ROTOBEC

TOUGH HANDLING EQUIPMENT

RLP-902 ROTATOR

Rotobec is proud to offer our customers a toll-free service and technical support line. You will be directed to your designated branch with service reps ready to assist. Our expert technical staff is available for all of your questions relating to installations, operation and maintenance.

CALL US TOLL FREE 1.855.383.3002

OPERATORS MANUAL

Labels

	This label points out a useful fact.
	**DANGER**. This label identifies a hazard or unsafe practice that will result in severe personal injury or death.
	**WARNING**. This label identifies a hazard or unsafe practice that could result in severe personal injury or death.
	**CAUTION**. This label denotes an instruction which, if not followed, could severely damage components.

Document Part Number: 146-1989
Re 1: 012215-REV1AN

IMPORTANT GENERAL INSTALLATION GUIDELINES

IMPORTANT INFORMATION TO READ AND UNDERSTAND BEFORE STARTING THE INSTALLATION.

This section describes the general guidelines to follow.

1. Identify the type of rotator on your grapple.

   Page 10 illustrates a rotator ***without*** valve on swivel.
   Page 11 illustrates a rotator ***with*** valve on swivel.

2. Page 21 shows the pressure adjustment of the tool cylinder on the bore and rod side.

3. Rotator ***without*** valve on swivel.
   Page 22 illustrates the hydraulic connections on the rotator.
   Page 23 gives the rotator pressure and flow adjustments.
   Page 24 illustrates the hydraulic schematic.

4. Rotator ***with*** valve on swivel.
   Page 25 illustrates the hydraulic connections on the rotator.
   Page 26 gives the rotator pressure and flow adjustments.
   Page 27 illustrates the hydraulic schematic.
   Page 29 illustrates the electrical installation schematic.
   Page 30 illustrates the electric schematic.

5. Before starting the installation process, we recommended that you set the pressure and flow required for the grapple and rotator.

   * Use a flow meter with a pressure gauge connected at the end of the boom.

Table of Contents

Product description

Our new RLP rotators are sold with a generic top for easy installation of lugging by our authorized dealers. They can also be sold with optional custom factory installed pin-on or quick attach lugging. These new RGP's are available with an optional patent pending valve-on-swivel kit, rotator float valve and tool cylinder. This kit simplifies the installation on the carrier.

IMPORTANT. Avant d'opérer ou effectuer tout entretien sur ce produit, Rotobec vous recommande de toujours consulter et suivre le standard ***ASME B30.20-2010 "en dessous du crochet de levage"*** pour maximiser la sécurité de vos opérations.

Functional description

Rotators

- Continuous rotators available for dangling or positioned mounting.
- Variety of models to match machine capacity and operation requirements for maximum life and productive time.
- Positioned rotators are standard ready to field-weld existing lugging. Also available with optional pin-on or quick-attach lugging.
- Slewing ring diameter from 24" to 34".
- Well protected slewing ring and pinion mechanism.
- Easy to lubricate bearing and gears system.
- Backlash adjustment device.
- Hardened pinion and the slewing ring gears.
- Easy access to all components by various panels.

Options

- Valve-on-swivel kit
- Rotator Float valve
- Tool cylinder
- Custom bolt-on lugging

Product Overview of the RLP-902 rotator

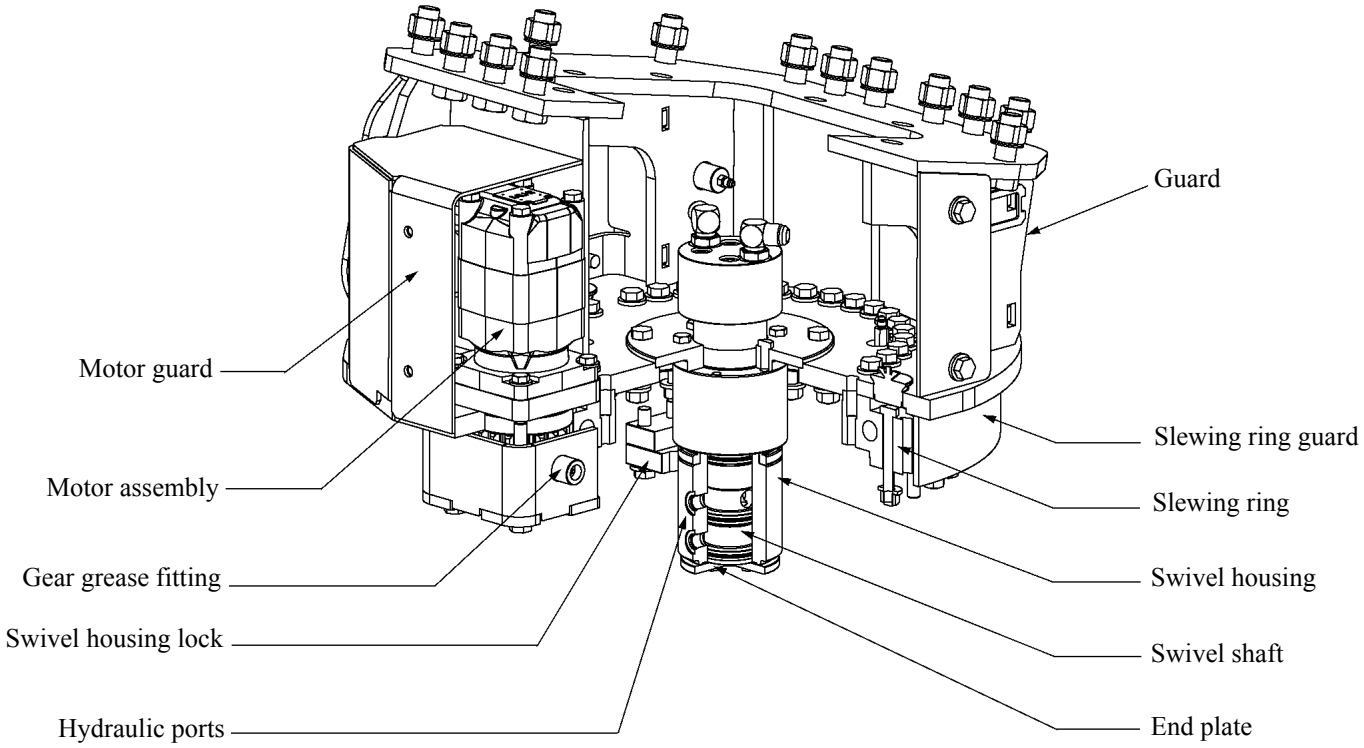


Figure 1

Product Overview of the RLP-902 rotator with optional Valve-on-swivel

The factory installed valve-on-swivel option is easier to install because it uses only three hydraulic lines (presure, tank and drain) and one electrical wire.

It also requests only one auxiliary function on the carrier instead of two for a standard grapple.

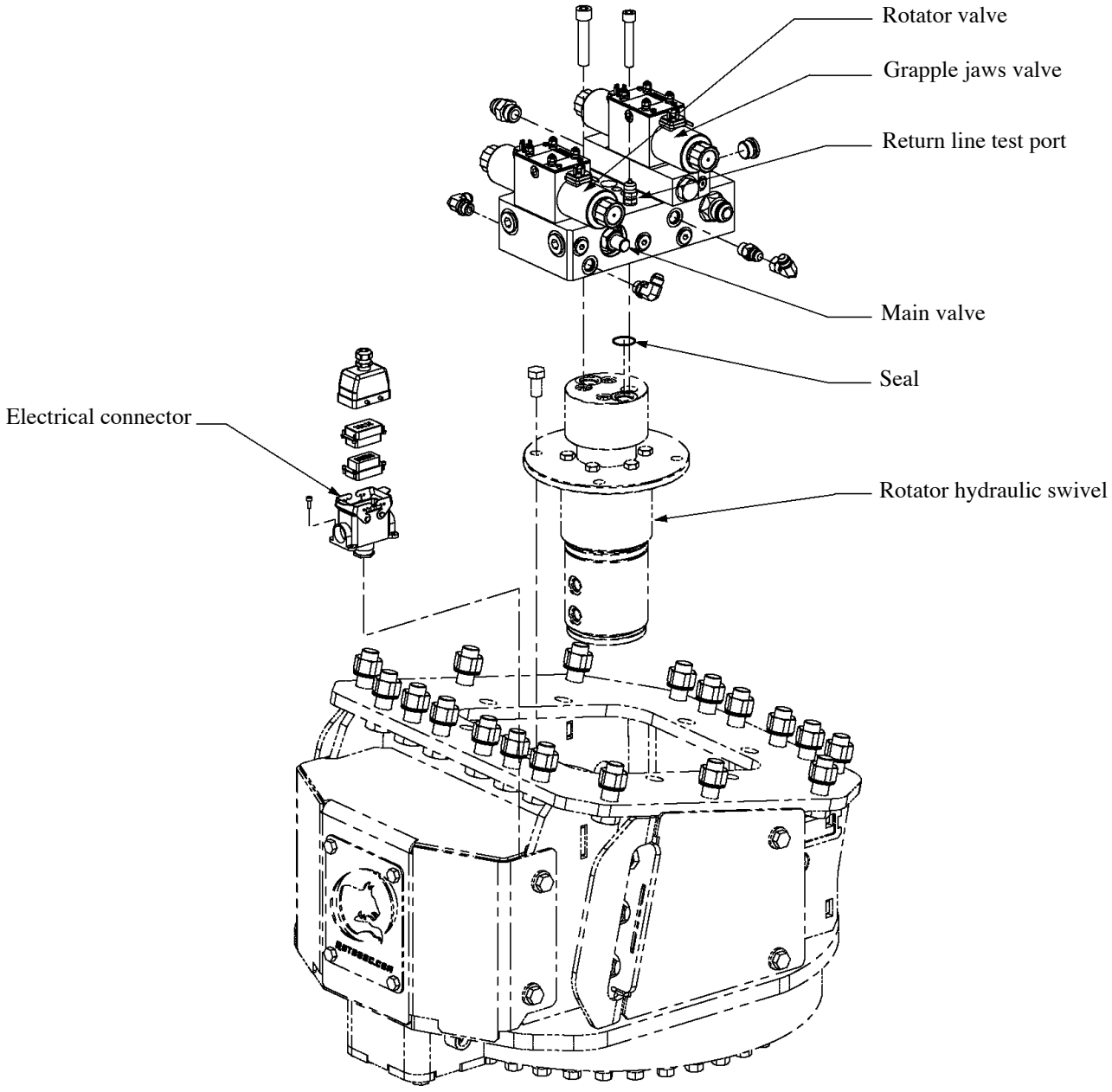


Figure 2

Product Overview of the RLP-902 rotator with optional Tool cylinder

The Rotobec tool cylinder option is required if your machine is not already equipped with a tool cylinder. Custom lugging, designed for direct pin-on to the end of the machine boom or to match an existing quick attach system.

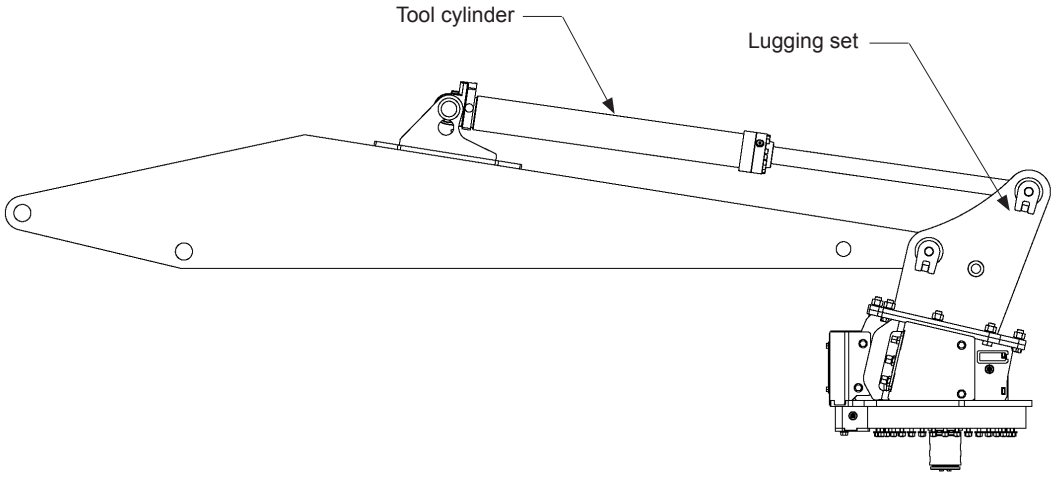


Figure 3

Location of Rotator ID plate

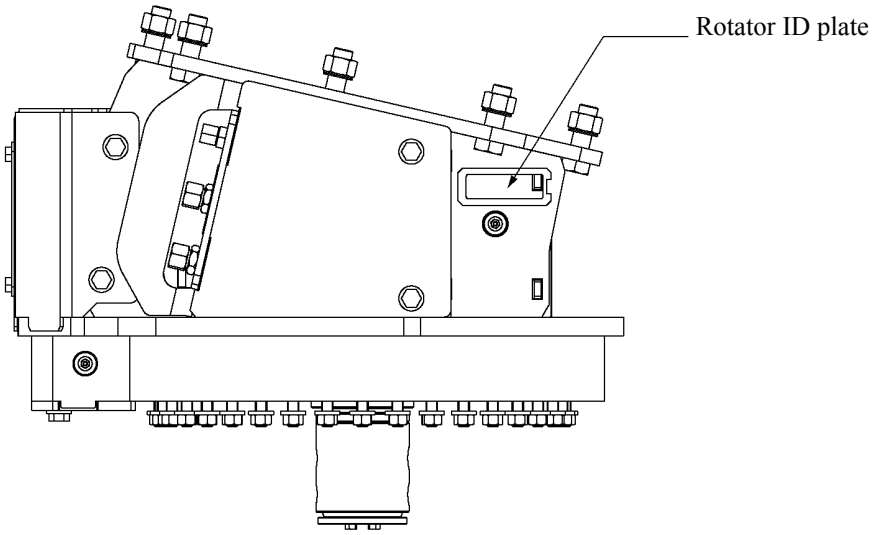


Figure 4

WARNING. It is important to refer to the grapple's ID plate for maximum pressure and flow allowed for cylinders and rotator.

Safety Guidelines

WARNING. This section provides guidelines to ensure the safety of the people working with and around the RLP rotator and to prevent damage to the RLP rotator. Rotobec assumes no liability or responsibility for injury or damages that may arise if these guidelines are not followed.

General guidelines

- Follow all federal and state or provincial safety regulations for hydraulic mechanisms, lifting devices, grapples, spillage, and disposal of hydraulic oil.
- The *Installation and Operation Manual* should be stored in an area so that the operator has easy access to the safety and maintenance guidelines at all times.

Service and maintenance guidelines

Installation and removal of the RLP rotator, as well as all service and repairs, must be carried out by qualified hydraulic mechanics and/or an authorized repair shop.

Welding on the RLP rotator can cause structural damage. Before welding on the RLP rotator:

- Contact your Rotobec representative for authorization.
- Clean the area around the welding area to eliminate any fire hazard and make sure fire-extinguishing equipment is available.
- Disconnect the ECU power plug, both battery cables, radio, and all electric throttle and alternator connections of the carrier.
- Place the ground wire as close to the welding area as possible and make sure the ground wire does not make contact with a moving part of the RLP rotator, loader or excavator (slewing ring, bearings, bushings, hydraulic swivel joint, etc).
- When welding close to bushings, disassemble them and remove the Nitrile seals. When reassembling the bushings and the Nitrile seals, replace them with new ones, if necessary.

Loose or over-torqued bolts can cause parts to separate which can result in property damage, severe injury, or death. Keep the bolts correctly torqued by inspecting the nuts and bolts regularly according to the Maintenance Section. Refer to your *Parts Manual* for torque specifications.

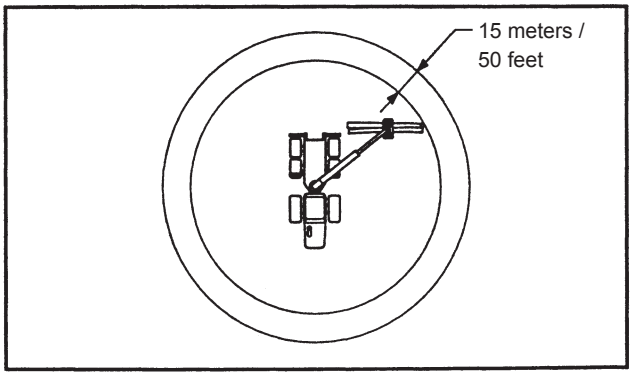
CAUTION.

- The owner and the operator are responsible for following all safety regulations and that the machine is safely equipped.
- Safety equipment such as safety glasses and protective gloves should be worn at all times when working on or around the RLP rotator.
- Check the machine for damages at the beginning of each shift.
- Make sure that the hydraulic pressure and flow in the RLP rotator is adjusted according to specifications. If the pressure is too low the RLP rotator will not perform adequately. If the pressure is too high the RLP rotator will be overloaded, which could result in structural failures, personal injuries and also void the warranty of the equipment.
- All service and repairs should be carried out by qualified personnel or authorized repair shop with suitable tools and lifting devices.

DANGER. Never touch or stand close to pressurized hydraulic hoses. High pressure hydraulic oil can penetrate the skin causing severe injury, gangrene, or death.

DANGER

- When operating this equipment ensure all other personnel remain outside the danger zone, which means at least 50 feet / 15 meters from the work zone. See figure below “work zone”.
- The operator must be aware that a load or partial load could fall at any time due to a faux maneuver or other.
- Stop all operations immediately if any bystanders enter the work zone.



Work Zone

Figure 5

Technical Specifications

GENERIC POSITIONED ROTATOR	MODEL RLP-902	
DIMENSIONS	in.	mm
A	27 1/2	698
B	14	356
C	33 1/8	841
D	13 1/2	343
E	25 3/4	654
F	19 7/16	494
G	21 3/16	538
H	13 5/16	338
I	19 3/16	487
Weight total without controls	1065 lb	483 kg

OPTION: Pin-on or quick attach lugging Two section valve-on-swivel. Float.

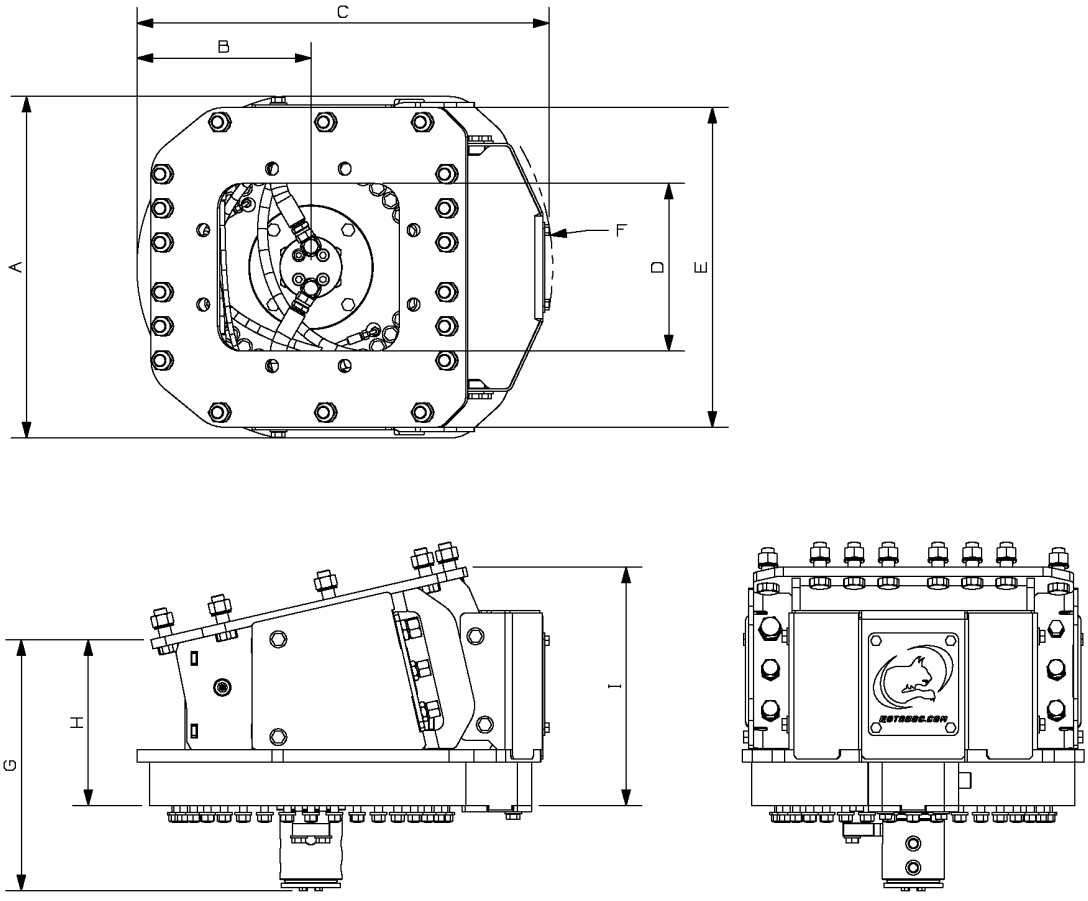


Figure 6

Lugging installation on the RLP-902 rotator

Assemble the lugging in reference to the assembly sequence and torque as indicated on drawing below.

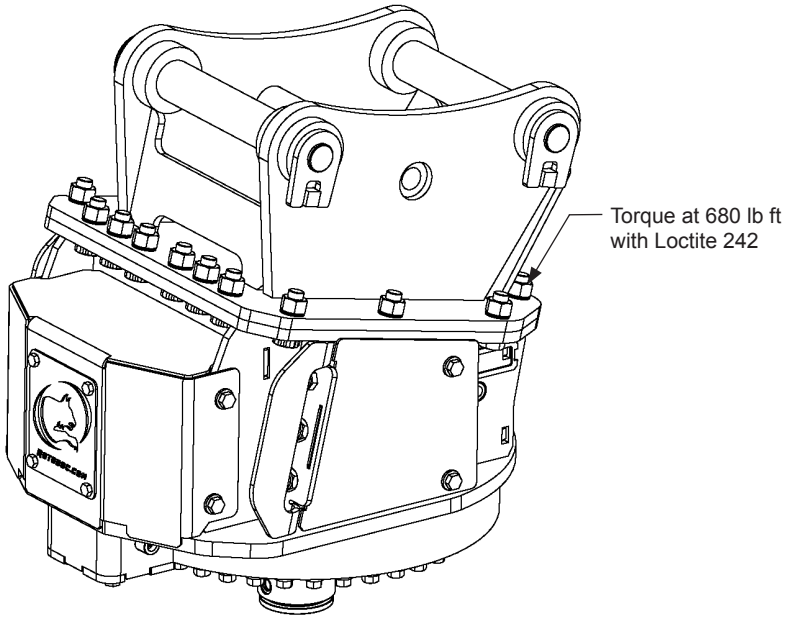


Figure 7

Torque sequence

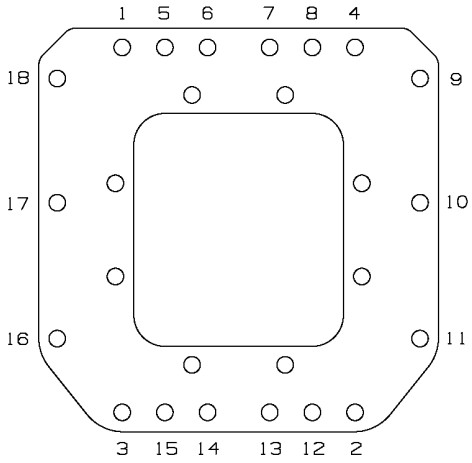


Figure 8

Hydraulic motor installation

1. Install the hydraulic motor and torque the lubricated bolts in a “X” manner (refer to chart below for torque values). Use Loctite 242 or 243. Be sure that the pinion bearing inside the pinion is properly mounted.
2. Install the hydraulic hoses (see fig. 11) and make sure they are clean to prevent any contamination.
4. Install the motor guard.

Recommended torque value

Rotator model	Recommended lubricated torque value (ft-lb)
RLP-902 / Motor bolt	5/8” NF x 2 1/2” (180 ft-lb / 245 Nm)

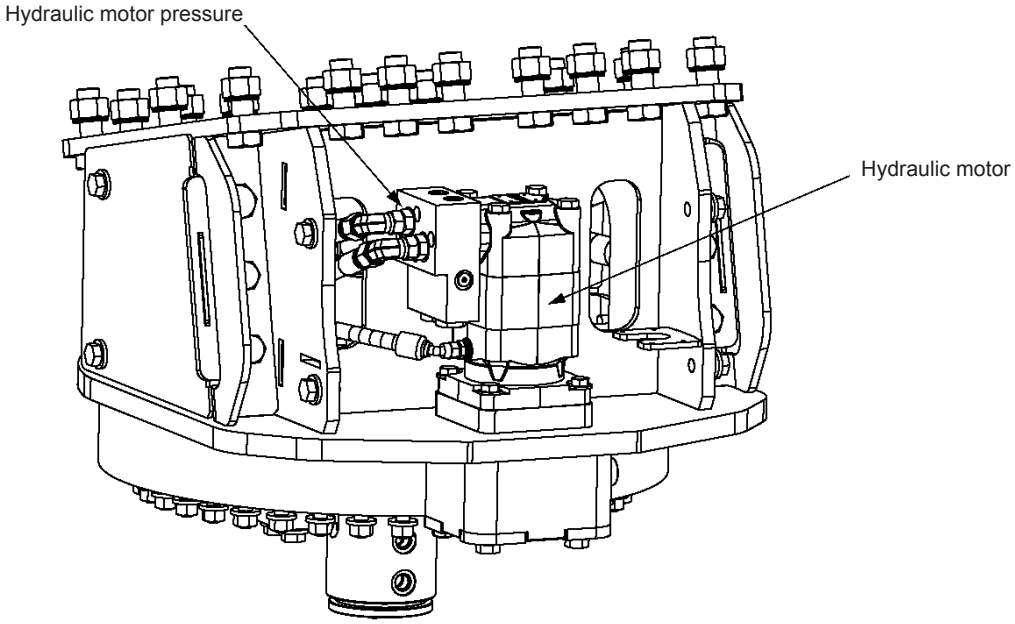


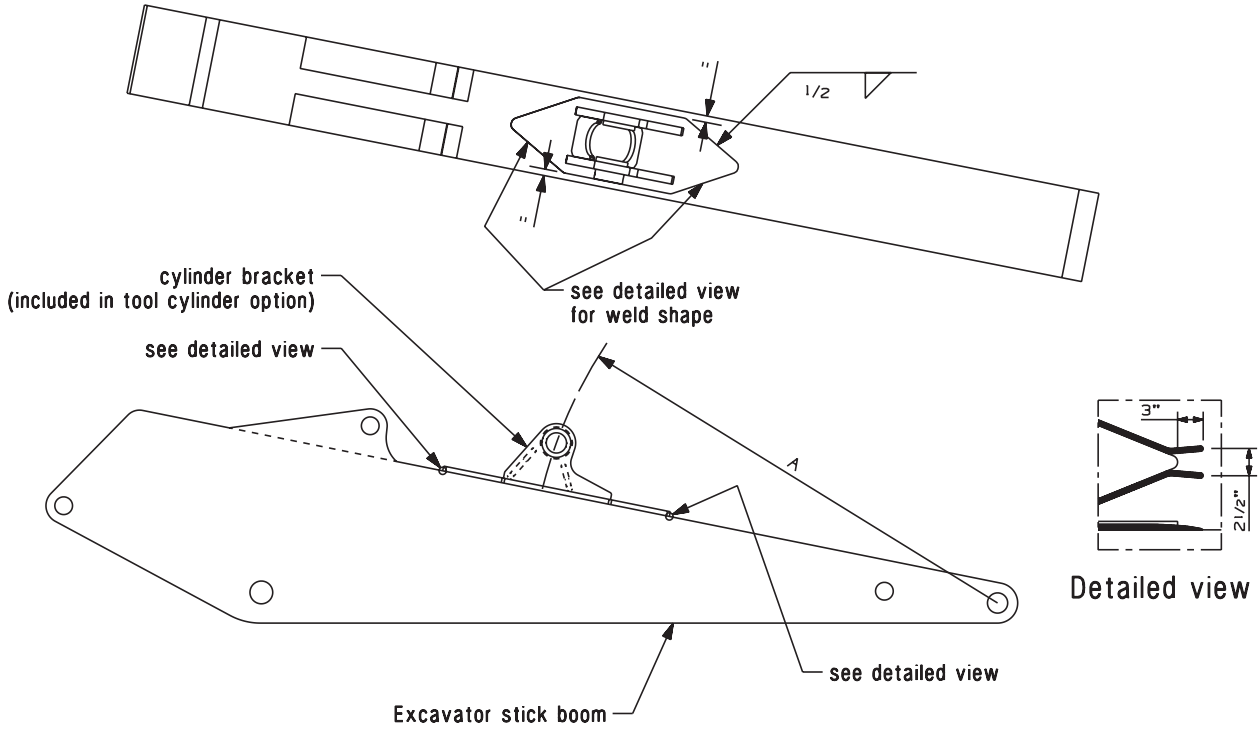
Figure 9

Tool cylinder installation (when option is purchased)

Welding the tool cylinder attachment on the log loader boom

CAUTION. Always respect Rotobec' recommendations for the installation of the tool cylinder, not following these instructions can cause accidents or severe damage to the equipment.

CAUTION. Never install the clamp welding ground on the cylinder or one of its components, this could cause damage to the cylinder or its components. Make sure that both cylinder ends are lined up properly with the cylinder bracket and the grapple lugging set to prevent any premature wear or severe damage to the cylinder.



Drawing PN: 07001-7552/00

Figure 10

When installing a Rotobec tool cylinder, the required pin and hole diameter for the cylinder is:

- hole diameter: 2.503" - 2.505"
- pin outside diameter: 2.498" - 2.500"
- material: chromed hardened steel

Tool Cylinder maximum operating pressure chart (port relief adjustment) for the RLP-902 rotator

NOTE: Area with diagonal lines do not require pressure to be adjusted below 5000 psi. (345 bars).

Length between lugging pins*		**Cylinder bore**									
inch	*mm*	3.5 in. psi	*90 mm bars*	4.0 in. psi	*100 mm bars*	4.5 in. psi	*110mm bars*	5.0 in. psi	*120 mm bars*	5.5 in. psi	*130 mm bars*
10	*250*	5000	*345*								
10	*250*	5000	*345*								
12	*300*										
12	*300*										
14	*350*									5000	*345*
14	*350*									**4510**	*345*
16	*400*							5000	*345*	5000	*345*
16	*400*							**4775**	*345*	**3946**	***319***
18	*450*							5000	*345*	**4993**	*345*
18	*450*							**4244**	***333***	**3508**	***284***
20	*500*					5000	*345*	5000	*345*	**4494**	*345*
20	*500*					**4716**	*345*	**3820**	***300***	**3157**	***255***
22	*550*					5000	*345*	**4978**	*345*	**4085**	***327***
22	*550*					**4287**	***324***	**3472**	***272***	**2870**	***232***
24	*600*			5000	*345*	5000	*345*	**4564**	*345*	**3745**	***300***
24	*600*			**4974**	*345*	**3930**	***297***	**3183**	***250***	**2631**	***213***
Maximum tilting moment ft.lb *(Nm)* 125000 *(169500)*											

rod side: psi *(bars)*
bore side: psi *(bars)*

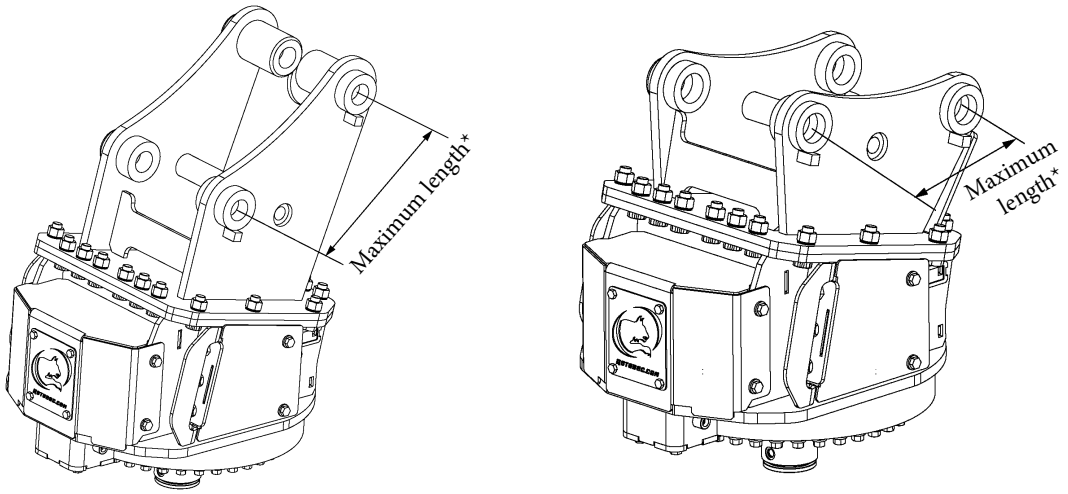


Figure 11

Pressure and Flow chart for the RLP-902 rotator (without valve-on-swivel option)

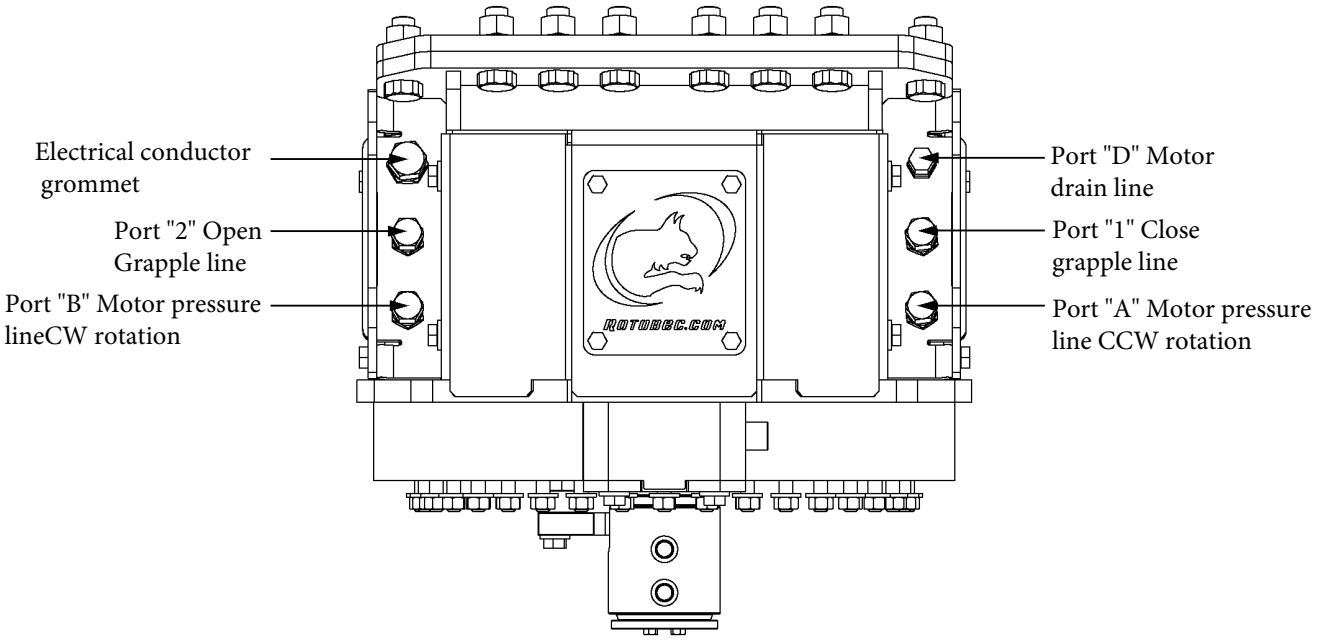


Figure 12

CAUTION. **The drain line must be connected to the filter on the carrier's drainage circuit. Should you not have a separate filter on the carrier, it is important that you install one.**

CAUTION. Rotobec does not recommend the use of quick couplers on hydraulic lines. A quick coupler improperly connected will automatically damage some rotator components.

Tools required for hydraulic installation

Wrench sizes: 1 of 1 5/8"
1 of 1 1/2"
1 of 1"
1 of 15/16"
1 x 1 1/8

CAUTION. Make sure hydraulic pressure and flow from carrier to the rotator functions do not exceed the specifications given in the chart below.

SPECIFICATIONS		**RLP-902**
Maximum lift capacity	lb kg	90000 40824
Maximum pressure to rotor	psi bars	5000 345
Maximum torque at 2200 psi	in. lb Nm	51150 5779
Maximum flow for rotator valve section	gpm l/min.	12 45
Speed at recomended flow	rpm	15
Maximum drain line pressure	psi bars	50 3.5
Maximum pressure to grapple	psi bars	5000 345
Rotator *without* valve in head		
Motor drain port *(port D)*		1 x 10 JIC
Rotator motor ports *(ports A & B)*		2 x 12 JIC
Cylinder ports *(ports 1 & 2)*		2 x 12 JIC
Motor drain line min. hose dia.	in. mm	1/2 12.5
Rotator line min. hose dia.	in. mm	3/4 19
Cylinder line min. hose dia.	in. mm	3/4 19

* The flow must be adjusted according to the grapple specifications.

Hydraulic schematic for the RLP-902 rotator (without valve-on-swivel option, closed center control valve)

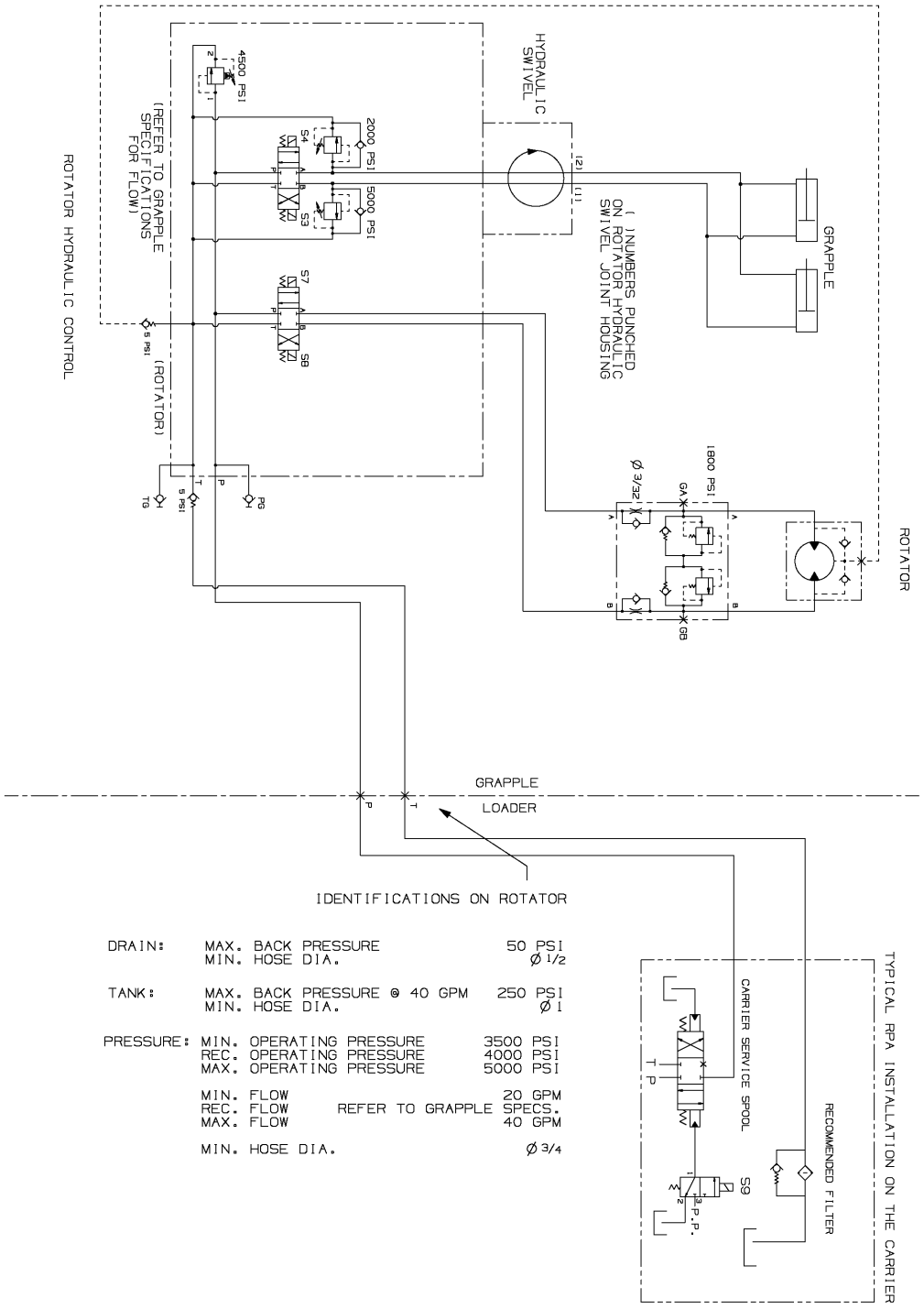


Figure 13

Pressure and Flow chart for the RLP-902 rotator (with valve-on-swivel option)

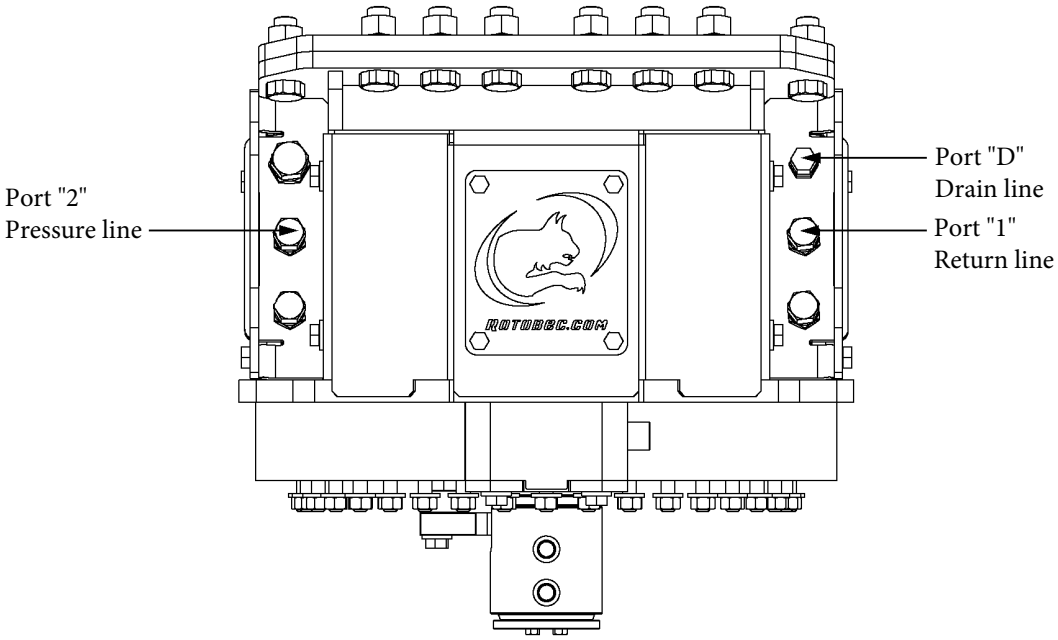


Figure 14

CAUTION. The return line (tank line) must be connected directly to the tank, DO NOT connect the return line to the service spool of the carrier or a junction manifold, this WILL DAMAGE the hydraulic filter or the control valve of the grapple immediately. Damages will not be covered by warranty.

CAUTION. The drain line must be connected to the filter on the carrier's drainage circuit. Should you not have a separate filter on the carrier, it is important that you install one.

CAUTION. Rotobec does not recommend the use of quick couplers on hydraulic lines. A quick coupler improperly connected will automatically damage some rotator components.

Tools required for hydraulic installation

Wrench sizes: 1 of 1 5/8”
1 of 1 1/2”
1 of 1”
1 of 15/16
1 of 1 1/8”

CAUTION. Make sure hydraulic pressure and flow from carrier to the rotator do not exceed the specifications given in the chart below.

SPECIFICATIONS		**RLP-902**
Maximum lift capacity	lb kg	90000 40824
Maximum pressure to rotator	psi bars	5000 345
Maximum flow to rotator *	gpm l/min.	12 45
Maximum back pressure @ max. flow Maximum back pressure @ max. l/min.	psi bars	250 17
Maximum drain line pressure	psi bars	50 3.5
Rotator *with* valve in head		
Drain line port *(port D)*		1 x 10 JIC
Pressure line port *(port 2)*		1 x 16 JIC
Return line port *(port 1)*		1 x 16 JIC
Drain line min. hose dia.	in. mm	1/2 12,5
Return line min. hose dia.	in. mm	1 25
Pressure line min. hose dia.	in. mm	3/4 19

* The flow must be adjusted according to the grapple specifications.

Hydraulic schematic for the RLP-902 rotator (with 2 section valve-on-swivel option, closed center control valve)

See 11 x 17 drawing

Figure 15 - REV.1

Electrical connections from carrier to the RLP-902 rotator (with 2 section valve-on-swivel option)

NO	DESCRIPTION	QTY
1	CAP SCREW	4
2	JUNCTION BOX	1
3	ELECTRIC BOX BRACKET	1
4	HYDRAULIC SCHEMATIC	1
5	ELECTRIC SCHEMATIC	1
6	PILOT VALVE	1
7	HARNESS	1
8	HARNESS	2
9	HANDLE	1
10	FEMALE CONNECTOR	1
11	MALE CONNECTOR	1
12	COVER	1
13	HOUSING	1
14	INSTALLATION KIT & DIAGRAM_EN (146-0241)	1
15	INSTALLATION KIT & DIAGRAM_FR (146-0242)	1
16	HYDRAULIC SCHEMATIC_EN (07000-8396)	1
17	HYDRAULIC SCHEMATIC_FR (07000-8396)	1
18	ELECTRIC SCHEMATIC_EN (07001-1652)	1
19	ELECTRIC SCHEMATIC_FR (07001-1652)	1

NO	NAME	DESCRIPTION	ROTO	LENGTH	QTY
A	ELECTRIC WIRE	18/10 SOW		31.0 M	1
B	ELECTRIC WIRE	14/2 SJOW		3.7 M	1

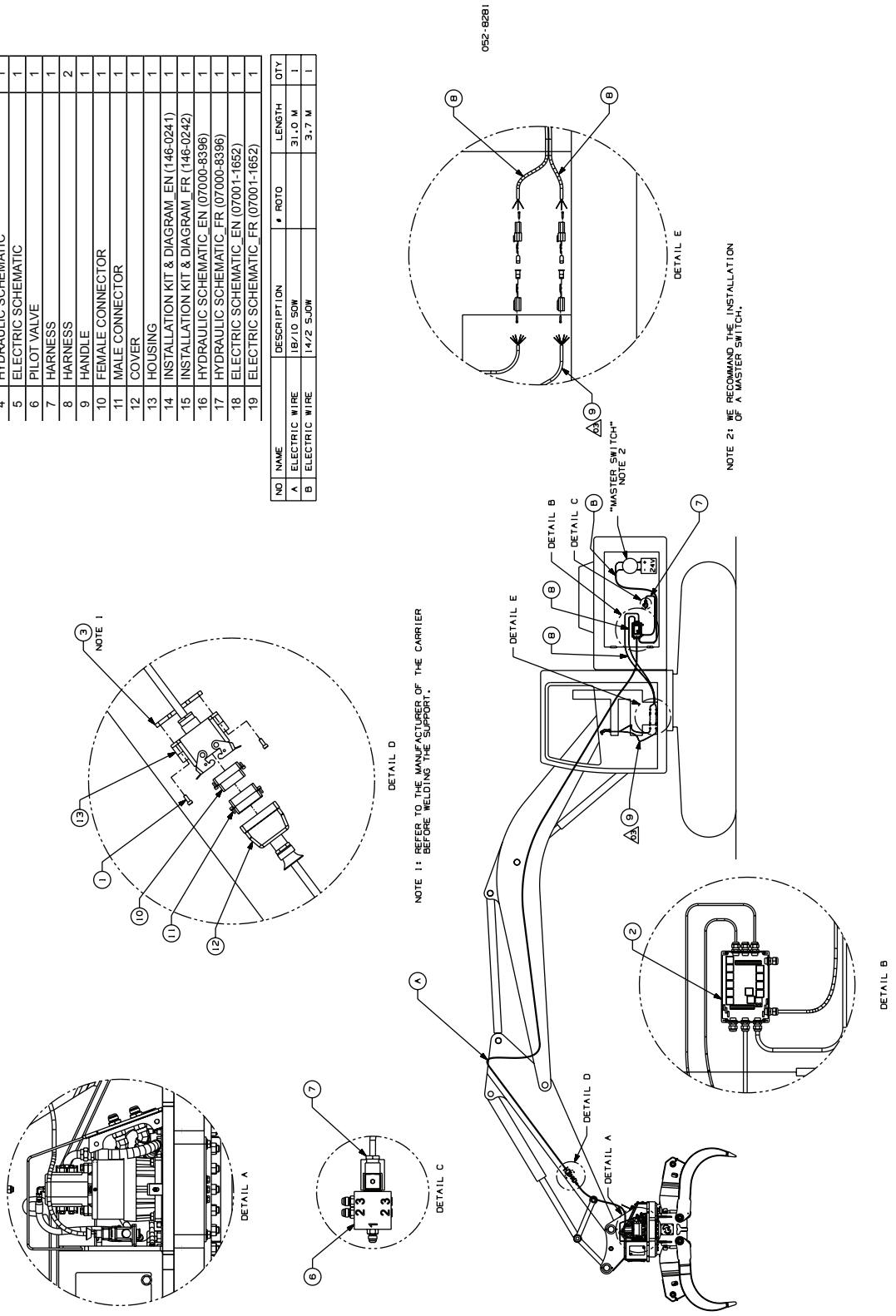


Figure 16 - REV.3

Electrical installation schematic for the RLP-902 rotator (with 2 section valve-on-swivel option)

See 11 x 17 drawing

Figure 17 (INS-RGP902-2S-3-EL1) REV.02

Electrical schematic for the RLP-902 rotator (with 2 section valve-on-swivel option)

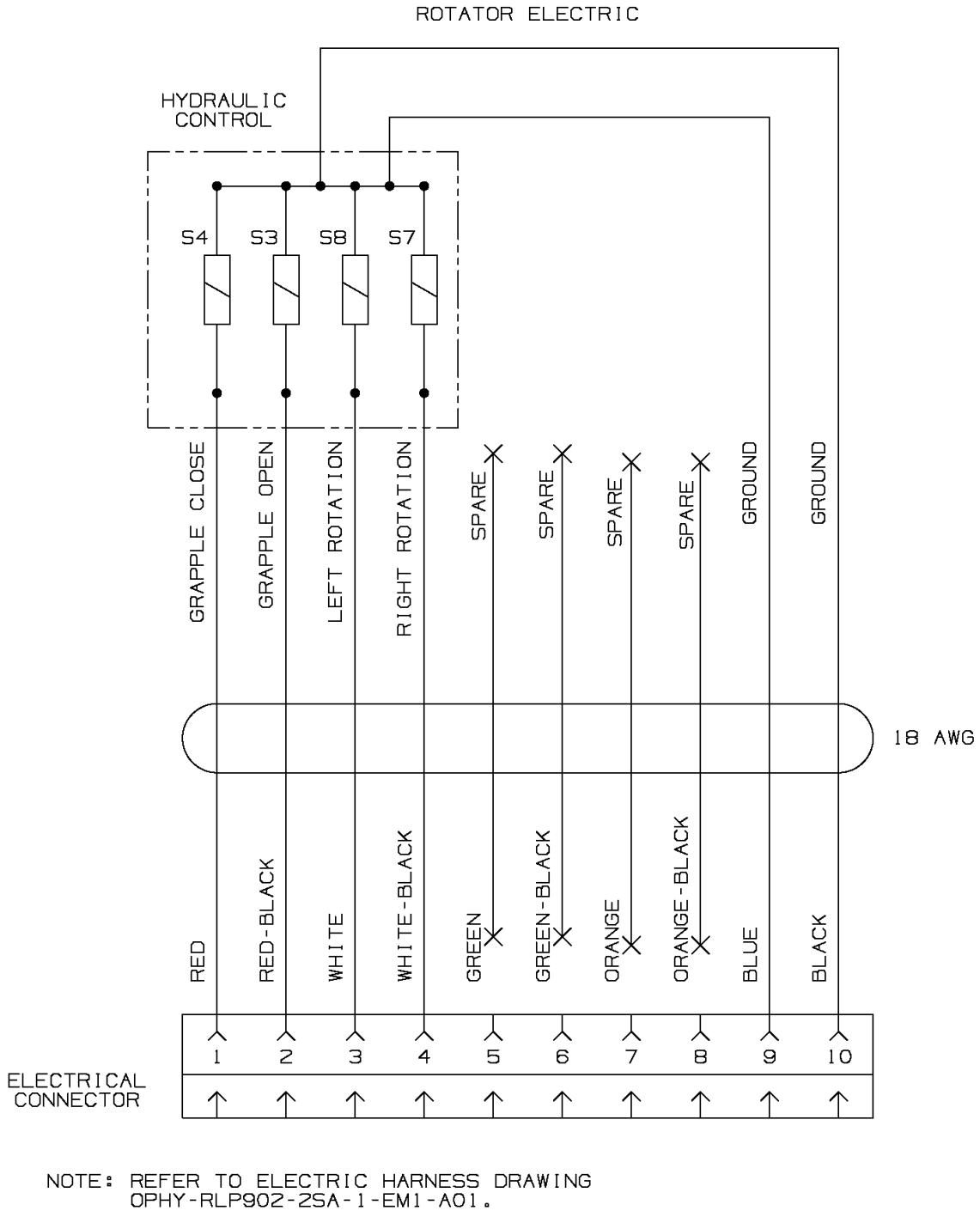


Figure 18

Maintenance

To keep your Rotobec RLP rotator in peak working condition and to ensure the safety of personnel, follow the maintenance schedule given in this section.

If your RLP rotator is used in extreme temperatures (either below 0°F/-20° C or above 100°F/40°C), difficult conditions, or works more than 40 hours a week, inspect and lubricate the RLP rotator at shorter intervals than those given in the *RLP rotator weekly lubrication chart, see page 39.*

Thoroughly clean the RLP rotator before each inspection in the following ways:

- Place the RLP rotator safely on the ground and shut off any source of power that operates the RLP rotator before beginning to work on it.
- Use protective gloves when working on the RLP rotator.
- Remove remaining dirt, excess oil, and grease that may hide cracks, leaks, loose bolts, or other problems.

Daily maintenance

Inspect the RLP rotator every 12 hours of service to make sure:

- That there are not any cracks on the RLP rotator, check the welding and structure.
- That the hydraulic system and the cylinders are not leaking.
- Retighten all loose fittings and bolts and repair all damage that has oc-curred to the RLP rotator.

WARNING. High pressure hydraulic oil can penetrate the skin causing severe injury, gangrene, or death. Never touch or stand close to a pressurized rotator and its hydraulic hoses.

CAUTION. The slewing ring bolts must be re-torqued after the first 100 hours and every 500 hours at 50 ft-lb / 68 Nm below the torque specifications in the parts maual. Visually check these bolts daily.

Removing and installing the hydraulic control valve assembly with Valve on Swivel (VOS)

Service guidelines

1. **Removing and installing the hydraulic control assembly on the rotator hydraulic swivel:**

1.1 Before removing the hydraulic control assembly, clean the inside of the rotator base assembly.

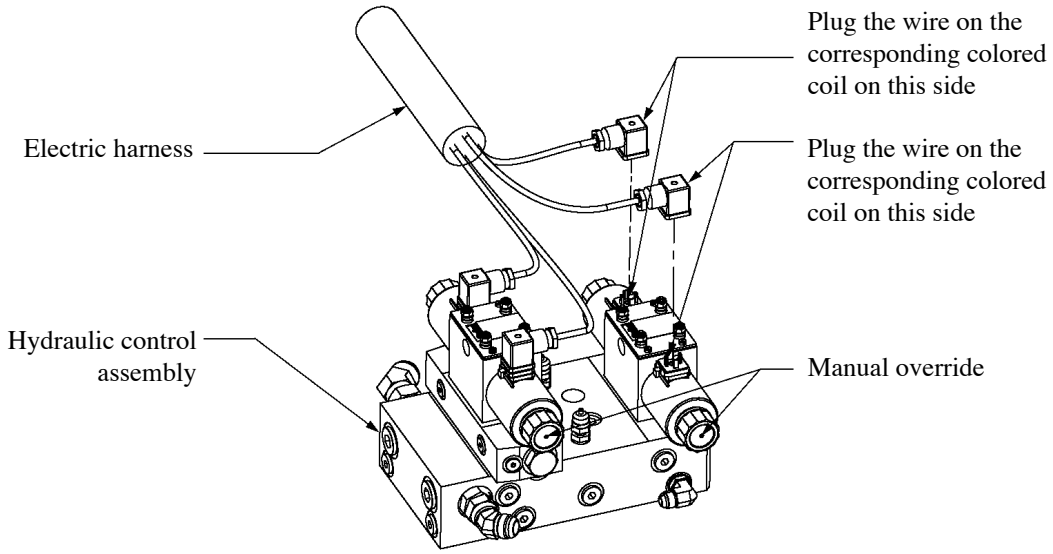


Figure 19

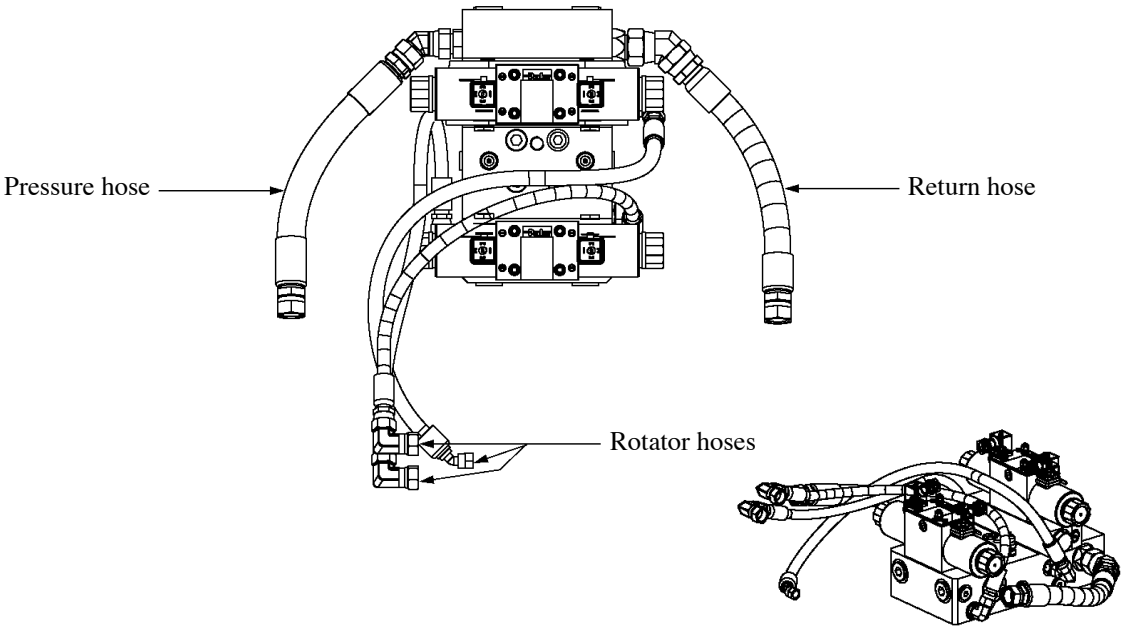


Figure 20

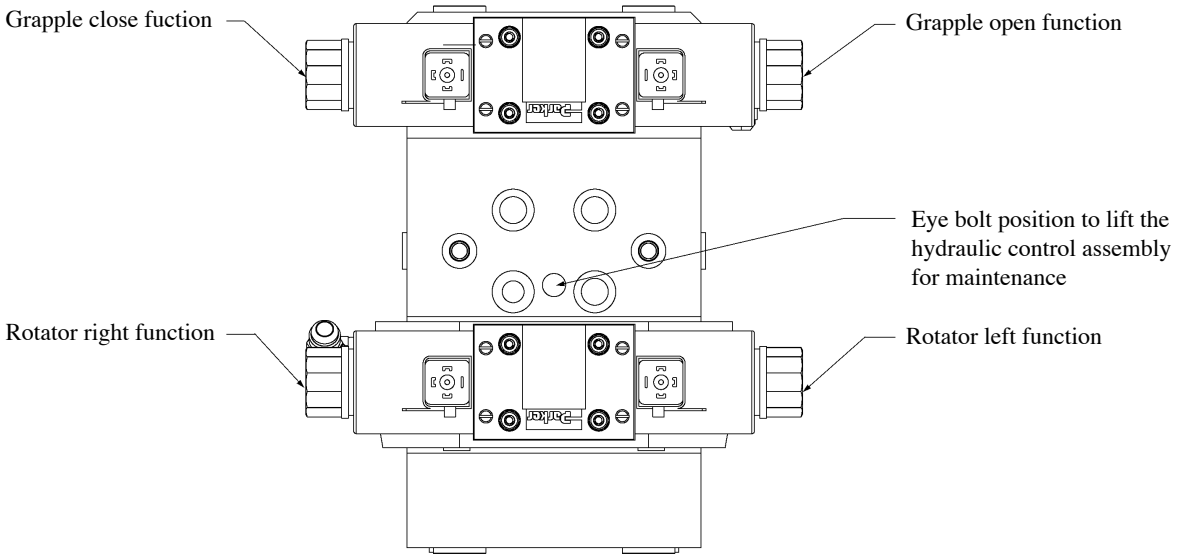


Figure 21

1.2 Disconnect the electrical connectors (Qty 4) from the coils and remove the hydraulic hoses as shown on drawing (fig. 22). NOTE: The color code on the electric coils.

1.3 Remove the four mounting bolts and using an eye-end bolt 5/8-11UNC screwed in the center of the hydraulic control assembly, lift it straight up to clear the control seat. (see fig. 25)

1.4 Clean the bottom part of the control and the top portion of the rotator hydraulic swivel. Replace the seals on top of the rotator hydraulic shaft.

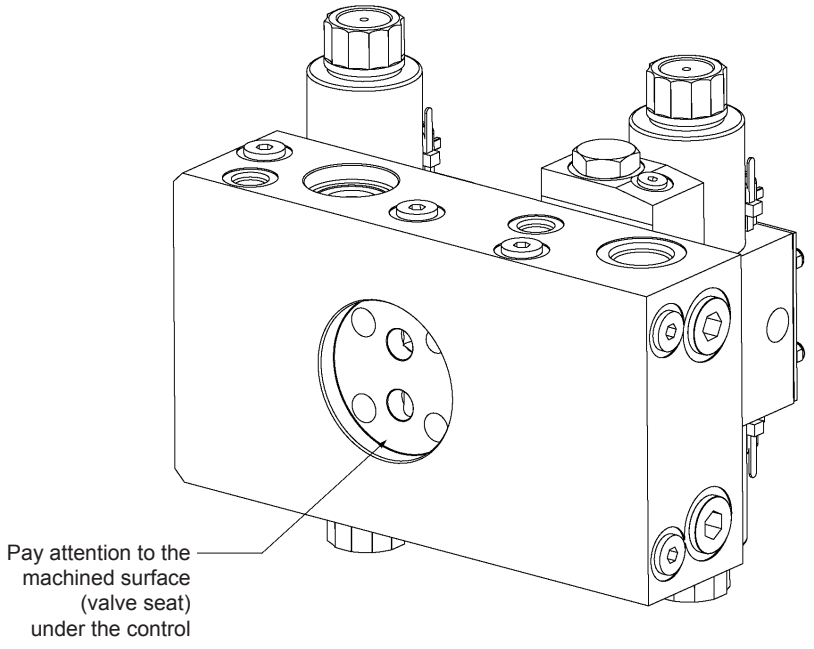


Figure 22

1.5 Install the hydraulic control assembly on top of the rotator hydraulic swivel. Make sure that the o-rings stay installed. Pay particular attention to the bolt pattern. One of the four mounting bolts is smaller than the other. Torque the bigger sized bolts (5/8” - 11 UNC) at 160 ft-lb and the smaller sized one (1/2” - 13 UNC) at 80 ft-lb. Make sure that the control is sitting correctly on top of the swivel.

1.6 Install the hydraulic hoses and connect the electrical connectors (Qty 4) to the coils following the color code.

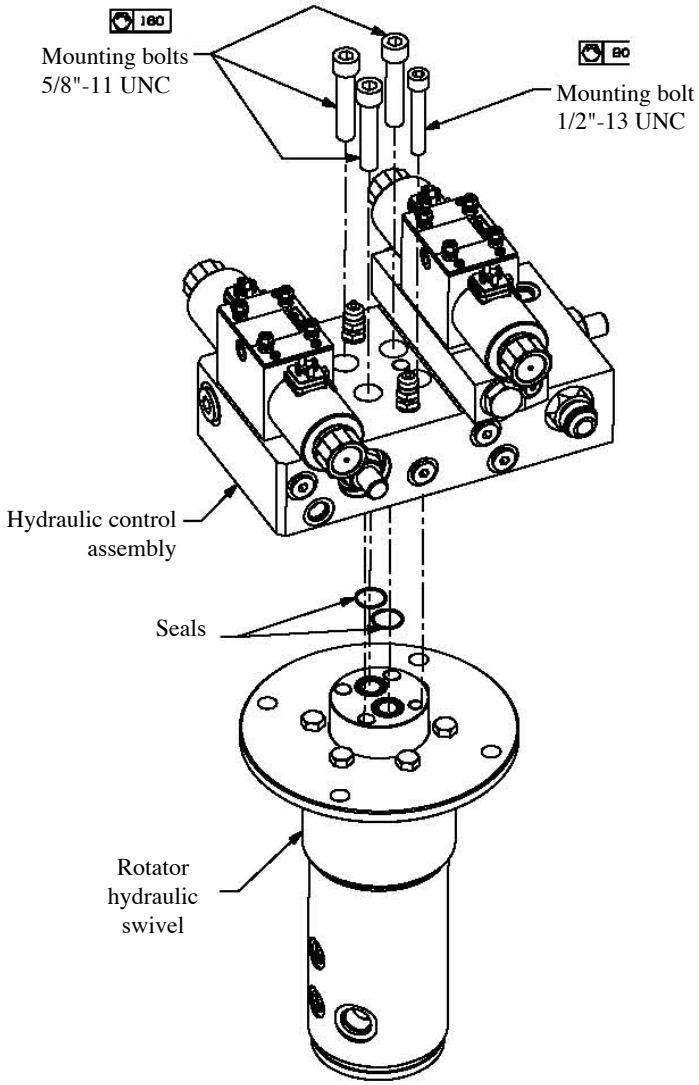


Figure 23

2. **Disassembling and assembling instructions for the hydraulic control assembly on RLP-902 with valve-on-swivel:**

2.1 Clean the hydraulic control assembly before disassembling it.

2.2 Handle with care in order not to damage the control seat under it.

2.3 Unscrew the directional valve mounting bolts and remove the directional valve.

2.4 Unscrew the main relief valve located in the manifold and both port relief valves located in the manifold below the grapple OPEN/CLOSE valve. Clean the cartridges, replace the seals or replace the cartridges, if necessary.

2.5 **Pay attention not to mix-up the grapple port relief valves, 5000 psi on the close side and 2000 psi on the open side.**

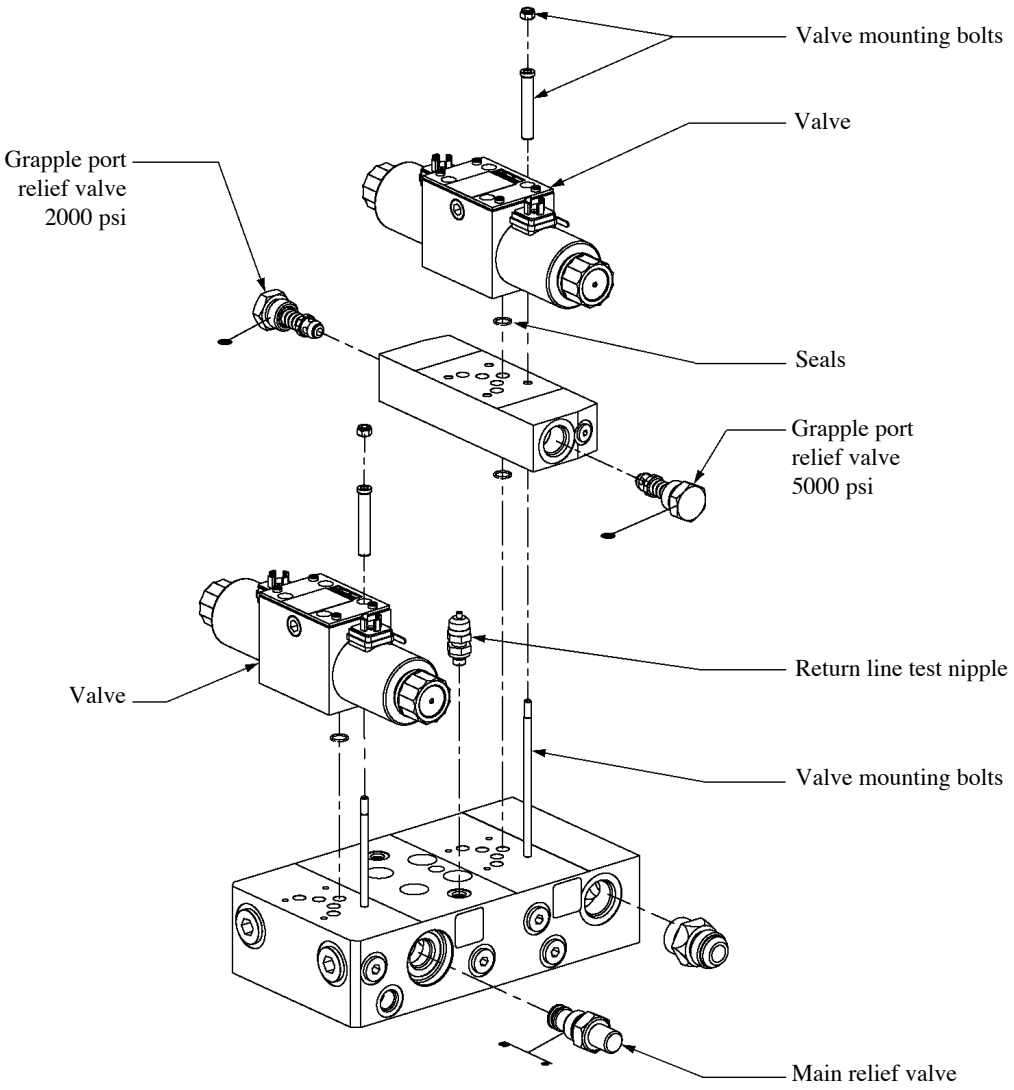


Figure 24

2.6 Before reinstalling the valves, clean the manifold

CAUTION: The valve mounting bolts must be torqued at a maximum of 9 ft-lb.

Make sure that the directional valve seals are well installed. Screw the bolts to properly seat the valve on the manifold and torque the bolts in 2 steps, first to 4 ft-lb in a cross pattern and then to 9 ft-lb the same way.

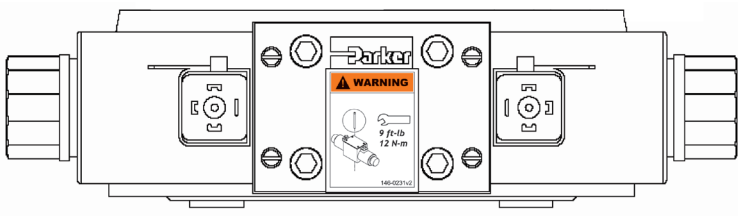


Figure 25

2.7 Replace the seals and the valve mounting bolts before reinstalling the valves or replace it, if necessary.

2.8 Unscrew the check valve, clean it and verify if it is working correctly or replace it, if necessary.

3. **Replacement of the valve coils.**

3.1 Clean and disconnect the electrical connector.

3.2 Unscrew the plastic retainer and remove the coil.

3.3 Install a new coil and screw the plastic retainer. Tighten it by hand or torque it at 5 ft-lb. Replace the seal, if necessary.

NOTE: The replacement of the valve coils can be done even if the control assembly is still installed on the rotator.

4. Adjustment and test.

If the grapple/rotator is too slow, a flow adjustment may be required on the machine. The hydraulic control valve does not have stroke limitors on the valve sections.

4.1 The main relief valve and the port relief valve are factory adjusted and there isn't any adjustment to be done on this control assembly.

4.2 It is possible to adjust the main relief valve, if it is absolutely necessary. Removing the protective cap allows access to the adjusting screw, it should be adjusted at 4500 psi cracking pressure and a minimum of 5 GPM.

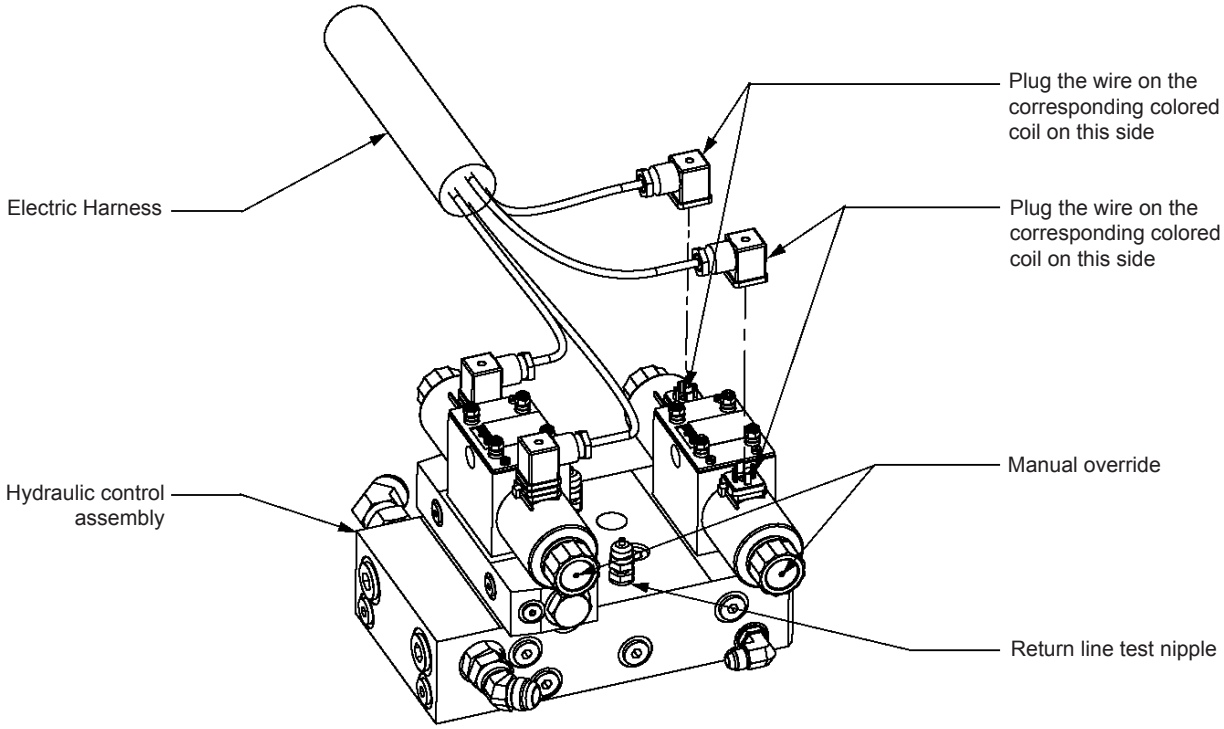


Figure 26

4.3 It is possible to check the mechanical operation of the valve. Using a long and narrow tool, push on the manual override through the hole located both side in the center of the coil plastic retainer.

4.4 It is possible to verify the hydraulic pressure in the pressure and return line using the test nipples located on the top center of the manifold,

Lubricating the RLP rotator

Lubricate the RLP rotator after it has been working for several hours because the new grease penetrates more easily when the old grease is hot.

If the working environment contains a high percentage of dirt and/or humidity, the lubrication period must be shortened.

Materials needed

Use one of the grease brands recommended below to grease your RLP rotator. This grease caalso be used in winter conditions. Avoid mixing different types of grease. The grease should have excellent water-repulsion durability, antirust capabilities, adhesive abilities and mechanical stability.

Brand	Raceway	Gear
Shell	Albida EP2	SRS 2000 Extreme EP2
Petro-Canada	Precision EP2	XCG-Flex EP1
Mobil	Mobilux EP2	Centaur Moly EP1
Exxon	Beacon EP2	Ronex Extra Duty Moly EP2
Chevron Texaco	Multifak EP2	Open Gear 100 NC

Grease manufacturer recommendations

Procedures

Shut down the loader or carrier so working around the RLP rotator and attachment is safe. The RLP rotator and attachment should be placed on a stable surface.

Weekly lubrication chart

RLP-902 Rotator	Quantity of nipples	Shots of grease gun per interval of 40 operating hours
Slewing ring raceway	2	4
Pinion gear bearing, Slewing ring and pinion gear teeth	1	6

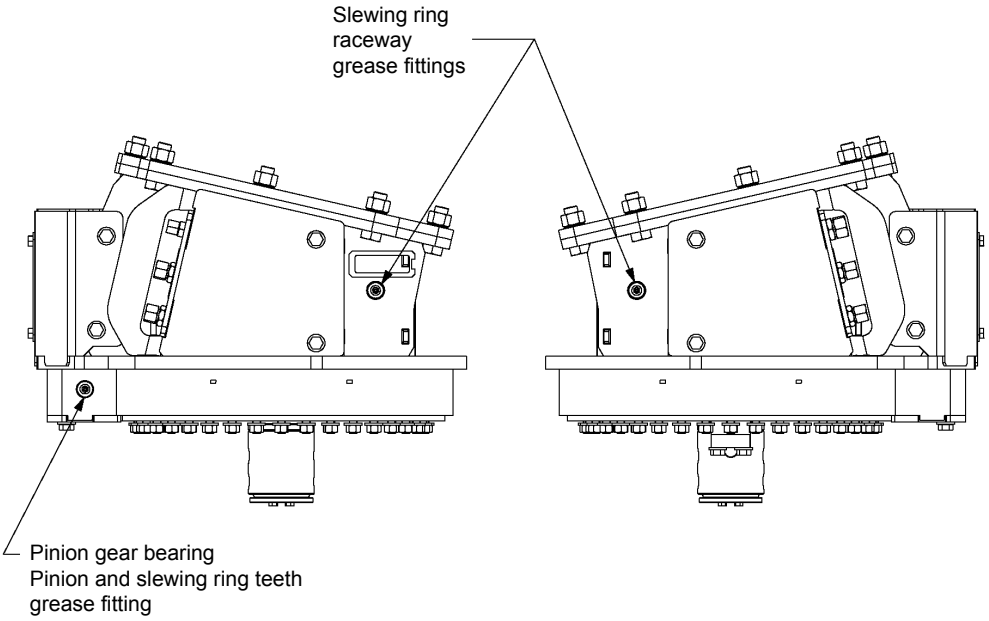


Figure 27

Raceway

Lubricating intervals are to be selected according to the operating conditions; **generally every 40 operating hours**, or shorter lubricating intervals must be used in tropical regions, in the presence of high humidity, dust or dirt and significant fluctuations in temperature, and where there is continuous rotation. (Please refer to weekly lubrication chart above for quick reference).

Gear

The meshing action and usual position of the gear tends to purge the lubricant; thus, the gear should be regreased frequently with a small amount of lubricant. It is recommended that grease be introduced at the point of mesh of **pinion and gear every 10 hours** of slow or intermittent operation, and more often for rapidly or continuously rotating applications.(Please refer to weekly lubrication chart for quick reference).

Before and after prolonged stoppage of the equipment, relubrication is absolutely necessary. This is especially important after a winter shutdown. When cleaning the equipment, care must be taken to prevent cleaning agents from damaging the seals or penetrating into the raceways, even following equipment shutdown.

Storage

This following information explains how to store your RLP rotator. Proper storage ensures the safety of personnel and prolongs the RLP rotator's work-ing life.

Before storing the RLP rotator, do the following:

1. To prevent the RLP rotator from falling over while in storage, sit it on a flat and stable surface.
2. With a rag and solvent, remove remaining dirt, oil, and grease from the RLP rotator. Debris can hide cracks, leaks, loose bolts, and other problems.
3. Repair any damage found during the inspection before storing the RLP rotator.
4. Lubricate the RLP rotator according Weekly lubrication chart, see page 39. Once the greasing procedure is done, we recommend turning the rotator to spread the new grease inside the slewing ring, this will prevent water from entering inside the raceway of the slewing ring.
5. Apply Loctite (if indicated in *Parts Manual*) to loose bolts and tighten them to their proper torque value.

CAUTION. The hydraulic system must be full of oil when storing the RLP rotator. Make sure that all hoses and orifices are plugged or capped to prevent contamination from getting into the hydraulic circuit.

After Storage

After storage and before operating the RLP rotator again, follow these procedures:

1. Inspect the RLP rotator for cracks, wear, loose or missing parts, vandalism, leaks, or other damage (follow the guidelines for Daily maintenance, see page 31).
2. If the RLP rotator has been in storage for three months or more, lubricate it according to the Weekly lubrication chart, see page 39).
3. Repeat the same procedure as described in step 4 above. Should some water enter the raceway of the slewing ring during storage, this will help eliminate it from the inside bearing.

Troubleshooting

Place the RPA grapple on a firm base and stop the machine before beginning the troubleshooting.

WARNING. Use safety glasses when troubleshooting.

Problem	Cause	Solution
Doesn't hold its load or stops working.	Hydraulic pressure too low.	Check the hydraulic pressure.
	Broken hydraulic hoses.	Replace hoses or leaking components, if needed.
	Defective o-ring on the cylinder plug at barrel end.	Change the o-ring.
	Control valve problem.	Check control valve regarding leakage.
		Check port relief adjustment and port relief seals.
	Broken seals in hydraulic cylinder.	Check piston seal. • Disassemble hydraulic hoses for "grapple close". • Pressurize hydraulic hoses for "grapple open". The attachment must be fully open to perform this operation. If oil flushes out of the hydraulic hoses for "grapple close", there is probably a problem with the piston seal. • Replace piston seal, if needed. • Make sure there hasn't been any damage done to the cylinder tubing.
	Broken seals in hydraulic swivel.	Check hydraulic swivel seals.
Rotator or grapple jaw function doesn't work.	Control valve solenoid is defective.	Install a new solenoid valve. Be sure to check for a good electrical connection before replacing parts.
	The problem is still occurring after installing a new solenoid valve.	• Test the defective function manually on the control valve, if the problem is still occurring, verify the defective valve section. • Check for a defective wire from junction to junction up to the power source to detect any broken wire. • Check pilot pressure.

ROTOBEC

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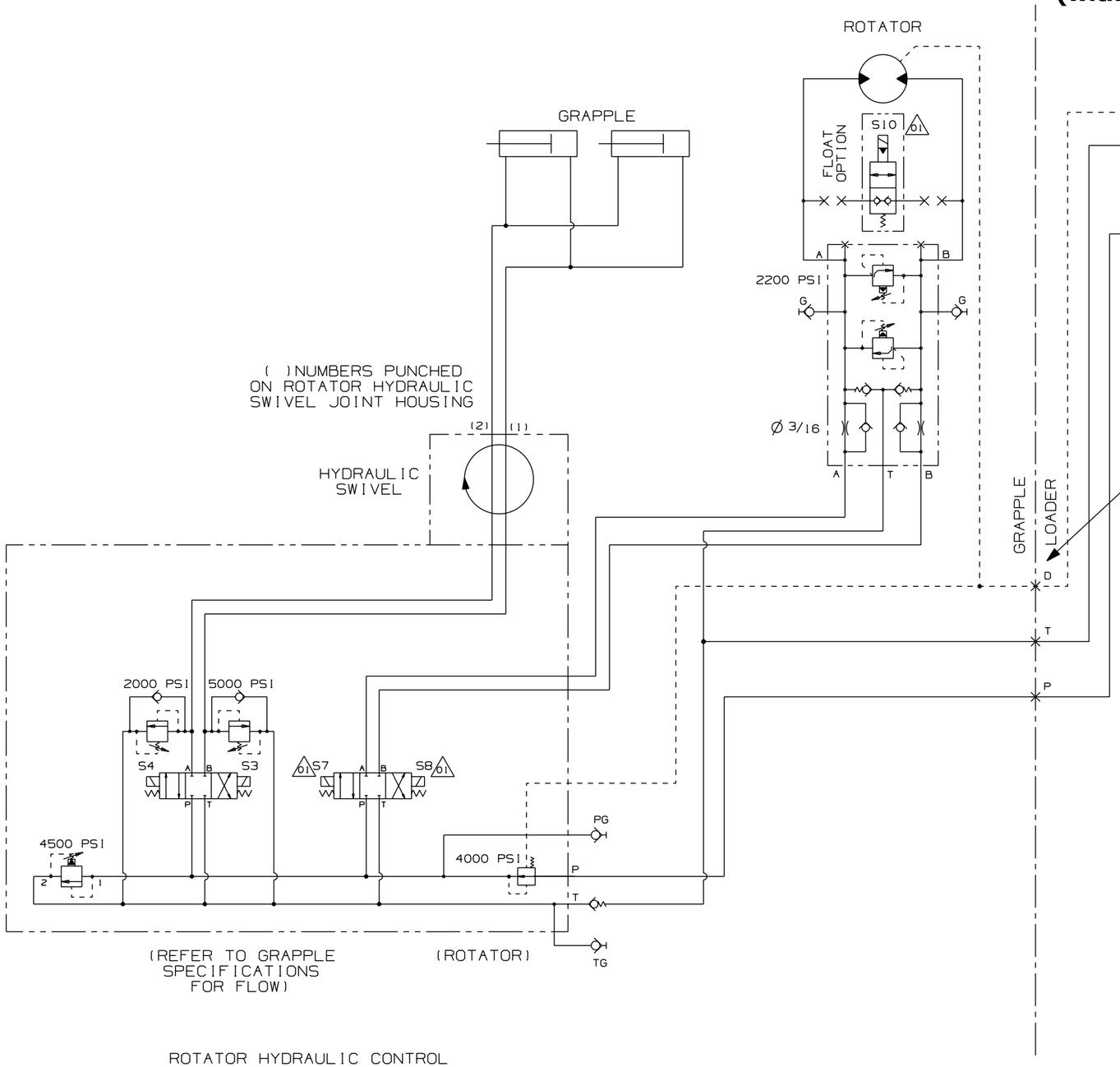
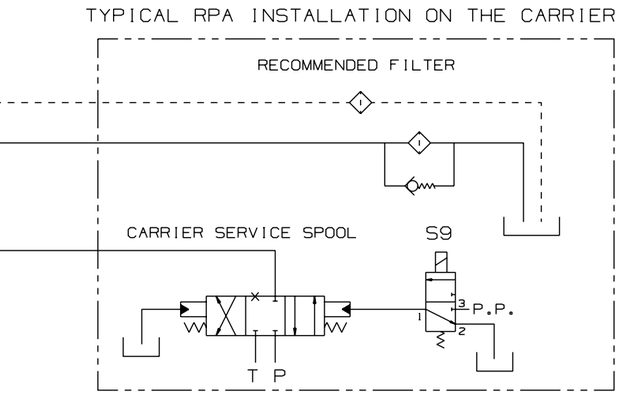
Hydraulic schematic for the RLP-902 rotator (with 2 section valve-on-swivel option, closed center control valve)





IDENTIFICATIONS ON ROTATOR

DRAIN:	D
TANK:	T
PRESSURE:	P

CAUTION. It is important to connect the tank line directly to the tank, **"DO NOT CONNECT THE TANK LINE TO THE SER-VICE SPOOL"** This will cause damage to the hydraulic compo-nents and will void your warranty.

Figure 15 - REV.1

Electrical installation schematic for the RLP-902 rotator (with 2 section valve-on-swivel option)

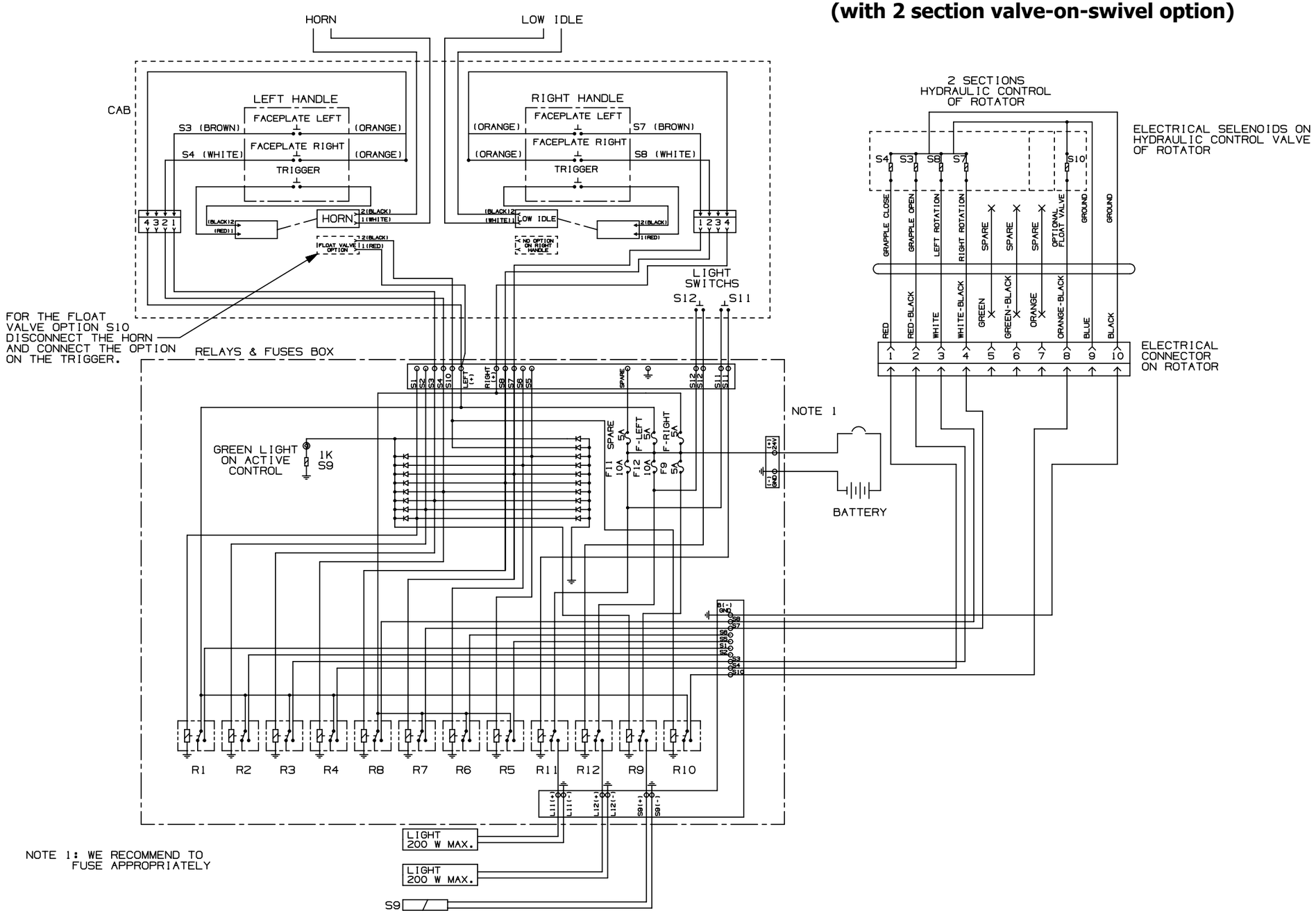


Figure 17 (INS-RLP902-2S-3-EL1) REV.02