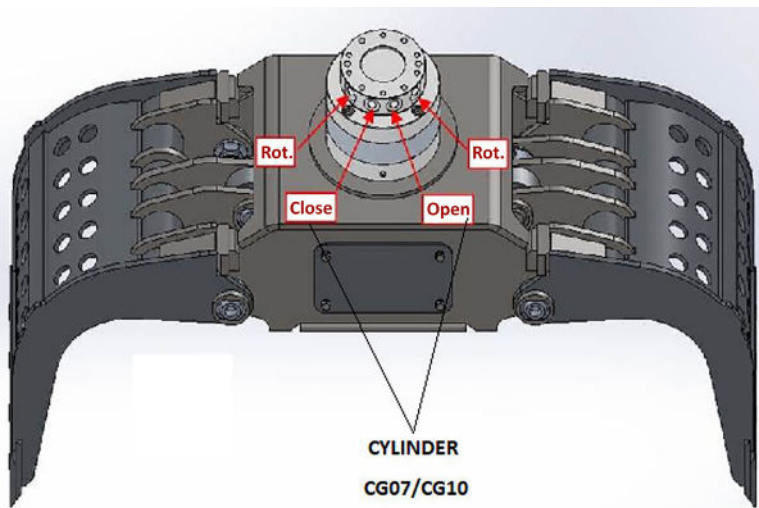
4.0 Installation

4.1 Hydraulic Connections

To operate the Grapple, two hydraulic systems are required. One is for opening and closing of the grapple shell and the other is for rotation of the grapple shell.

The Grapple has hose nipples for hydraulic connections. The specification for the hose nipples are shown in the table below:

CAUTION For safety reasons, and to prevent environmental pollution, a stop valve for each connection should be installed.



Grapple Model	ROTATOR CURCUIT INLET/OUTLET	Recommended Lead Hose Rotation Circuit	INLET/OUTLET	Recommended Lead Hose Inlet/Outlet
CG07	CGAPO08MJC08	JIC-8 / (1/2in)	CGAME08MJC08M	JIC-8 / 1/2in)
CG10			CCAPO12MJC12M	JIC-12 / 3/4in)
CG15			CWAUF16MJC16M	JIC-16 (1in)
CG22				
CG30			CGAUF20MJC20M	JIC-20 (1 1/4in)
CG40				

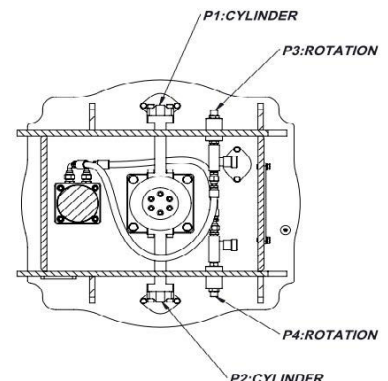
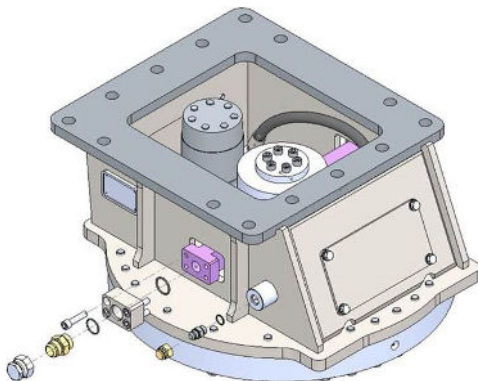
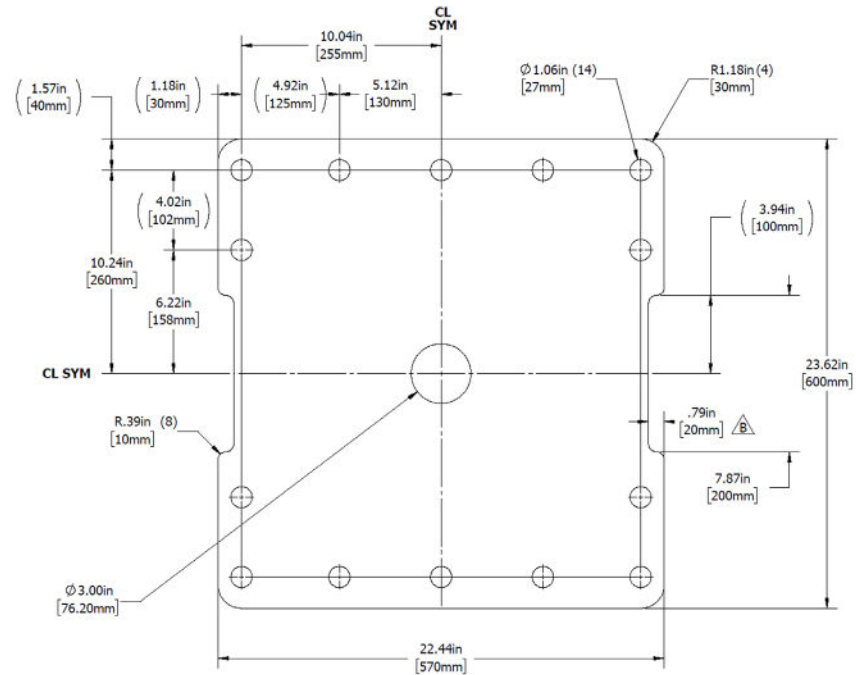


Fig. 4.1 Hydraulic Connections

4.0 Installation

4.2 Mounting Plate Pattern and Dimensions - continued

CG15 / CG22



CG30

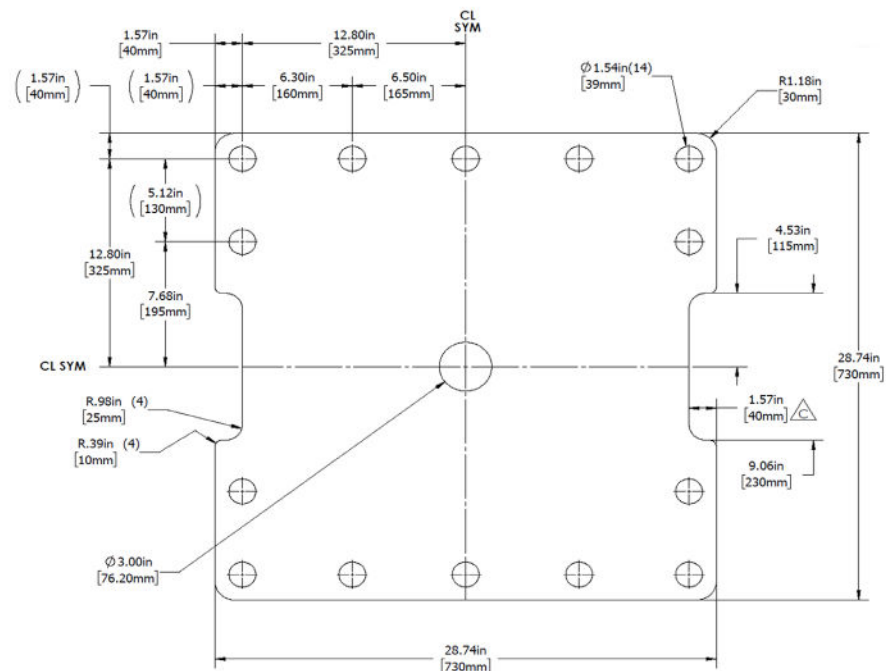


Fig. 4.2.2 Bolt Patterns

4.0 Installation

4.3 Attaching to the Carrier

1. Assemble the top bracket to the Grapple top plate.
2. Connect the top bracket to the carrier boom by using the boom pins.



Do not put hands inside the pin holes of the carrier boom when installing the boom pins.

3. Check the pins are in correct position.
4. Grease the pins.
5. Move boom cylinder and check the movement of the Grapple.
6. Connect the hydraulic line. The hydraulic hose specification is shown in the table below. Make sure that the hoses are long enough for free movement of the Grapple.



Before connecting the hoses, remove all foreign materials such as dirt/sand from the connectors. Hoses must be capable of withstanding high pressure as specified in sections 4.3 and 4.4.

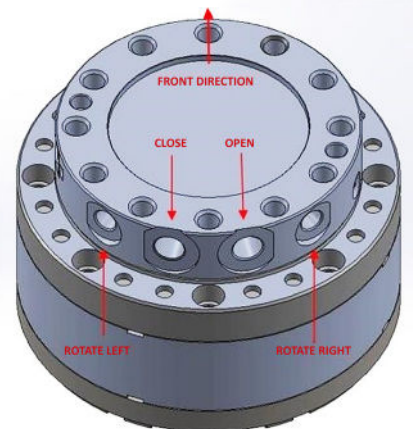
Grapple Model	Recommended Lead Hose Rotation Circuit	INLET/OUTLET	Recommended Lead Inlet/Outlet
CG07	JIC-8 / (1/2in)	CG07	JIC-8 / (1/2in)
CG10		CG10	JIC-12 / (3/4in)
CG15		CG15	JIC-16 / (1in)
CG22		CG22	
CG30		CG30	JIC-20 (1 1/4in)
CG40		CG40	

After mounting on the carrier, the hydraulic system must be bled for remaining air. If this is not done, the cylinder in the Grapple could be easily damaged.

Bleeding method: Open and close grapple slowly four times. Do not hold grapple open or closed, that would induce high pressure into the grapple.



Do not use high pressure at this time.



CG07/CG10

4.0 Installation

4.4 Working Pressures and Opening and Closing Times

For proper operating of the Grapple, the operating pressure should be within the required range shown in the table below.

Low working pressure may cause reduced closing power of the grapple shell.

Check the working pressure setting, and adjust it if necessary.

Grapple Cylinder	CG Grapples					
	CG07	CG10	CG15	CG22	CG30	CG40
Max Pressure (bar)	320			350		
Max Pressure (psi)	4,641			5,076		

Opening and closing time of the shells depends on the oil flow.

The table below shows the opening & closing time with relevant oil flow.

If the oil flow is too high, the temperature will increase and the lifetime of oil may be reduced.

Specification		CG Grapples					
		CG07	CG10	CG15	CG22	CG30	CG40
Excavator flow (L/min)		60/15.9gpm		80/21.1gpm	100/26.4gpm	180/47.5gpm	
Time(s)	Closing	1.3		0.8	1.5	2.0	1.8
	Opening	0.74		0.5	0.8	1.0	0.9

4.5 Rotation Time

Grapple Rotation	CG Grapples					
	CG07	CG10	CG15	CG22	CG30	CG40
Max. pressure (bar)	250		140			
Max. pressure (psi)	3,626		2,031			
Optimal flow (L/min)	15	30	75			
Optimal flow (gal/min)	4	7.9	19.8			

The maximum turning speed of the Grapple is 20 RPM and the oil flow at this time is 30-50 L/m respectively.

It is possible to adjust turning speed through oil flow control valves at each connection. By turning counter-clockwise, the rotation speed will increase. By turning clockwise, the rotation speed will decrease.

5.0 Operation

5.1 Operation

During operation, make sure to adhere to the following points:

1. Never operate Grapple over the cab, other people or machines.
2. Only work with Grapple when the carrier is on a safe base.
3. Never move the boom or the carrier while closing the grapple.
4. Never turn the Grapple while closing the grapple.
5. Never extend the bucket cylinder while closing the grapple.
6. Never pull supports or walls with Grapple.
7. Never use the Grapple for hammering on the structure to be demolished.

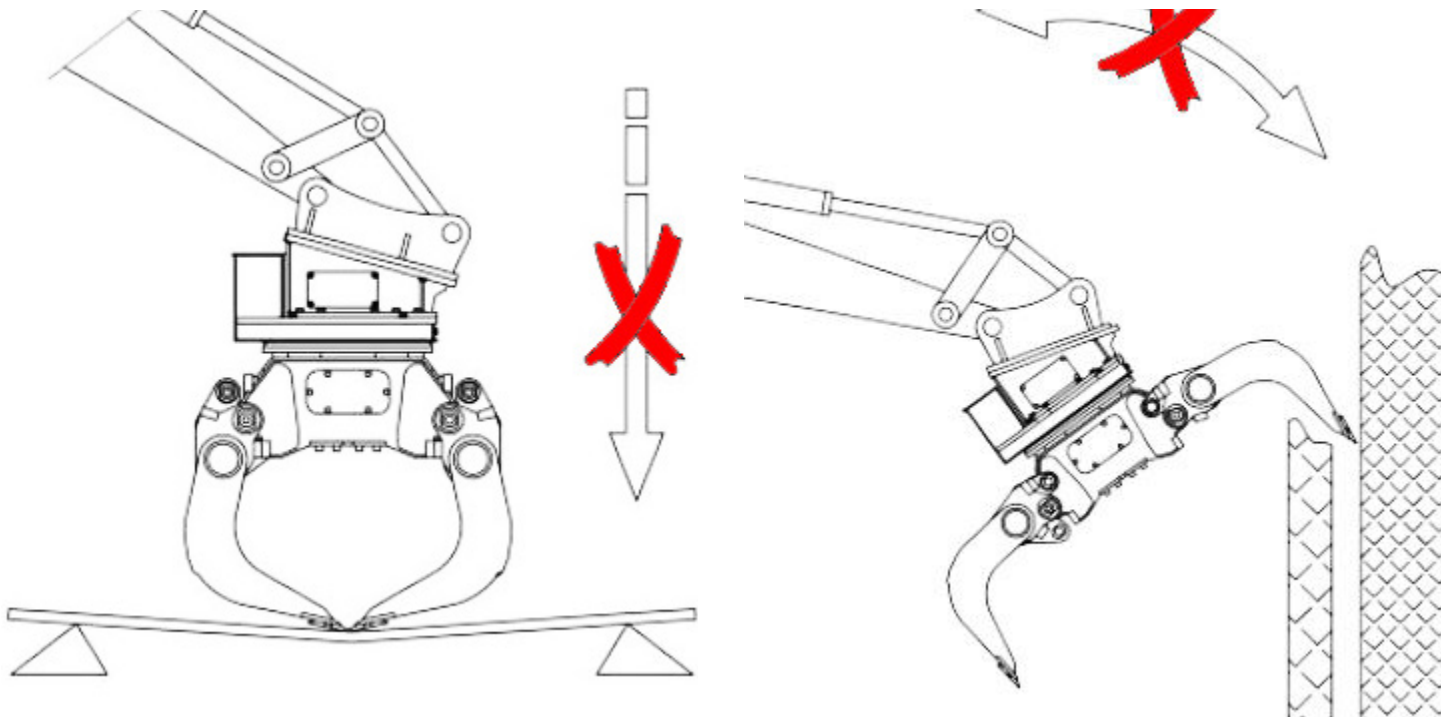


Fig. 5.1 Incorrect Use

5.0 Operation

5.2 Application of Breaking Plates

The Grapple has wear plates for extracting materials.

They are attached to both ends of each shell to prevent material dropping from the shell and are also used for crushing of soft material.

There are holes for attaching the plates on the shell. Refer to the "Tightening Torque" section.

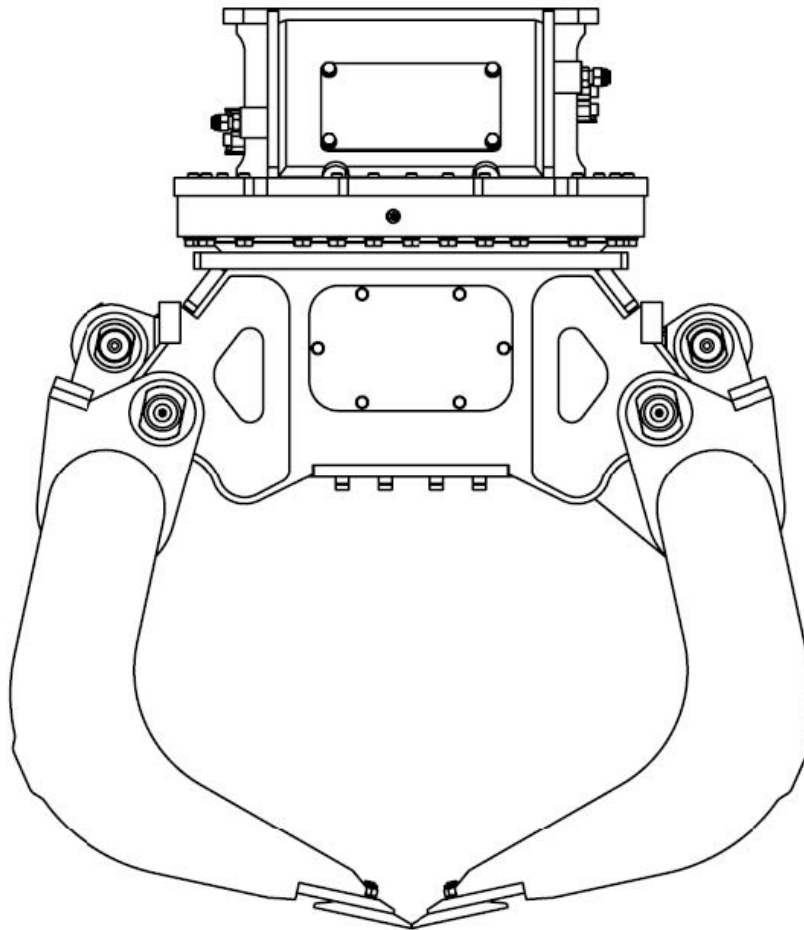


Fig. 5.2 Wear Plates

6.0 Maintenance

6.1 Safety Precautions

General:

Do not carry out inspection or maintenance work when the engine is working.

During inspection, two qualified persons are necessary. One for operation of the excavator, and the other person for checking the operation of the Grapple.

During the inspection, do not touch the Grapple.

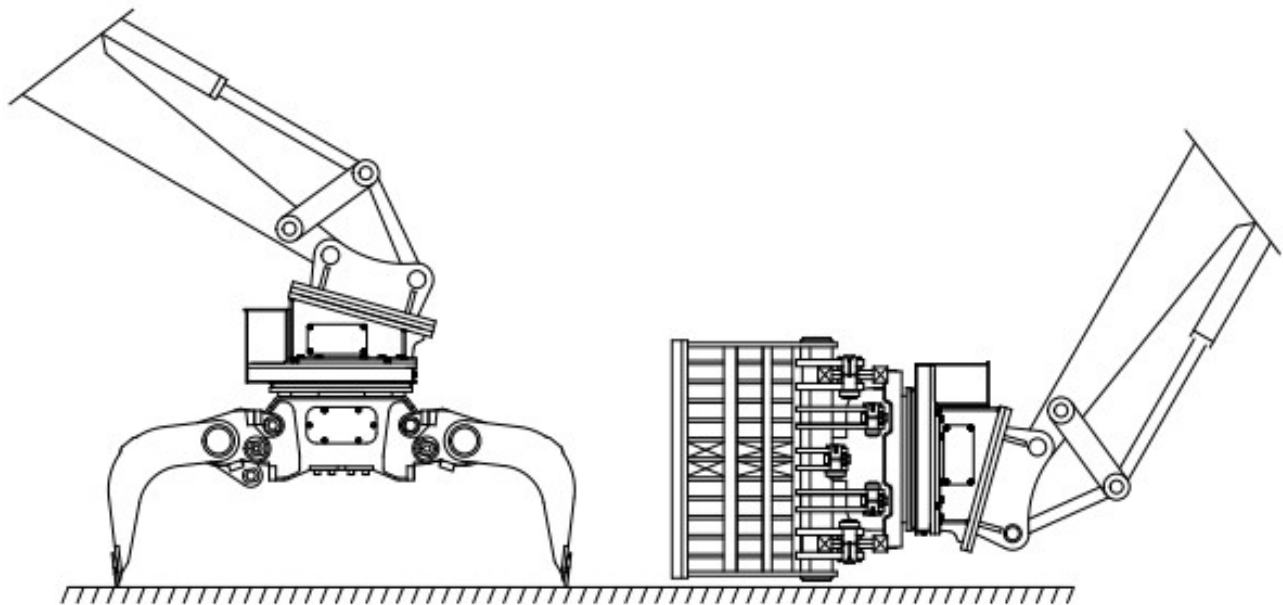
NOTICE Wait until the pressure reduces to 5 bar/75 psi.

A. Maintenance or repair of the Grapple shell or swivel head:

1. Place Grapple on level ground with shells open or lay Grapple on its side.
2. Turn off the excavator engine and close the stop valve at boom and cap the Grapple ports and hose ends.
3. Above 1, 2 should be done before maintenance or inspection.

B. Maintenance or repair of the hydraulic system:

Maintenance of the hydraulic system can only be performed after internal pressure reduces.



LUBRICATE GREASE POINTS L1 & L2 THREE (3) TO (4) FOUR STROKES WITH RECOMMENDED LUBRICANT
AFTER LUBRICATING AT POINTS L1 & L2, TURN THE GRAPPLE 180 DEGREES AND LUBRICATE POINTS L1 & L2 TURN TABLE ONCE MORE

NOTE: ALL GREASE POINTS CAN BE ACCESSED EASILY WHEN GRAPPLE IS IN CLOSED POSITION

CAUTION: DO NOT LUBRICATE THE GRAPPLE WHILE STANDING BELOW IT

Fig. 6.1 Grapple Maintenance

6.0 Maintenance

6.2 Daily Inspection Checklist

1. Visually check for cracks or excessive wear that may cause structural failure.
2. Check hydraulic lines for leaks and damage.
3. Check the pins and bushings for wear and damage, replace if necessary.
4. Check for loose and missing bolts, nuts. Tighten or replace if needed.
5. Lubricate all lubrication zerks.
6. Check all parts for damage and if necessary, change faulty ones.

6.3 Lubrication

Injection parts are shown in the picture below. After lubrication at L1 & L2, turn 180 and lubricate at L1 & L2 once more. (During greasing at L1 & L2, give 3 or 4 strokes with the grease pump).

NOTICE

Note: All greasing points can be accessed easily when the grapple is closed.
Note: Do not grease the grapple while standing below it.

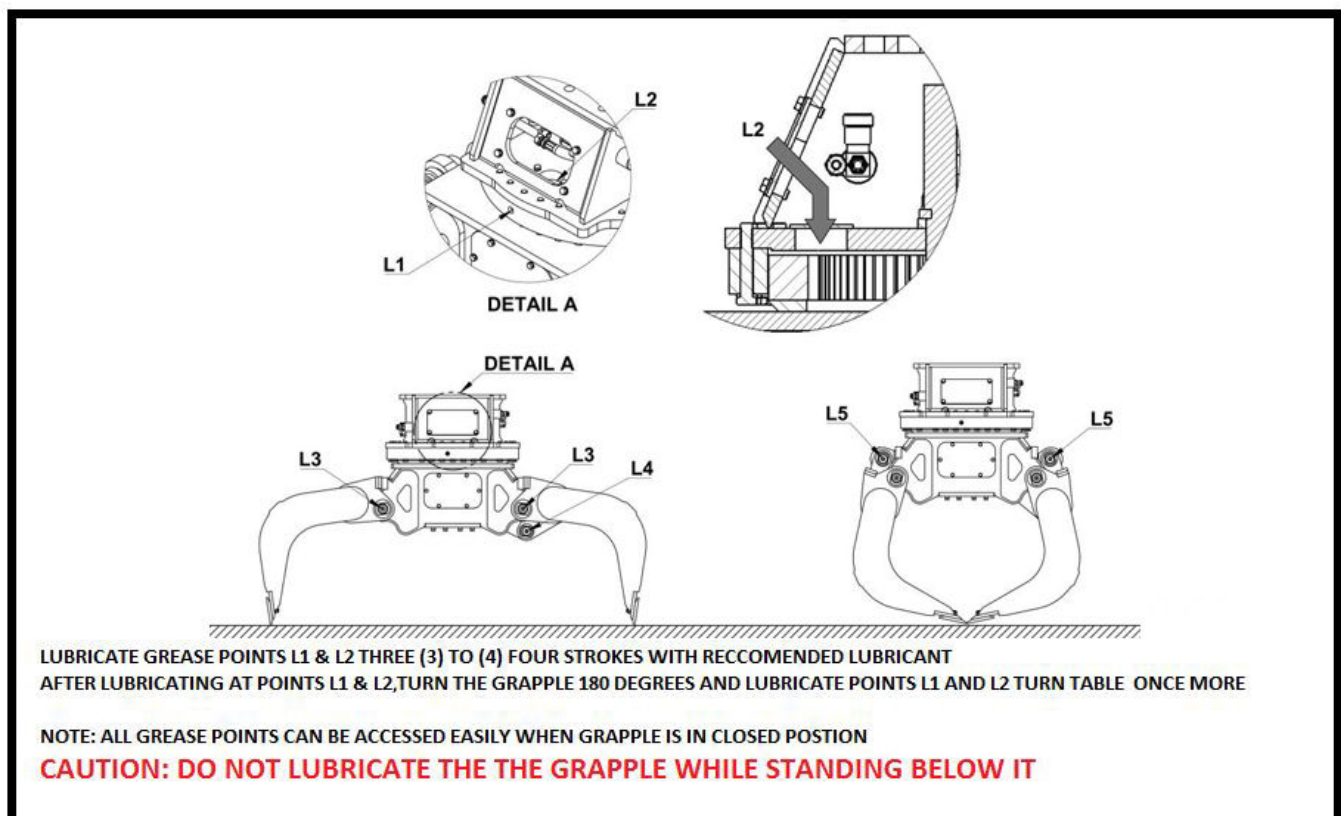


Fig. 6.3 Grapple Lubrication

6.0 Maintenance

6.4 Welding the Grapple

Do not weld any parts of the Grapple without getting the manufacturer's procedure.

6.5 Replacement of Cutting Edges

When the cutting edges are badly worn or damaged, it should be turned to the opposite side.

Check and torque to the specifications below:

Size	Torque Values (+/- 10% [Nm])		
	Material quality (8.8T)	Material quality (10.9T)	Material quality (12.9T)
M10	50	70	80
M12	85	120	145
M14	135	190	230
M16	210	295	355
M20	410	580	690
M24	710	1,000	-
M27	1,050	1,500	-
M30	1,450	2,000	-

7.0 Troubleshooting

PROBLEM	PROBABLE CAUSE	REMEDY
Cylinder does not operate	Sticking in solenoid valve	Repair solenoid spool or replace with new one
	Working fluid (oil) does not flow	Check the piping. (turn on stop valve)
	Damage of seal in center	Replace damaged seal
	Damage of seal in cylinder	Replace damaged seal
Motor does not operate	Sticking in solenoid valve	Repair solenoid spool or replace with new one
	Motor Damage	Repair or replace with new one
	Breaking of pinion or motor	Replace with new one
	Brake pressure too low	Adjust brake valve pressure
Oil leakage from cylinder	Damaged Seal	Replace with new one
Oil leakage from rotary joint	Damaged Seal	Replace with new one
Oil temperature too high	The failure of an excavator cooling system	Ask service station for base machine service
	The failure of a return line	Ask Connect Work Tools service for repair

GRAPPLE HOSE ROUTING ROTATION CURCUIT ALL CG SERIES MODELS

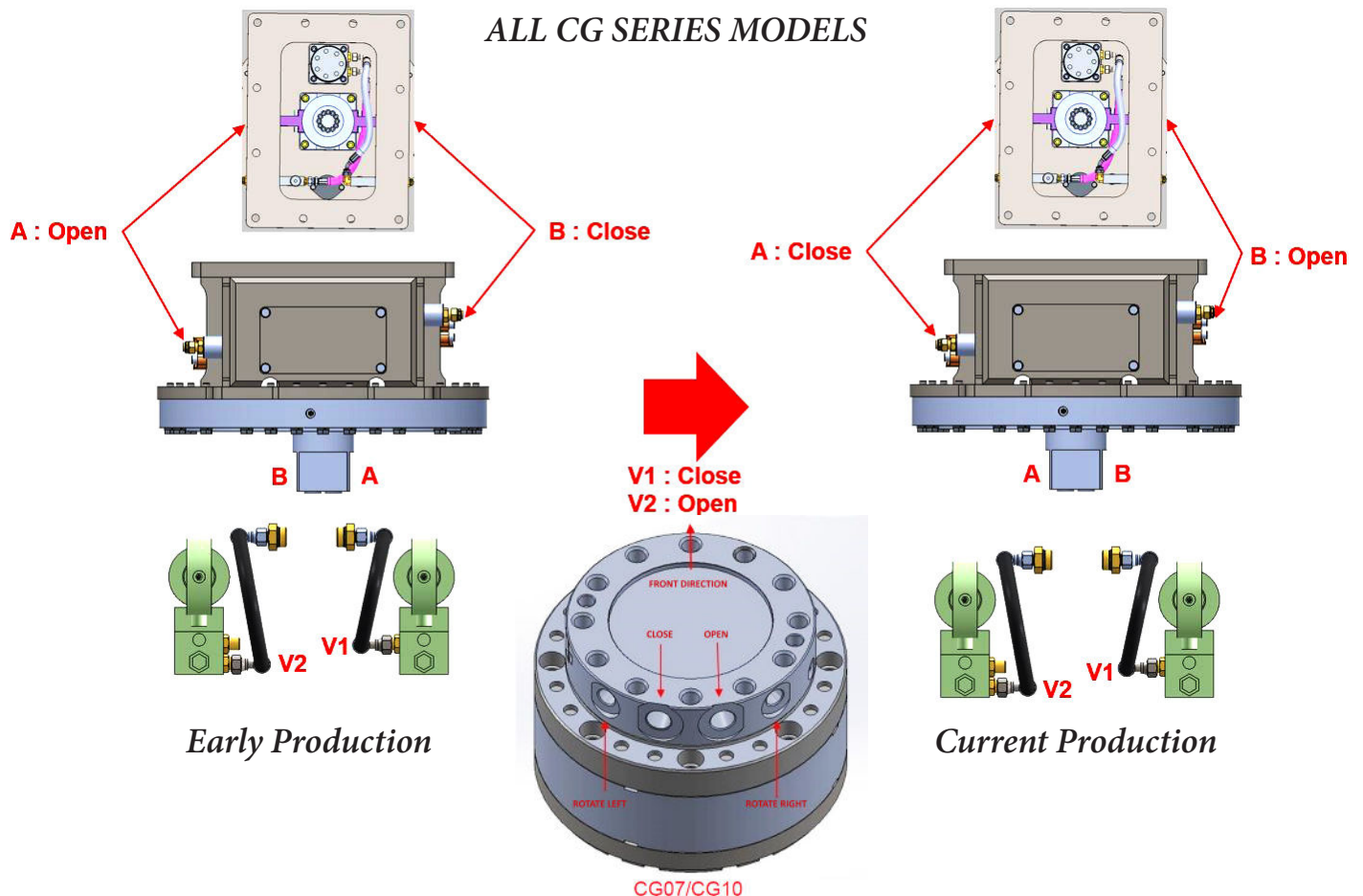
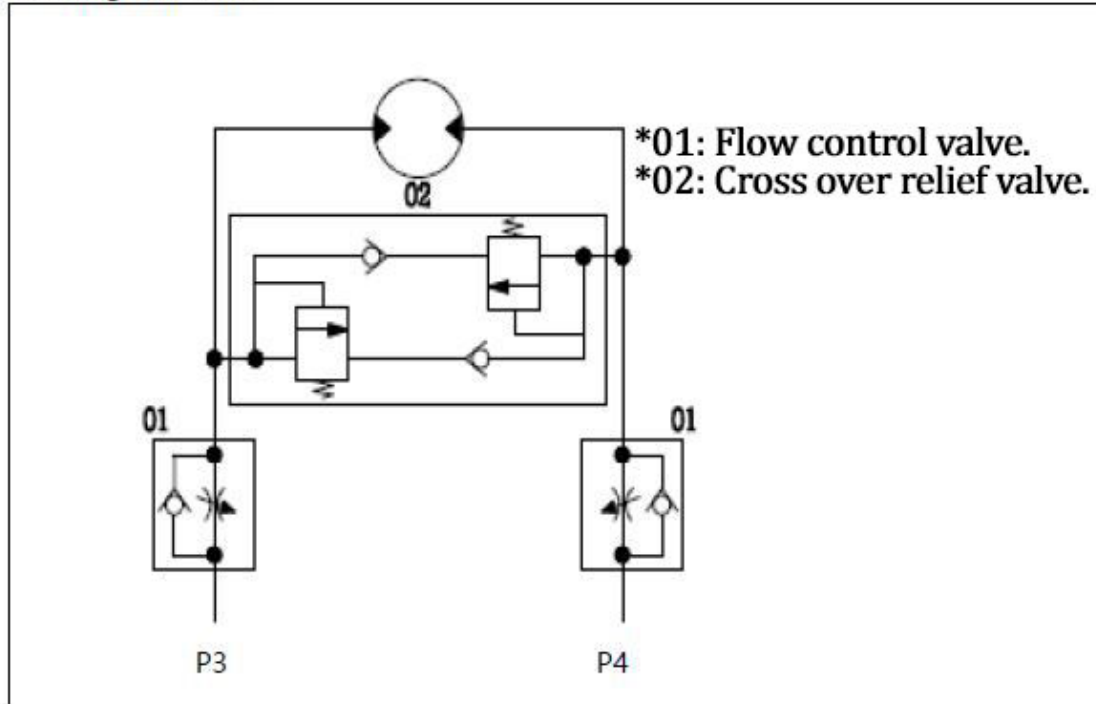


Fig. 7.1 Hose Routing Rotation Circuit

8.0 Hydraulic Diagram

1) Swing Motor.



2) Cylinder

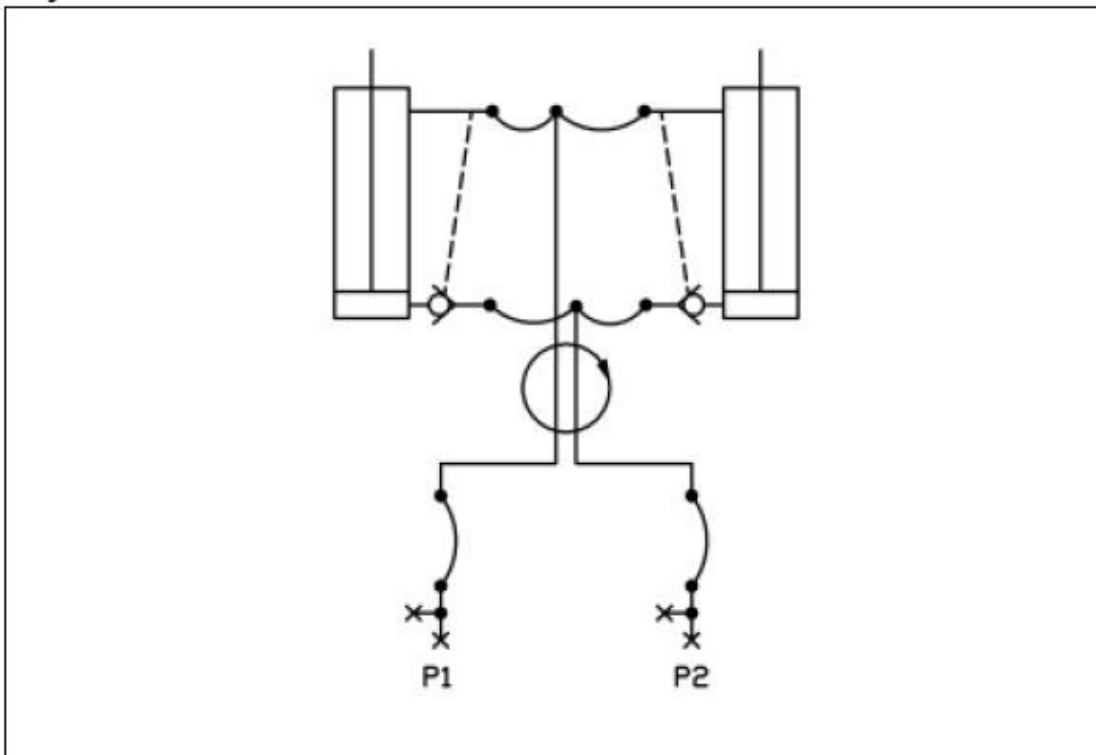


Fig. 8.1 Hydraulic Diagram



CG Series Grapples



Models

CG07

CG10

CG15

CG22

CG30

CG40

Parts Manual

Connect Work Tools - www.connectworktools.com - 920.238.6657

9.0 Equipment Identification

9.1 Location of the Serial Number Decal

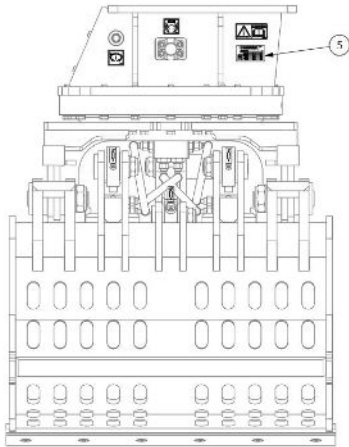


Fig. 9.1 Equipment Identification

The Serial Equipment Identification Decal is affixed to the side of the housing box. It provides the following information:

- Serial Number
- Model
- Weight
- Open/Close Pressure
- Open/Close Oil Volume
- Rotate Pressure
- Rotate Oil Volume

****Note: Prior to ordering parts, it's important to confirm your model and serial number**

CONNECT WORKTOOLS™			
S/N:			
Model:			
Weight:	kg	lb	
Operating Pressure:	bar	psi	
Oil Flow:	l/min	gpm	
Carrier Relief Pressure:	bar	psi	
Return Line Pressure:	bar	psi	

Fig. 9.2 Serial Decal

9.2 Owner's Record of the Equipment

Record the Model and Serial Number from the Serial Equipment Identification Tag to the space provided below. Indicate the date in which the Connect Work Tools equipment was placed into service.

Model CG07: CG07

Model CG10: CG10

Model CG15: CG15

Model CG22: CG22

Model CG30: CG30

Model CG40: CG40

Serial Number: _____

In Service Date: _____

Your Connect Work Tools representative requires this information to better assist you with questions regarding parts, warranty, operation, maintenance, or repair.

Your equipment must be registered by your local Distributor at the time of sale.

Product Registration Date: _____

10.0 CG Grapples - CG07

Connect Work Tools CG Series Grapple Model CG07

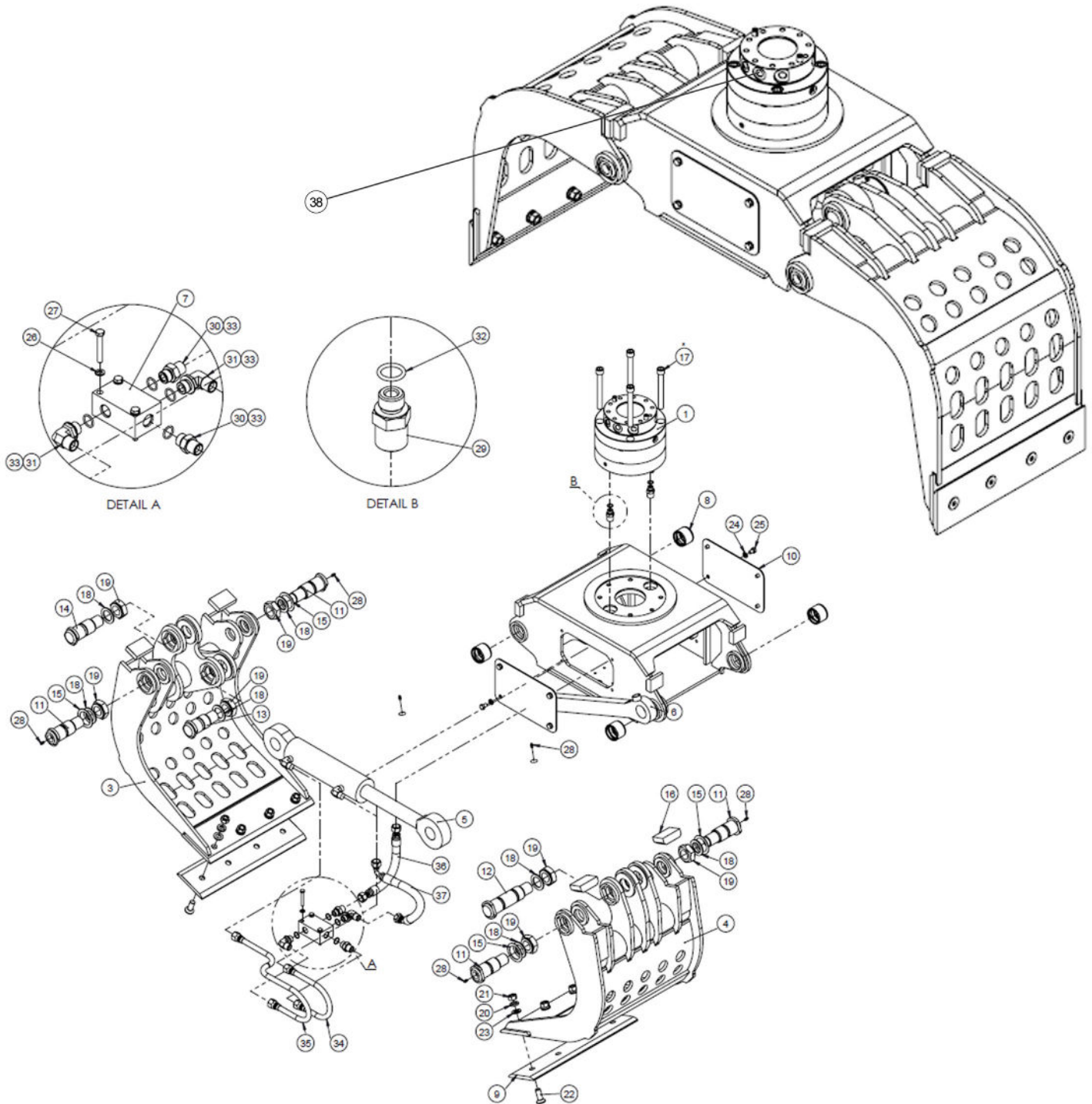


Fig. 10.1 CG Series Grapple Model CG07

10.0 CG Grapples - CG07

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS0770010	ROTATOR CPR-5-01	1	
2	CGS0771000	BODY ASSY	1	
3	CGS0774000	PERFORATED ARM W.A (L)	1	PERFORATED TYPE
	CGS0772000	RIBBED ARM W.A (L)	1	RIBBED TYPE (Not pictured)
4	CGS0775000	PERFORATED ARM W.A (R)	1	PERFORATED TYPE
	CGS0773000	RIBBED ARM W.A (R)	1	RIBBED TYPE (Not pictured)
5	CGS1025000	CYLINDER	1	
6	CGS1008000	ROD W.A	1	
7	CGS1026000	BLOCK	1	
8	CGS1012000	BUSHING LINK	4	
9	CGS0700010	CUTTING PLATE	2	
10	CGS0700020	CG	2	
11	CGS0700030	LINK PIN	4	
12	CGS0700040	PIN	1	
13	CGS0700050	PIN	1	
14	CGS0700060	PIN	1	
15	CGS0700070	SHIM	4	
16	CGS0774110	LUG STOPPER	4	
17	50-00733	SOCKET BOLT	4	
18	CHPW360000	PLAIN WASHER	7	
19	CWNN3640000	NYLON NUT	7	
20	CHSW160000	SPRING WASHER	8	
21	CHHN160000	HEX. NUT	8	
22	CGDB1620045	DISH BOLT	8	
23	CHPW160000	PLAIN WASHER	8	
24	CHSW100000	SPRING WASHER	8	
25	CGHB1015015	HEX BOLT	8	
26	CGSW080000	SPRING WASHER	3	
27	CGHB0812055	HEX BOLT DIN931	3	
28	CHGN180000	GREASE NIPPLE	6	
29	CGAPO06MJS08M	ADAPTER	2	
30	CWAPO08MJS08M	ADAPTER	2	
31	CGAPO08MJS08M90	ADAPTER	2	
32	CHB1807310	O-RING (1BP14)	2	
33	CGA2507380	O-RING (P18)	4	
34	CGS1032000	HOSE ASSY	1	
35	CGS1034000	HOSE ASSY	1	
36	CGS0770020	HOSE ASSY	1	
37	CGS0770030	HOSE ASSY	1	
38	CGAME08MJC08M	ADAPTER	4	

10.0 CG Grapples - CG10

Connect Work Tools CG Series Grapple Model CG10

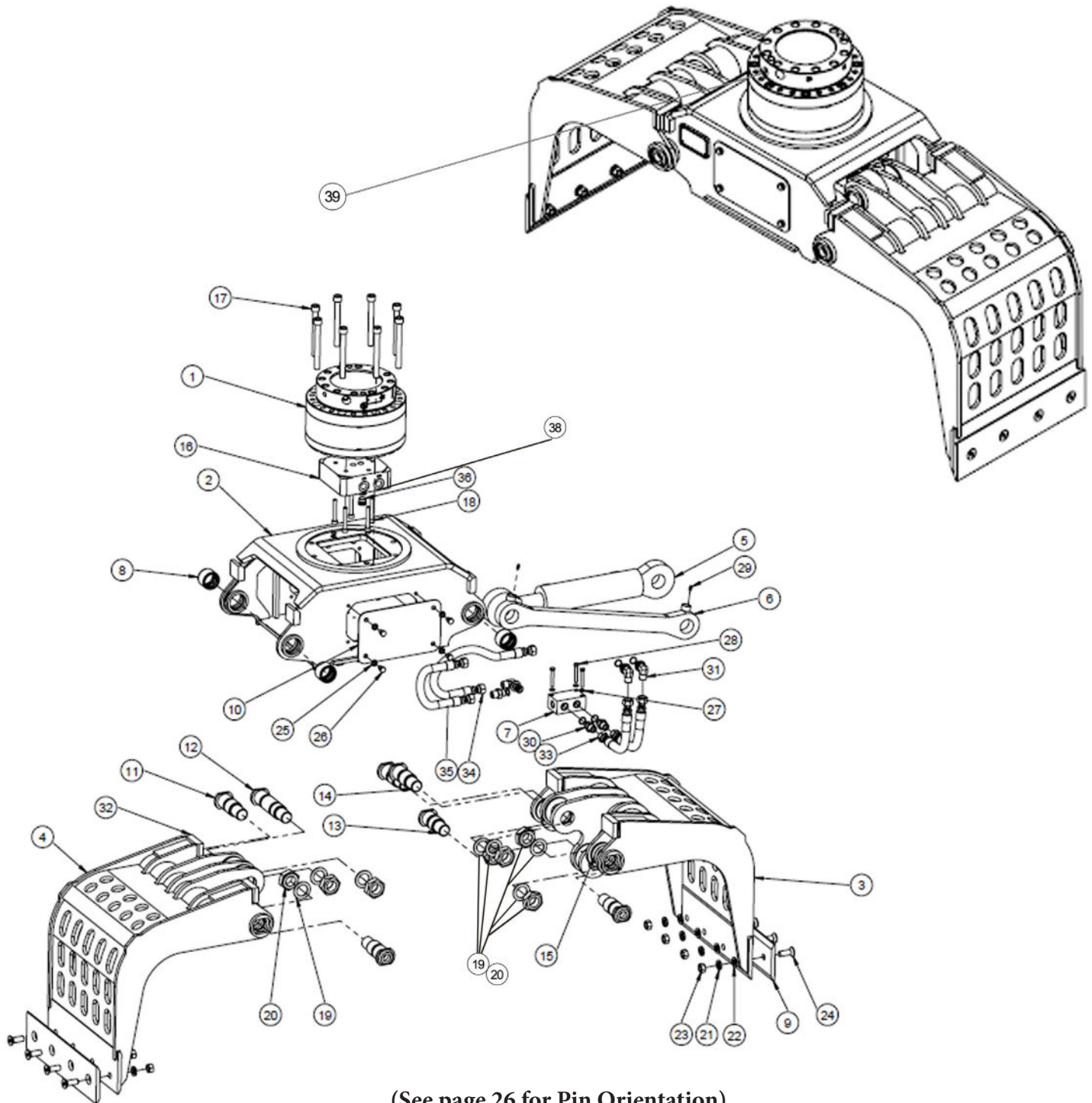


Fig. 10.2 CG Series Grapple Model CG10

10.0 CG Grapples - CG10

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS1070010	ROTATOR CPR-9	1	
2	CGS1071000	BODY ASSY	1	
3	CGS1074000	PERFORATED ARM W.A (L)	1	PERFORATED TYPE
	CGS1072000	RIBBED ARM W.A (L)	1	RIBBED TYPE (Not pictured)
4	CGS1075000	PERFORATED ARM W.A (R)	1	PERFORATED TYPE
	CGS1073000	RIBBED ARM W.A (R)	1	RIBBED TYPE (Not pictured)
5	CGS1025000	CYLINDER	1	
6	CGS1008000	ROD W.A	1	
7	CGS1026000	BLOCK	1	
8	CGS1012000	BUSHING LINK	4	
9	CGS0700010	CUTTING PLATE	2	
10	CGS0700020	COVER	2	
11	CGS0700030	LINK PIN	4	
12	CGS0700040	PIN	1	
13	CGS0700050	PIN	1	
14	CGS0700060	PIN	1	
15	CGS0700070	SHIM	4	
16	CGS1074170	CPR09 BLOCK	1	
17	CGSB1620150	SOCKET BOLT	8	
18	CGSB1015070	SOCKET BOLT	5	
19	CHPW360000	PLAIN WASHER	7	
20	CWNN3640000	NYLON NUT	7	
21	CHSW160000	SPRING WASHER	8	
22	CHPW160000	PLAIN WASHER	8	
23	CHHN160000	HEX. NUT	8	
24	CGDB1620045	DISH BOLT	8	
25	CHSW100000	SPRING WASHER	8	
26	CGHB1015015	HEX BOLT	8	
27	CGSW080000	SPRING WASHER	3	
28	CGHB0812055	HEX. BOLT	3	
29	CHGN180000	GREASE NIPPLE	6	
30	CWAPO08MJS08M	ADAPTER	3	
31	CGAPO08MJS08M90	ADAPTER	3	
32	CGS1074080	STOPPER-1	4	
33	CGS1074180	HOSE	2	
34	CGS1074190	HOSE	1	
35	CGS1074200	HOSE	1	
36	CFA0606180	SOCKET PLUG	1	
37	CGA2507380	O-RING (P18)	7	
38	CCAPO12MJC12M	ADAPTER	2	
39	CGAME08MJC08M	ADAPTER	2	

10.0 CG Grapples - CG15

Connect Work Tools CG Series Grapple Model CG15

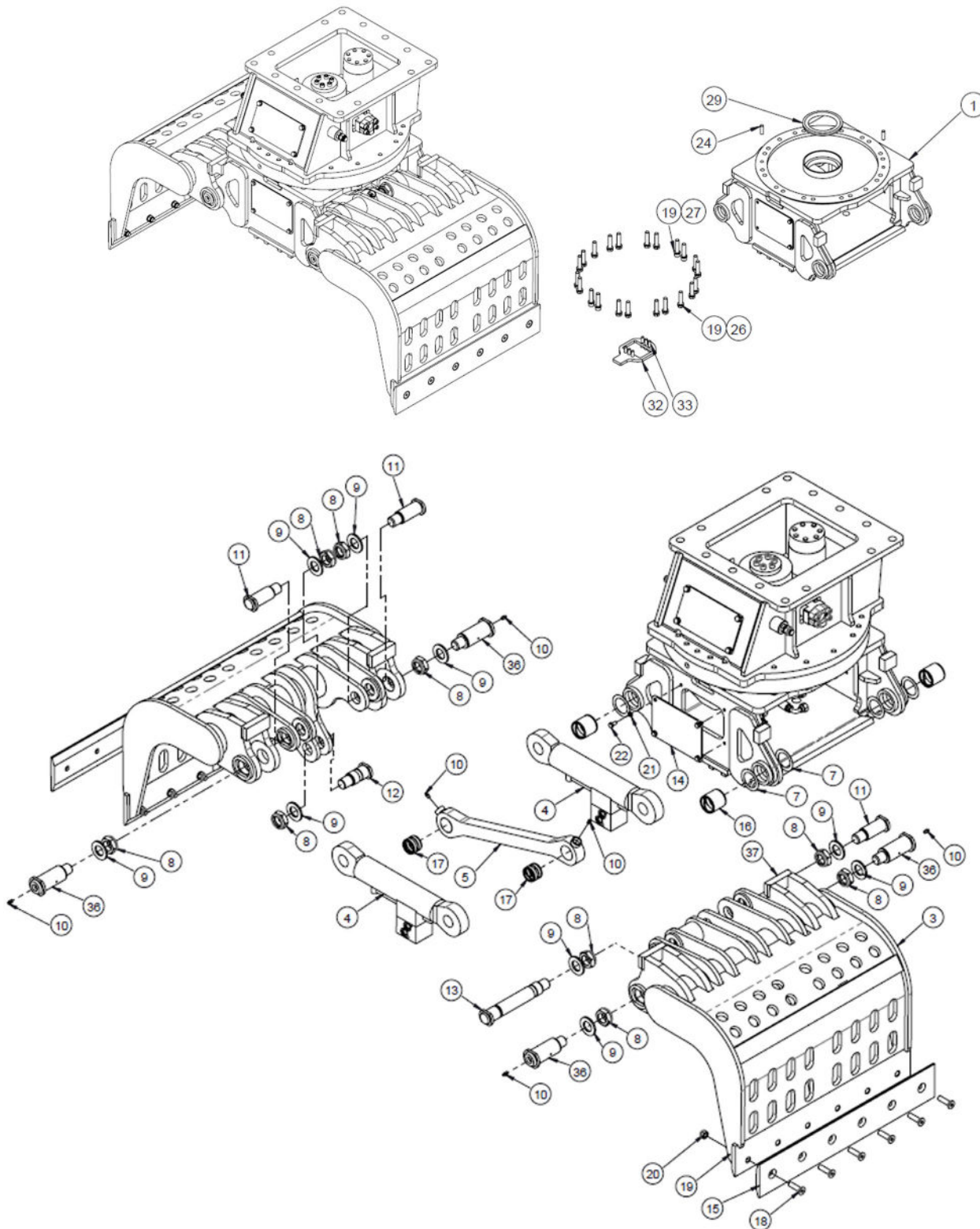


Fig. 10.3.1 CG Series Grapple Model CG15

10.0 CG Grapples - CG15

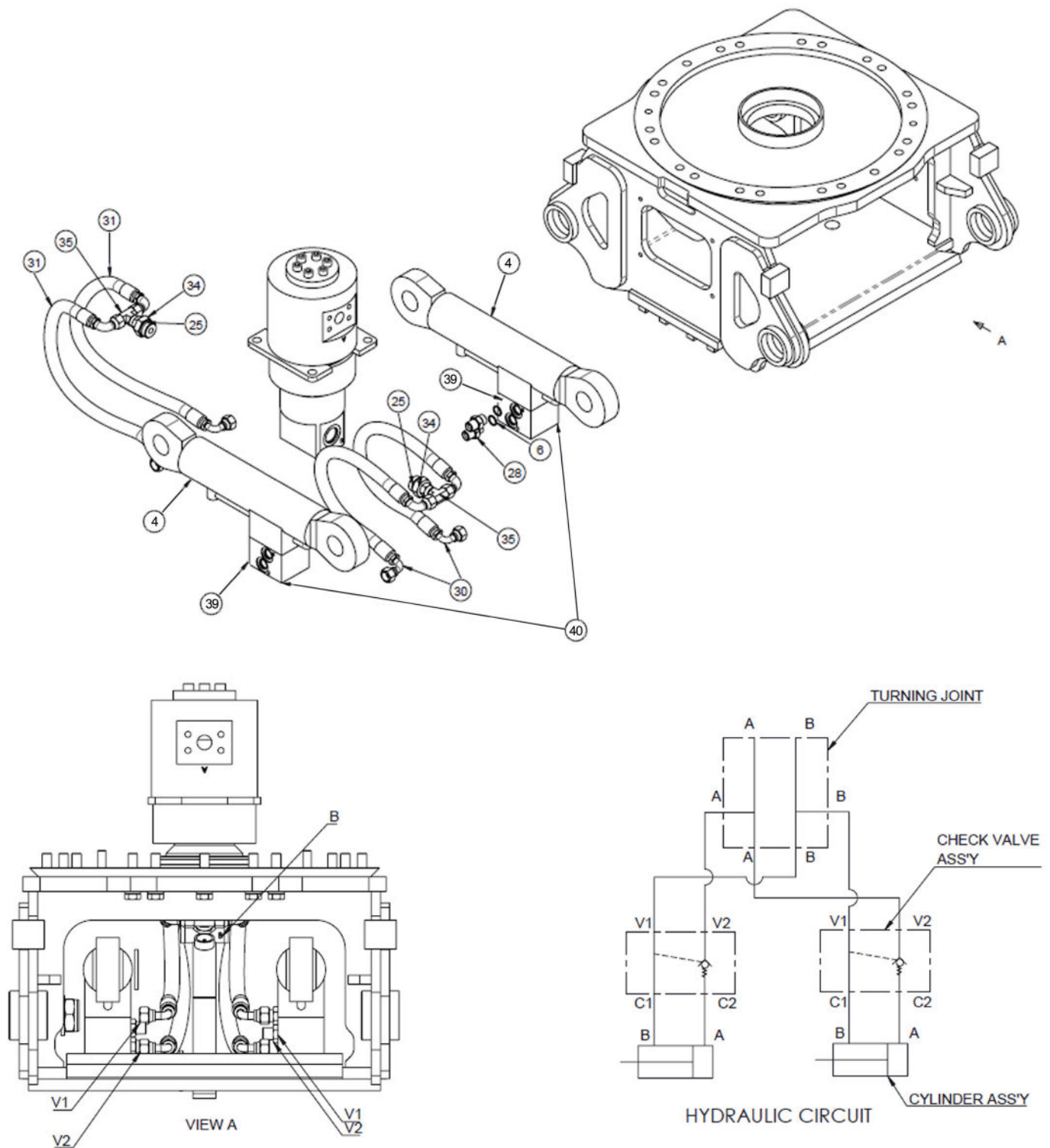


Fig. 10.3.2 CG Series Grapple Model CG15

10.0 CG Grapples - CG15

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS1591000	BODY ASSY	1	
2	CGS1574000	PLATE ARM W.A (L)	1	PERFORATED TYPE
	CGS1572000	PLATE ARM W.A (L)	1	RIBBED TYPE (Not pictured)
3	CGS1575000	PLATE ARM W.A (R)	1	PERFORATED TYPE
	CGS1573000	PLATE ARM W.A (R)	1	RIBBED TYPE (Not pictured)
4	CGS1706000	CYLINDER TOTAL ASSY	2	
5	CGS1511000	ROD W.A	1	
6	CGA2507380	O-RING (P18)	4	
7	CGS1523000	SHIM	8	
8	CWNN3640000	NYLON NUT	10	
9	CHPW360000	PLAIN WASHER	10	
10	CHGN180000	GREASE NIPPLE	6	
11	CGS1515000	PIN	3	
12	CGS1516000	PIN	1	
13	CGS1514000	PIN	1	
14	CGS1509000	COVER 1.	2	
15	CGS1508000	CUTTING PLATE	2	
16	CGS1580550	BUSHING	4	
17	CGS1518000	BUSHING	2	
18	CGDB1620060	DISH BOLT	12	
19	CHSW160000	SPRING WASHER	34	
20	CHNN162000	NYLON LOCK NUT	12	
21	CHSW100000	SPRING WASHER	8	
22	CGHB1015020	HEX. BOLT	8	
23	CGS2052100	TOP BODY ASSY	1	
24	CHA2506420	GUIDE PIN	2	
25	CWSWV4300010	O-RING (AS568-916)	2	
26	CFHB1620070	HEX. BOLT	18	
27	CGSB1620070	SOCKET BOLT	4	
28	CWAP008MJS08M	ADAPTER	4	
29	CWP25U0030	TRIMS SEAL RUBBER	1	
30	CGS1580510	HOSE ASSY	2	
31	CGS1580520	HOSE ASSY	2	
32	CWS2050060	STOPPER	1	
33	CHSB1217040	SOCKET BOLT	6	
34	CGAUF16MJC10M	ADAPTER	2	
35	CGS1580560	TEE	2	
36	CGS1580540	PIN	4	
37	CGS1572140	STOPPER-1	4	
38	CGS1527100	CYLINDER SEAL KIT	1	(Not Pictured)
39	CGS2158010	PILOT CHECK VALVE	2	
40	CGS2158000	PVC CYLINDER VALVE ASSY	2	

10.0 CG Grapples - CG15

Connect Work Tools CG Series Grapple Model CG15 Top Body Assy

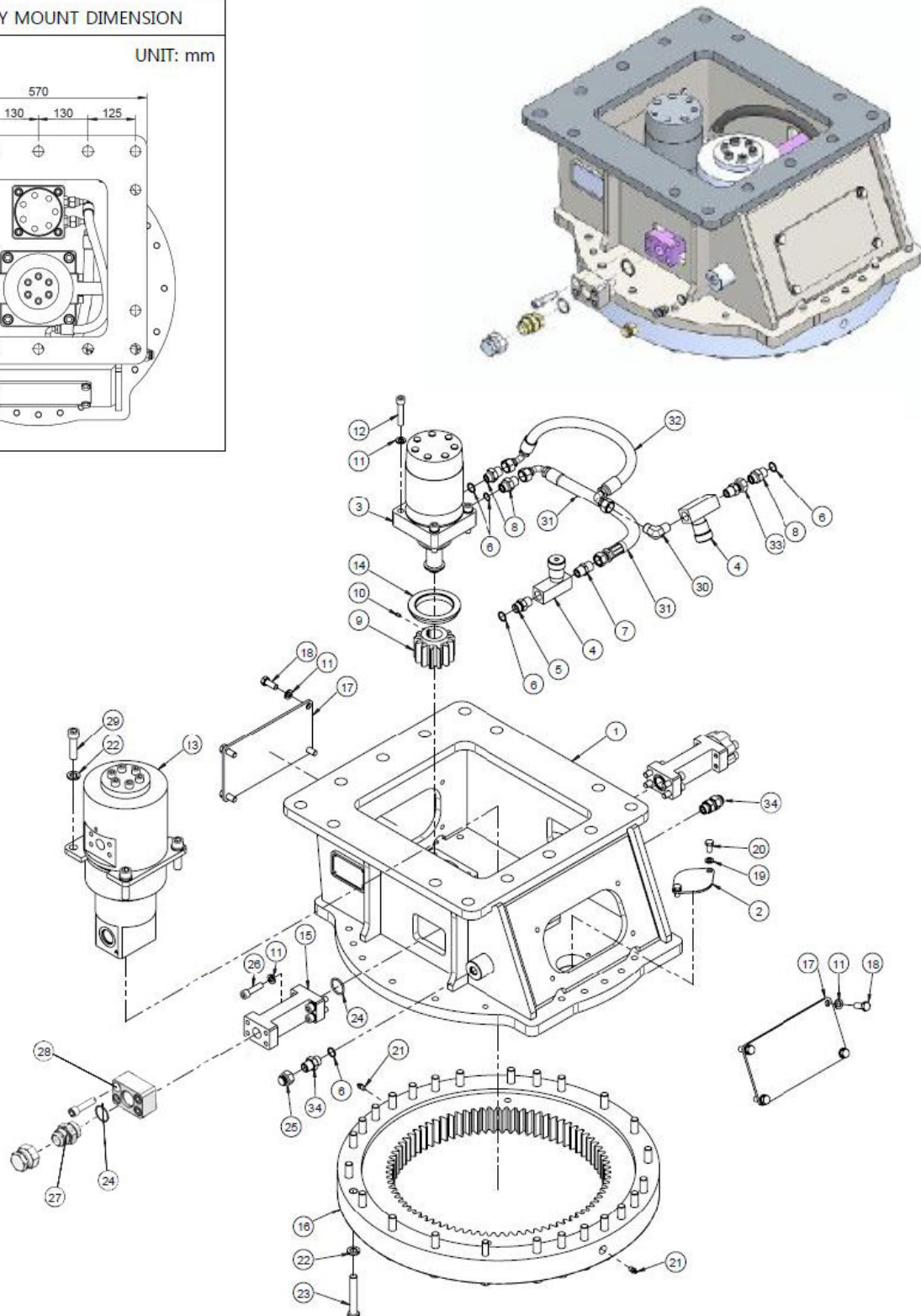
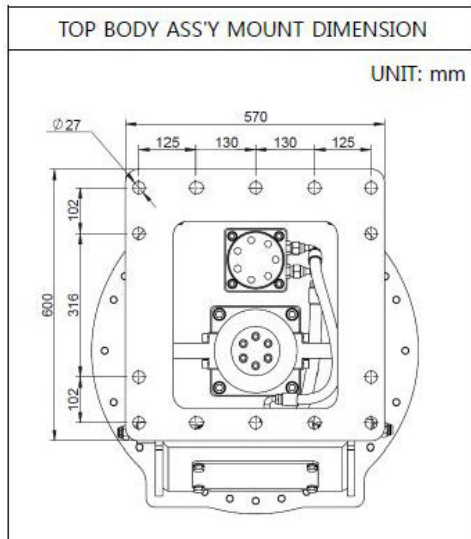


Fig. 10.3.3 CG Series Grapple Model CG15

10.0 CG Grapples - CG15

NO	PART NO.	PART NAME	QTY	REMARKS
1	CWS2052600	TOP BODY FRAME ASSY	1	
2	CWC2010280	COVER	1	
3	CWC2010220	MOTOR ASSY	1	
4	CGC2010230	FLOW CONTROL VALVE	2	
5	CWAPO08MPT08M	ADAPTER	1	
6	CGA2507380	O-RING (P18)	6	
7	CWAPT08MJS08M	ADAPTER	1	
8	CWAPO08MJS08M	ADAPTER	5	
9	CWC2010180	PINION GEAR	1	
10	CGSS0610010	SET SCREW	1	
11	CHSW120000	SPRING WASHER	20	
12	CWSB1217060	SOCKET BOLT	4	
13	CWS2050040	TURNING JOINT	1	
14	CWS3025010	PLATE	1	
15	CWS3020090	MACH PORT RLOCK	2	
16	CWC2010190	SLEWING RING ASSY	1	
17	CWS3025060	MAIN PLATE	2	
18	CHHB1217030	HEX. BOLT	8	
19	CHSW100000	SPRING WASHER	2	
20	CFHB1015020	HEX. BOLT	2	
21	CHGN180000	GREASE NIPPLE	2	
22	CHSW160000	SPRING WASHER	30	
23	CWHB1620100	HEX. BOLT	26	
24	CWP3201012	O-RING (AS568-219)	4	
25	CWCJS08F	CAP	2	
26	CGSB1217045	SOCKET BOLT	16	
27	CWAUF16MJC16M	ADAPTER CYLINDER IN/OUT	2	
28	CWS3020090	PORT BLOCK	2	
29	CWSB1620060	SOCKET BOLT	4	
30	CWAPT08MJS08M90	ADAPTER	1	
31	CWS2056000	HOSE ASSY	1	
32	CGS2052110	HOSE ASSY	1	
33	CGAPT08MJS08F	ADAPTER	1	
34	CTS2050040SK	T-JOINT SEAL KIT (HYD SWIVEL)	1	Not Pictured

10.0 CG Grapples - CG22

Connect Work Tools CG Series Grapple Model CG22

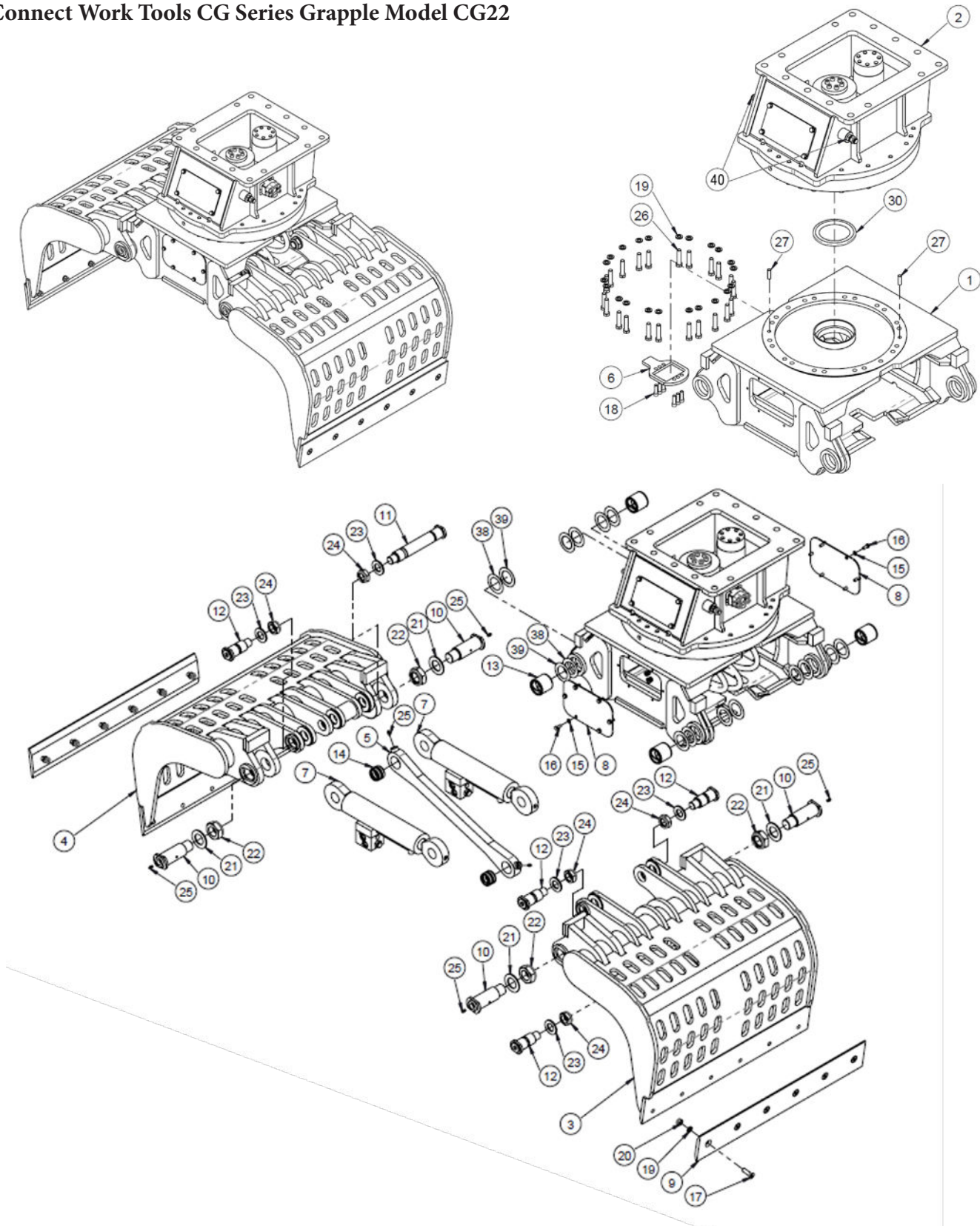


Fig. 10.4.1 CG Series Grapple Model CG22

10.0 CG Grapples - CG22

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS2061000	BODY ASSY	1	
2	CGS2052100	TOP BODY ASSY	1	
3	CGS2066000	ARM W.A (L)	1	PERFORATED TYPE
	CGS2063000	ARM W.A (L)	1	RIBBED TYPE (Not pictured)
4	CGS2065000	ARM W.A (R)	1	PERFORATED TYPE
	CGS2062000	ARM W.A (R)	1	RIBBED TYPE (Not pictured)
5	CGS2011000	ROD W.A	1	
6	CWS2050060	STOPPER	1	
7	CGS2159000	CYLINDER TOTAL ASSY	2	
8	CGS2105000	COVER PLATE	2	
9	CGS2104000	CUTTING PLATE	2	
10	CGS2156000	PIN ASSY	4	
11	CGS2014000	PIN ASSY	1	
12	CGS2016000	PIN ASSY	4	
13	CGS2018000	BUSHING	4	
14	CGS2020000	BUSHING	2	
15	CHSW100000	SPRING WASHER	12	
16	CHHB1015025	HEX. BOLT	12	
17	CGDB1620055	DISH BOLT	12	
18	CHSB1217040	SOCKET BOLT	6	
19	CHSW160000	SPRING WASHER	34	
20	CHNN160000	NYLON LOCK NUT	12	
21	CGPW480000	PLAIN WASHER	4	
22	CGNN485000	NYLON NUT	4	
23	CHPW360000	PLAIN WASHER	5	
24	CWNN3640000	NYLON NUT	5	
25	CHGN180000	GREASE NIPPLE	6	
26	CHHB1620070	HEX. BOLT	22	
27	CHA2506420	GUIDE PIN	2	
28	CGAUF16MJC10M	ADAPTER	4	
29	CWAPO08MJS08M	ADAPTER	4	
30	CWP25U0030	TRIMS SEAL RUBBER	1	
31	CFA0606180	SOCKET PLUG	4	
32	CWV4300010	O-RING (AS568-916)	4	
33	CGA2507380	O-RING (P18)	8	
34	CGS2060010	HOSE ASSY	1	
35	CGS2060020	HOSE ASSY	1	
36	CGS2060040	HOSE ASSY	1	
37	CGS2060030	HOSE ASSY	1	
38	CGS2155300	SHIM	8	
39	CGS4053000	SHIM	8	
40	CGAPO08MJC08M	ADAPTER	2	
41	CGS2008000	CYLINDER SEAL KIT	1	(Not pictured)
42	CGS2158010	PILOT CHECK VALVE	2	
43	CGS2158000	PVC CYLINDER VALVE ASSY	2	

10.0 CG Grapples - CG22

Connect Work Tools CG Series Grapple Model CG22 Top Body Assy

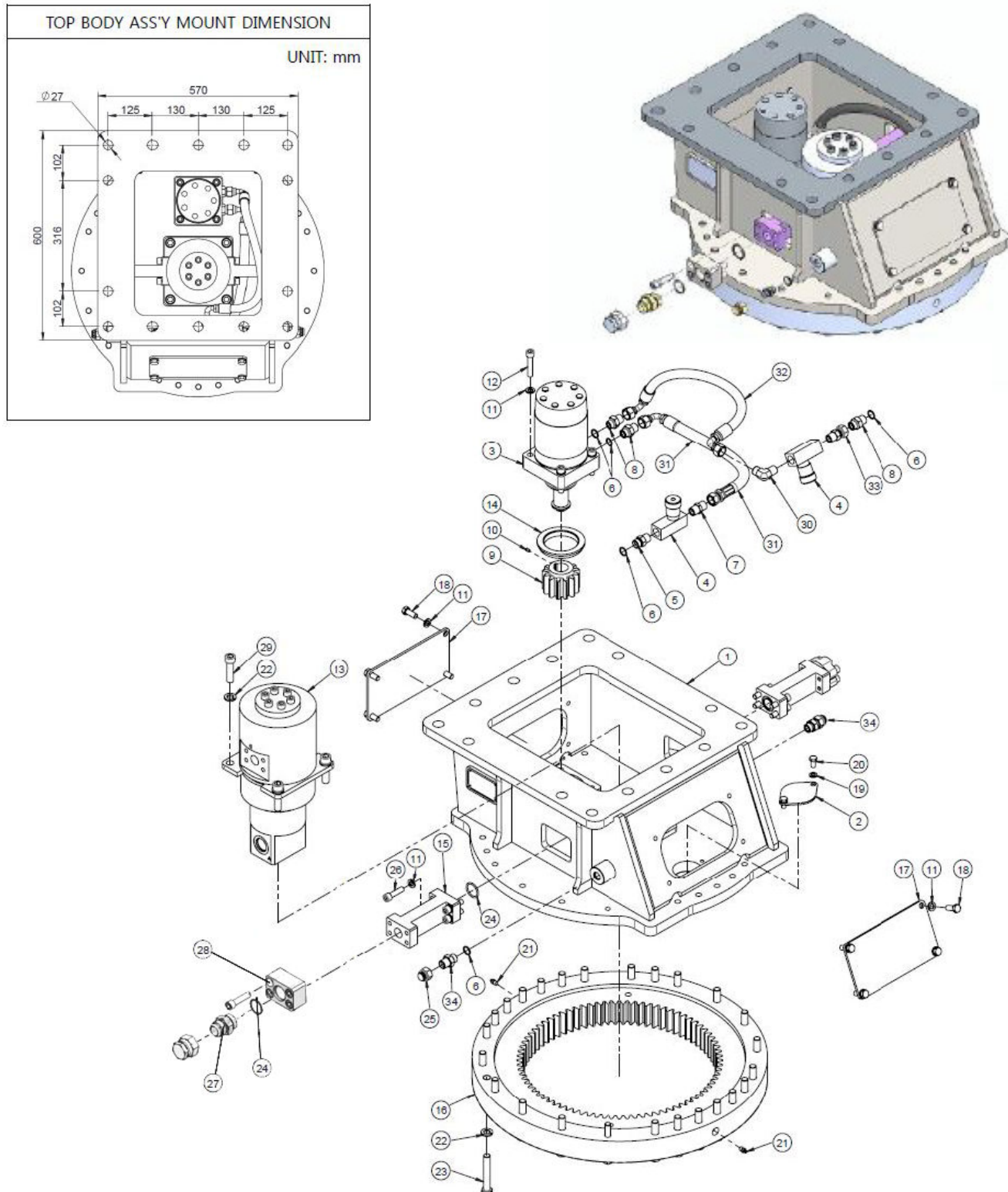


Fig. 10.4.3 CG Series Grapple Model CG22

10.0 CG Grapples - CG22

NO	PART NO.	PART NAME	QTY	REMARKS
1	CWS2052600	TOP BODY FRAME ASSY	1	
2	CWC2010280	COVER	1	
3	CWC2010220	MOTOR ASSY	1	
4	CGC2010230	FLOW CONTROL VALVE	2	
5	CWAPO08MPT08M	ADAPTER	1	
6	CGA2507380	O-RING (P18)	6	
7	CWAPT08MJS08M	ADAPTER	1	
8	CWAPO08MJS08M	ADAPTER	5	
9	CWC2010180	PINION GEAR	1	
10	CGSS0610010	SET SCREW	1	
11	CHSW120000	SPRING WASHER	20	
12	CWSB1217060	SOCKET BOLT	4	
13	CWS2050040	TURNING JOINT	1	
14	CWS3025010	PLATE	1	
15	CWS3020090	MACH PORT RLOCK	2	
16	CWC2010190	SLEWING RING ASSY	1	
17	CWS3025060	MAIN PLATE	2	
18	CHHB1217030	HEX. BOLT	8	
19	CHSW100000	SPRING WASHER	2	
20	CFHB1015020	HEX. BOLT	2	
21	CHGN180000	GREASE NIPPLE	2	
22	CHSW160000	SPRING WASHER	30	
23	CWHB1620100	HEX. BOLT	26	
24	CWP3201012	O-RING (AS568-219)	4	
25	CWCJS08F	CAP	2	
26	CGSB1217045	SOCKET BOLT	16	
27	CWAUF16MJC16M	ADAPTER CYLINDER IN/OUT	2	
28	CWS3020090	PORT BLOCK	2	
29	CWSB1620060	SOCKET BOLT	4	
30	CWAPT08MJS08M90	ADAPTER	1	
31	CWS2056000	HOSE ASSY	1	
32	CGS2052110	HOSE ASSY	1	
33	CGAPT08MJS08F	ADAPTER	1	
34	CGAPO08MJC08M	ADAPTER (ROTATION)	2	
35	CGS2050040SK	T-JOINT SEAL KIT (HYD SWIVEL)	1	Not Pictured

Connect Work Tools CG Series Grapple Model CG30



10.0 CG Grapples - CG30

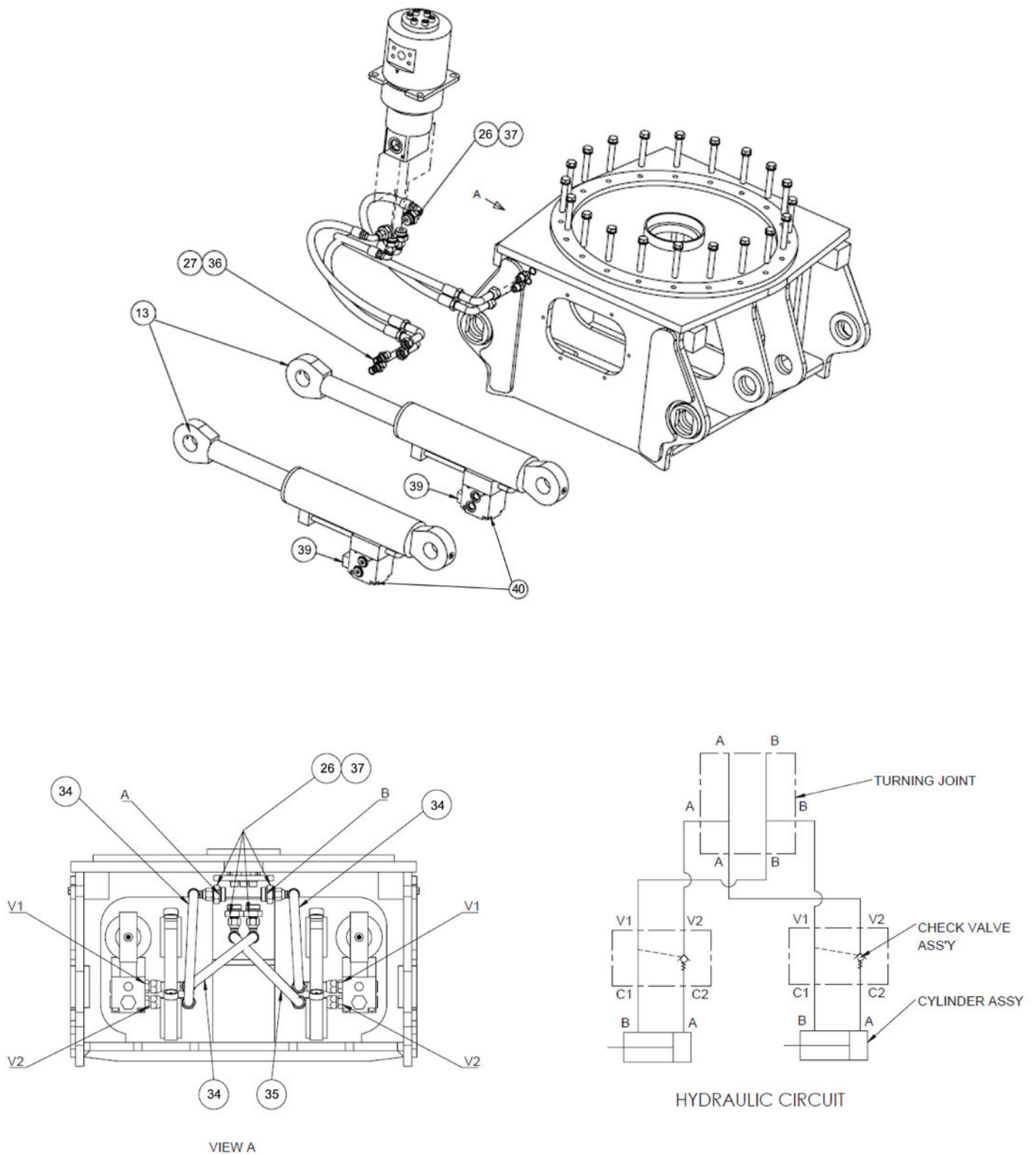


Fig. 10.5.2 CG Series Grapple Model CG30

10.0 CG Grapples - CG30

Reference Fig. 10.5.1 Page 38

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS3061000	BODY ASSY	1	
2	CGS3005000	CUTTING PLATE	2	
3	CGS4008000	COVER	2	
4	CGS3060010	ROD W.A	2	
5	CGS4011000	PIN	4	
6	CGS4053000	SHIM	4	
7	CGS4052000	SHIM	4	
8	CGS4015000	BUSHING	8	
9	CGS4013000	PIN	2	
10	CGS4013000	PIN	2	
11	CGS4014000	PIN	2	
12	CGS4017000	NYLON NUT	10	
13	CGS3206000	CYLINDER ASSY	2	
14	CGPW480000	PLAIN WASHER	10	
15	CHPW100000	PLAIN WASHER	12	
16	CHSW100000	SPRING WASHER	12	
17	CHSW200000	SPRING WASHER	16	
18	CHHB1015025	HEX. BOLT	12	
19	CGDB2025075	DISH BOLT	16	
20	CHNN202500	NYLON LOCK NUT	16	
21	CGS4016000	BUSHING	4	
22	CGS3065000	ARM ASSY (R)	1	PERFORATED TYPE
23	CGS3063000	ARM ASSY (R)	1	RIBBED TYPE (Not Pictured)
24	CGS3066000	ARM ASSY (L)	1	PERFORATED TYPE
25	CGS3064000	ARM ASSY (L)	1	RIBBED TYPE (Not Pictured)
26	CGAUF16MJC10M	ADAPTER	4	
27	CWAPO08MJS08M	ADAPTER	4	
28	CHGN180000	GREASE NIPPLE	8	
29	CWS2050060	STOPPER	1	
30	CHSW120000	WASHER, SPRING	6	
31	CHSB1217040	SOCKET BOLT	6	
32	CWP25U0030	TRIMS SEAL RUBBER	1	
33	CGS3026400	TOP BODY SUB ASSY	1	
34	CGS3060020	HOSE ASSY	3	
35	CGS3060030	HOSE ASSY	1	
36	CGA2507380	O-RING (P18)	4	
37	CWV4300010	O-RING (AS568-916)	4	
38	CGS4026001	CYLINDER SEAL KIT	1	(Not Pictured)
39	CGS3205010	PILOT CHECK VALVE	2	
40	CGS3205000	PVC CYLINDER VALVE ASSY	2	

10.0 CG Grapples - CG30

Connect Work Tools CG Series Grapple Model CG30 Top Body Assy

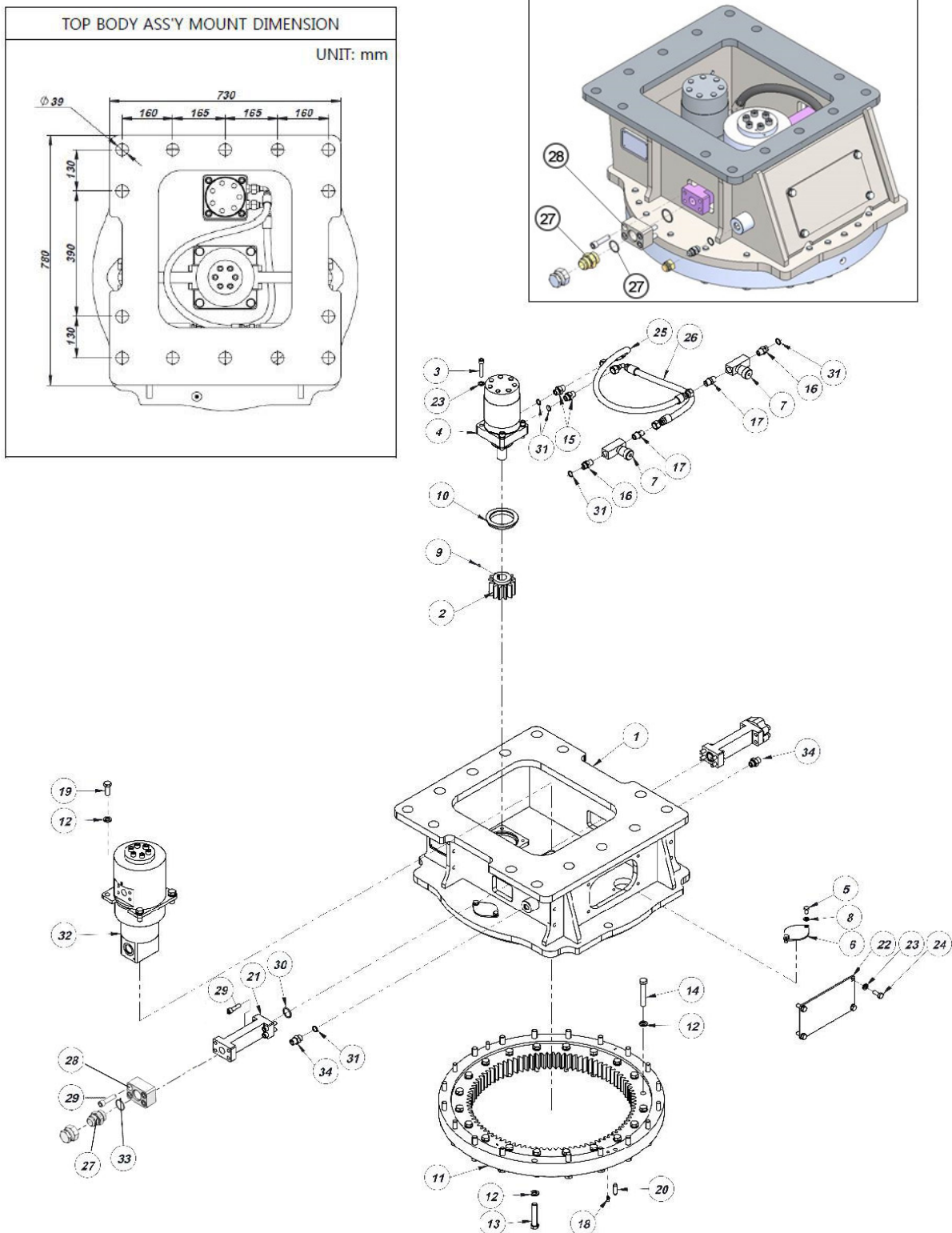


Fig. 10.5.3 CG Series Grapple Model CG30

10.0 CG Grapples - CG30

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS3026500	TOP BODY W.A	1	
2	CWC3010180	PINION GEAR	1	
3	CWSB1217060	BOLT, SOCKET	4	
4	CGC2010220	MOTOR ASSY	1	
5	CGHB1015020	HEX. BOLT	6	
6	CWC3010280	COVER	3	
7	CGC2010230	FLOW CONT' VALVE	2	
8	CHSW100000	SPRING WASHER	6	
9	CGSS0610010	SCREW SET	1	
10	CWS3025010	PLATE	1	
11	CWC3010190	SLEWING RING GEAR	1	
12	CHSW160000	SPRING WASHER	44	
13	CWHB1620090	HEX. BOLT	20	
14	CWHB1620100	HEX. BOLT	20	
15	CWAP008MJS08M	ADAPTER	4	
16	CWAP008MPT08M	ADAPTER	2	
17	CWAPT08MJS08M	ADAPTER	2	
18	CHGN180000	GREASE NIPPLE	1	
19	CHHB1620040	HEX. BOLT	4	
20	CWC2010050	PIN, DOWEL	2	
21	CWS3020095	MACH PORT BLOCK	2	
22	CWS3025070	COVER	1	
23	CHSW120000	SPRING WASHER	8	
24	CHHB1217030	HEX. BOLT	4	
25	CGS3026700	HOSE ASSY	1	
26	CGS3026800	HOSE ASSY	1	
27	CGAUF20MJC20M	ADAPTER CYLINDER IN/OUT	2	
28	CWS3020095	PORT BLOCK	2	
29	CGSB1217045	SOCKET BOLT	16	
30	CWP3201012	O-RING (AS568-219)	2	
31	CGA2507380	O-RING (P18)	6	
32	CWS2050040	HYD SWIVEL	1	
33	CHB6007330	O-RING (AS568-222)	2	
34	CGAPO08MJC08M	ADAPTER ROTATOR	2	
35	CGS2050040SK	T-JOINT SEAL KIT (HYD SWIVEL)	1	Not Pictured

10.0 CG Grapples - CG40

Connect Work Tools CG Series Grapple Model CG40

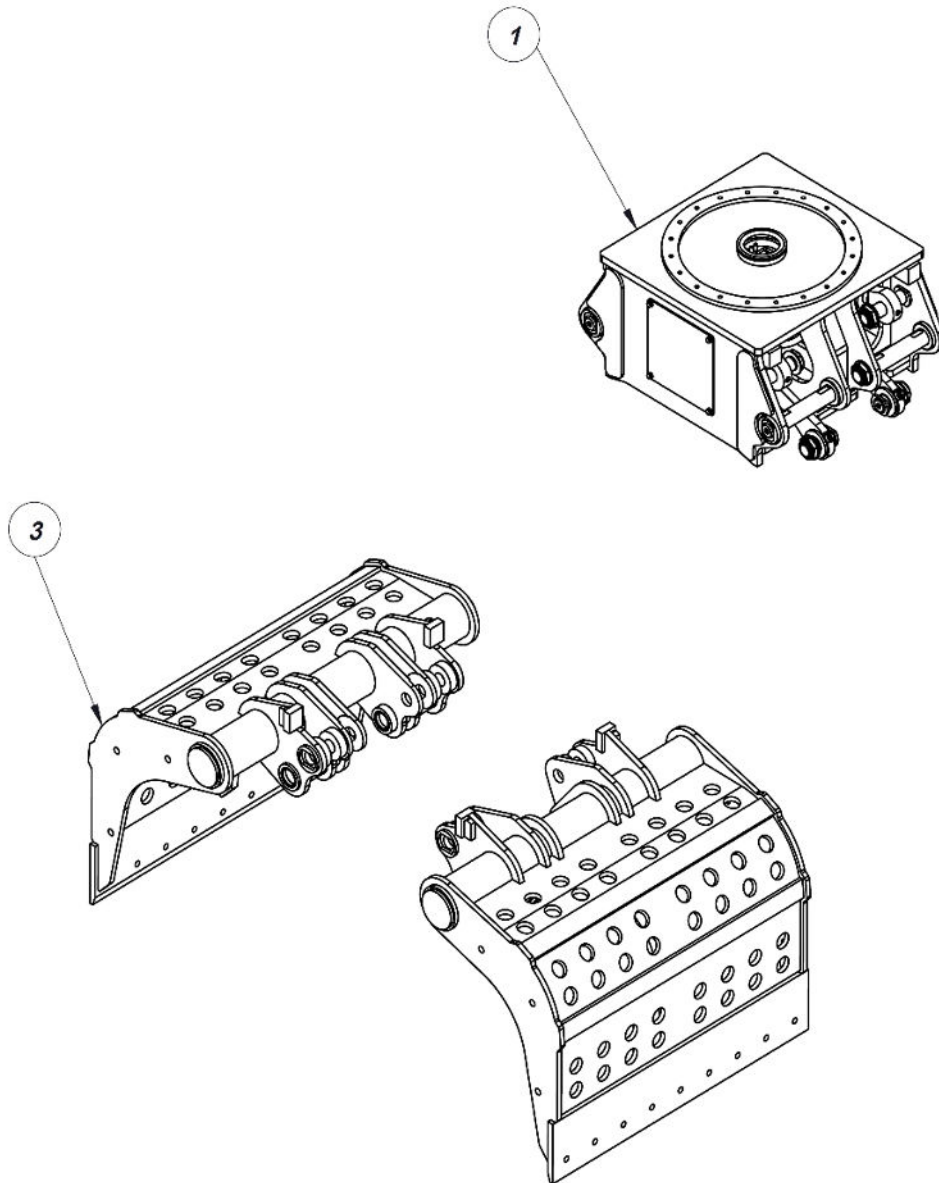


Fig. 10.6.1 CG Series Grapple Model CG40

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS4080500	STONE GRAB BODY T.A	1	
2	CGS3026400	TOP BODY SUB ASSY	1	
3	CGS4080100	TINE T.A	1	

10.0 CG Grapples - CG40

Connect Work Tools CG Series Grapple Model CG40

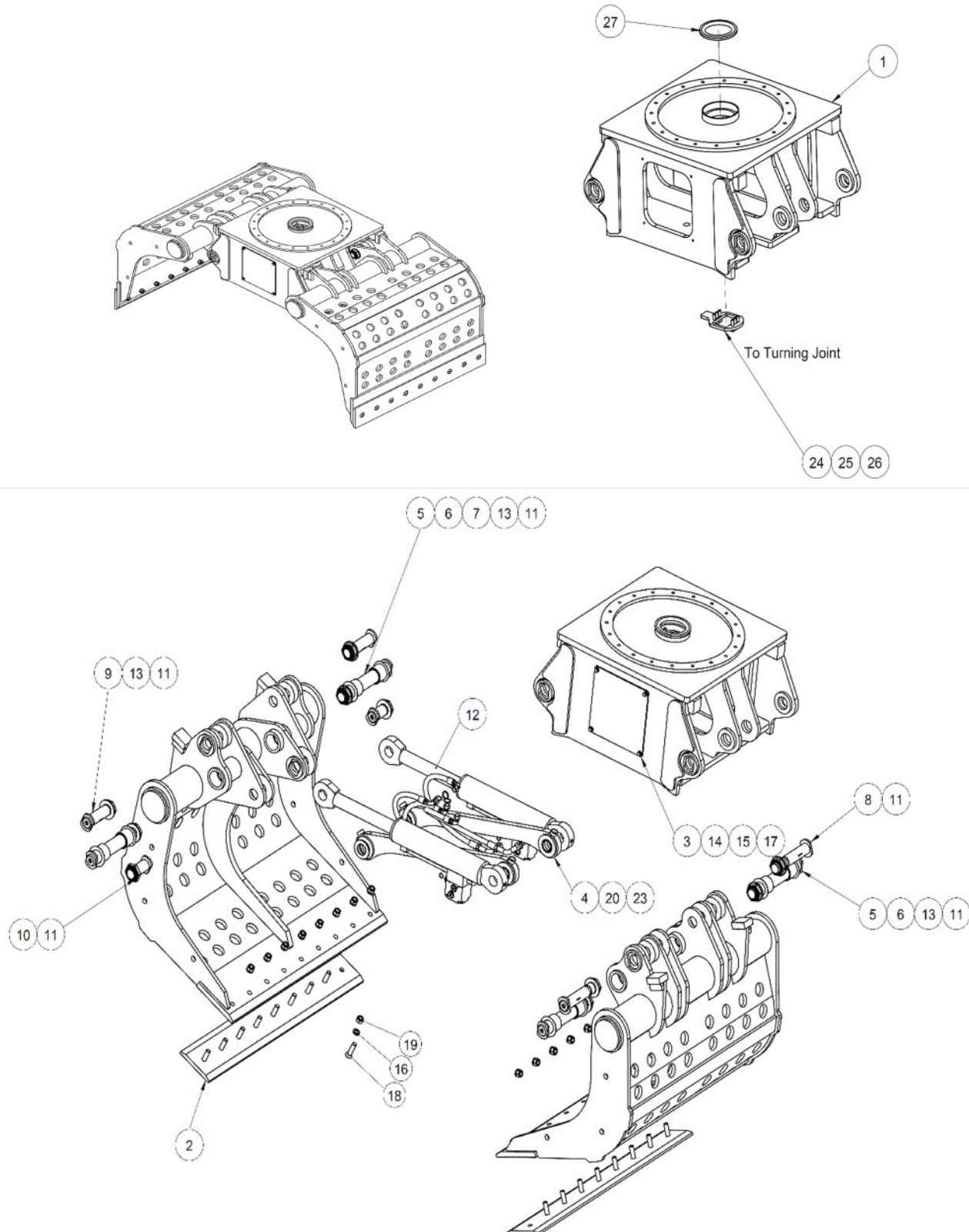


Fig. 10.6.2 CG Series Grapple Model CG40

10.0 CG Grapples - CG40

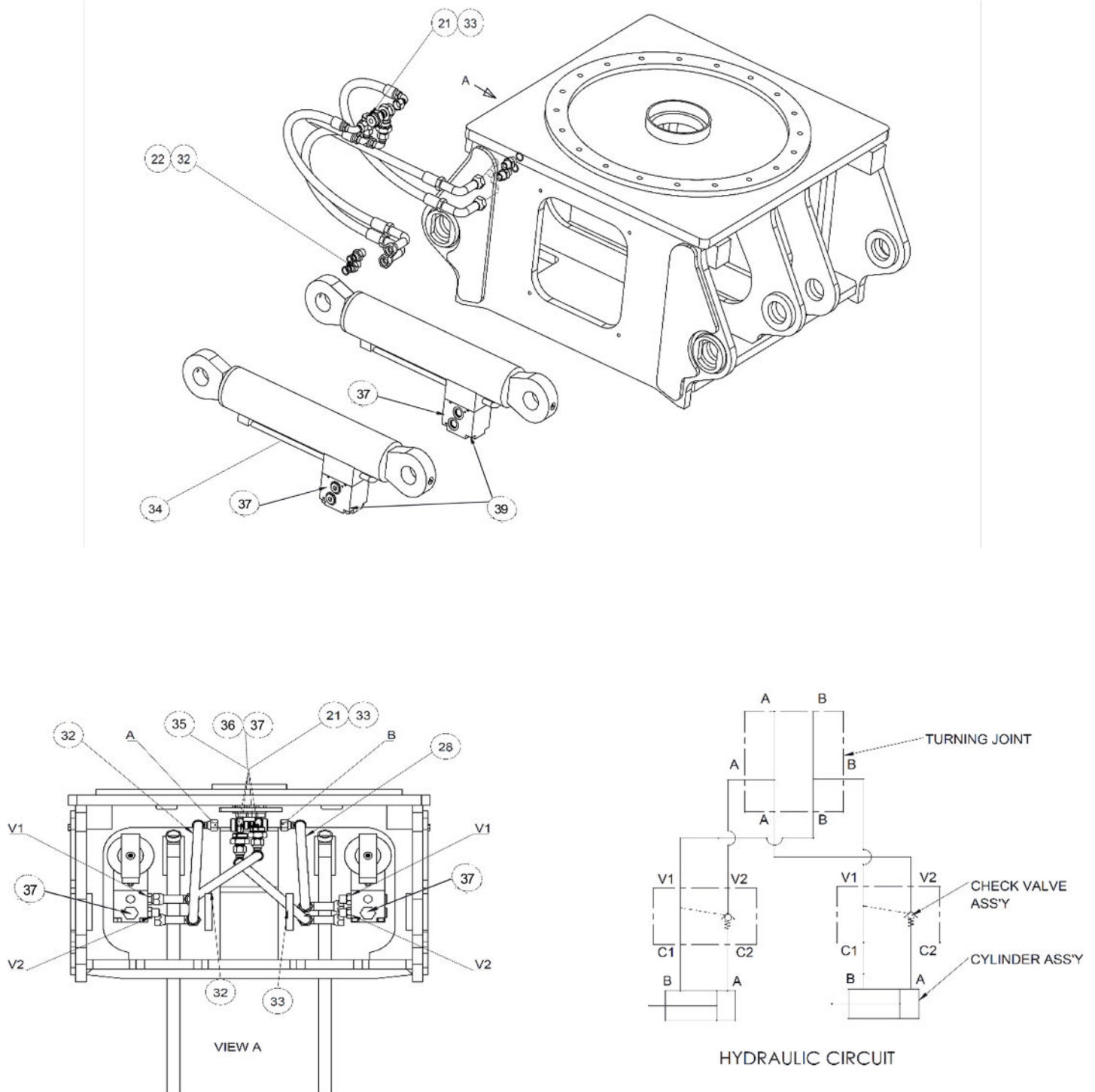


Fig. 10.6.3 CG Series Grapple Model CG40

10.0 CG Grapples - CG40

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS4080501	BODY W.A	1	
2	CGS4080502	CUTTING PLATE	2	
3	CGS4080503	COVER	2	
4	CGS4080535	ROD W.A	2	
5	CGS4080504	PIN #1	4	
6	CGS4053000	SHIM	4	
7	CGS4052000	SHIM	4	
8	CGS4012000	PIN	2	
9	CGS4013000	PIN	2	
10	CGS4014000	PIN	2	
11	CGS4017000	NYLON NUT	10	
12	CGS4080000	CYLINDER ASSY	2	
13	CGPW480000	PLAIN WASHER	10	
14	CHPW100000	PLAIN WASHER	8	
15	CHSW100000	SPRING WASHER	8	
16	CHSW200000	SPRING WASHER	18	
17	CHHB1015025	HEX. BOLT	8	
18	CGDB2025075	DISH BOLT	18	
19	CHNN202500	NYLON LOCK NUT	18	
20	CGS4016000	BUSHING	4	
21	CGAUF16MJC10M	ADAPTER	4	
22	CWAPO08MJS08M	ADAPTER	4	
23	CHGN180000	GREASE NIPPLE	8	
24	CWS2050060	STOPPER	1	
25	CHSW120000	SPRING WASHER	6	
26	CHSB1217040	SOCKET BOLT	6	
27	CWP25U0030	TRIMS SEAL RUBBER	1	
28	CGS4080538	HOSE ASSY	1	
29	CGS4080539	HOSE ASSY	1	
30	CGS4080540	HOSE ASSY	1	
31	CGS4080541	HOSE ASSY	1	
32	CGA2507380	O-RING (P18)	4	
33	CGV4300010	O-RING (AS568-916)	4	
34	CGS3205000	VALVE BLOCK	2	
35	CGPW080000	PLAIN WASHER	8	
36	CGSB0812090	SOCKET BOLT	8	
37	CGS4026001	PILOT CHECK VALVE	2	(Not pictured)
38	CGS3205010	CYLINDER SEAL KIT	1	
39	CGS3205000	PVC CYLINDER VALVE ASSY	2	

10.0 CG Grapples - CG40

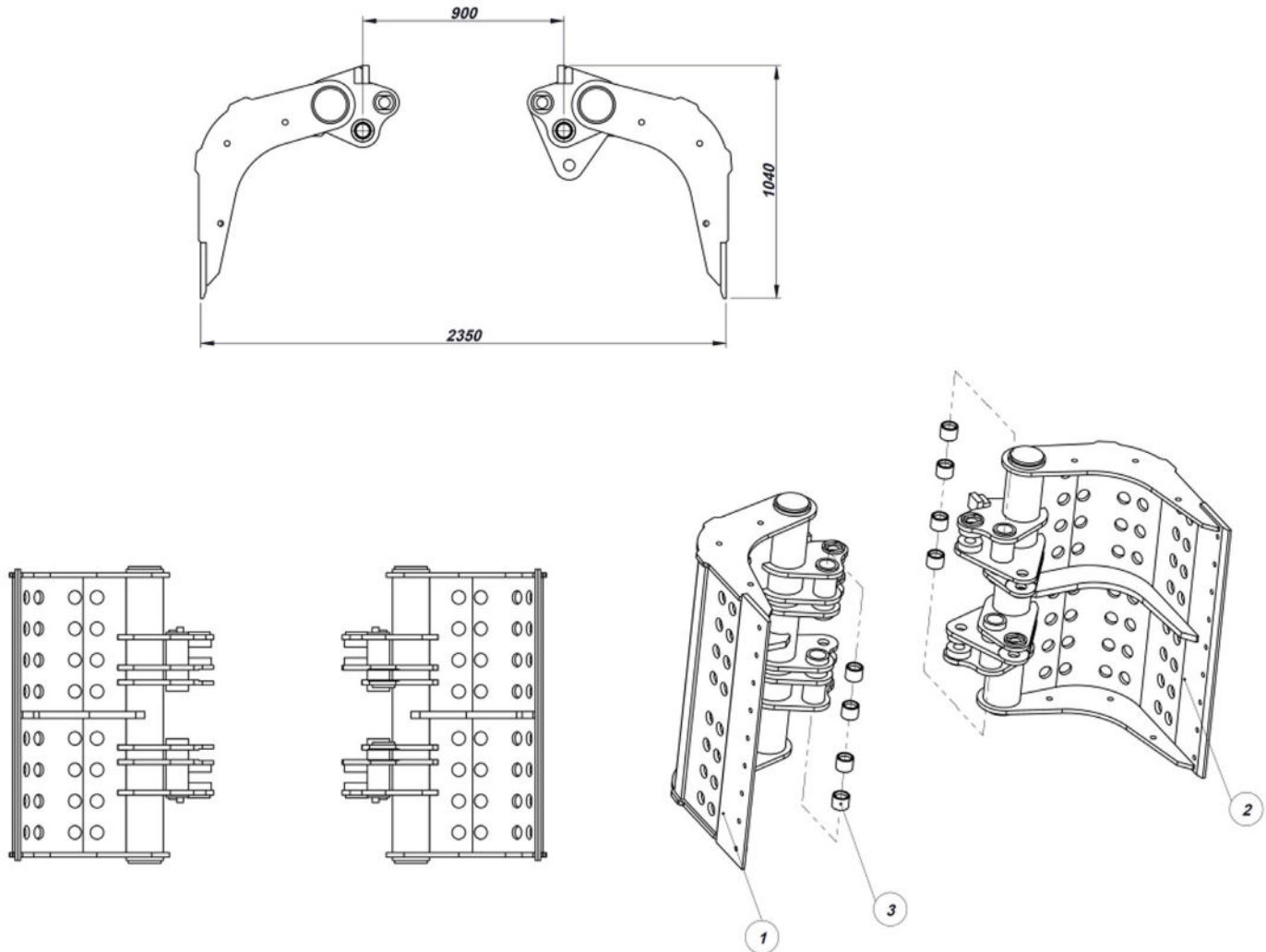


Fig. 10.6.4 CG Series Grapple Model CG40

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS4080505	ARM W.A (R)	1	
2	CGS4080506	ARM W.A (L)	1	
3	CGS4015000	BUSHING	8	

10.0 CG Grapples - CG40

Connect Work Tools CG Series Grapple Model CG40 Top Body Assy

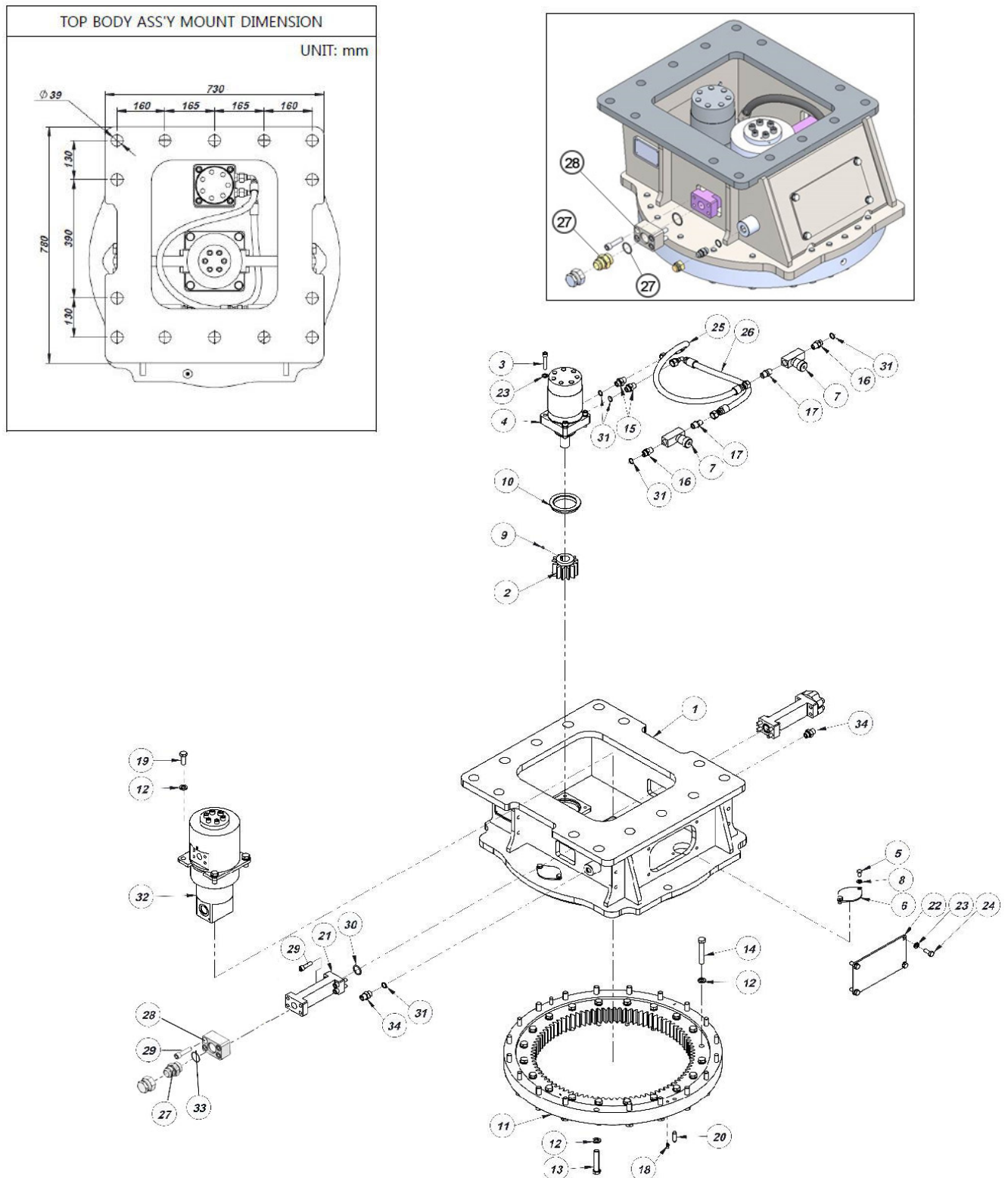


Fig. 10.6.5 CG Series Grapple Model CG40

10.0 CG Grapples - CG40

NO	PART NO.	PART NAME	QTY	REMARKS
1	CGS3026500	TOP BODY W.A	1	
2	CWC3010180	PINION GEAR	1	
3	CWSB1217060	BOLT, SOCKET	4	
4	CGC2010220	MOTOR ASSY	1	
5	CGHB1015020	HEX. BOLT	6	
6	CWC3010280	COVER	3	
7	CGC2010230	FLOW CONT' VALVE	2	
8	CHSW100000	SPRING WASHER	6	
9	CGSS0610010	SCREW SET	1	
10	CWS3025010	PLATE	1	
11	CWC3010190	SLEWING RING GEAR	1	
12	CHSW160000	SPRING WASHER	44	
13	CWHB1620090	HEX. BOLT	20	
14	CWHB1620100	HEX. BOLT	20	
15	CWAPO08MJS08M	ADAPTER	4	
16	CWAPO08MPT08M	ADAPTER	2	
17	CWAPT08MJS08M	ADAPTER	2	
18	CHGN180000	GREASE NIPPLE	1	
19	CHHB1620040	HEX. BOLT	4	
20	CWC2010050	PIN, DOWEL	2	
21	CWS3020095	MACH PORT BLOCK	2	
22	CWS3025070	COVER	1	
23	CHSW120000	SPRING WASHER	8	
24	CHHB1217030	HEX. BOLT	4	
25	CGS3026700	HOSE ASSY	1	
26	CGS3026800	HOSE ASSY	1	
27	CGAUF20MJC20M	ADAPTER CYLINDER IN/OUT	2	
28	CWS3020095	PORT BLOCK	2	
29	CGSB1217045	SOCKET BOLT	16	
30	CWP3201012	O-RING (AS568-219)	2	
31	CGA2507380	O-RING (P18)	6	
32	CWS2050040	HYD SWIVEL	1	
33	CHB6007330	O-RING (AS568-222)	2	
34	CGAPO08MJC08M	ADAPTER ROTATOR	2	
35	CGS2050040SK	T-JOINT SEAL KIT (HYD SWIVEL)	1	Not Pictured

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