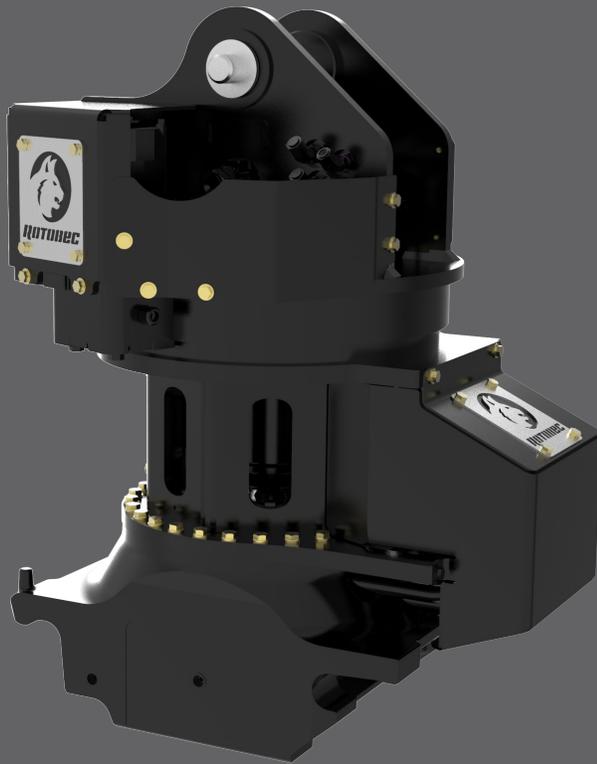


ROTOBEC

RT SERIES OQC SYSTEM



OPERATOR'S MANUAL

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



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Safety Information



Recognize Safety Information

This is the alert symbol. When you see this symbol on your machine or in this manual, be alert for potential of personal injury.

Failure to follow the safety precautions in this manual can result in death, severe personal injury or property damage. Carefully read and understand the safety hazards in this group and elsewhere within this manual.



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Is used to address practices not related to physical injury.



Safety instructions (or equivalent) signs indicate specific safety-related instructions or procedures.

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About This Manual

This manual contains instructions for the installation, maintenance, and repair of your Rotobec product. It also contains information on controls, maintenance as well as instructions on operating safely. The parts and components used in Rotobec products are specifically designed and manufactured to ensure the highest standards of performance and durability.

The illustrations, technical information and specifications within this manual were accurate at the time of printing. However, Rotobec reserves the right to revise specifications, instructions and design.

If you have questions about the information in the manual, please consult the nearest Rotobec branch (for a list of branches, see the back cover).

⚠ WARNING

Rotobec assumes no liability or responsibility for damages or injury that may arise as a result of using parts in the attachment other than Rotobec parts, not following the instructions in the manual, or for the improper use of the Rotobec attachment.

NOTICE

Before operating, servicing or performing any maintenance on this product, Rotobec recommends that you always refer to and follow the standard ASME B30.20-2010 “Below the hook lifting devices” to maximize the safety of your operations.

Safety Guidelines

⚠ WARNING

This section provides guidelines to help provide for the safety of the people working with and around the rotator and to prevent damage to the rotator. You should read and understand these guidelines and the warnings of the potential for serious personal injury or death. Rotobec assumes no liability or responsibility for injury or damages that may arise if these guidelines are not followed.

Operators have the legal and moral responsibility to comply with all instructions, warnings and safety regulations to provide for their safety and the safety of others.

General Guidelines

- Follow all federal and state or provincial safety regulations for hydraulic mechanisms, lifting devices, grapples, spillage and disposal of hydraulic oil.
- This manual should be stored in an area so that all personnel have ready access to these safety and maintenance guidelines at all times.
- Rotobec attachments should be operated only by qualified knowledgeable personnel.
- Whenever conditions, environment or circumstances cause there to be any doubt to safety, operators should refrain from handling a load and consult a designated person.
- Operators must be aware that a load or partial load could fall at any time due to inadvertent activation of controls or otherwise.
- An attachment should never be loaded in excess of its listed capacity or used to handle any load for which it is not designed.
- Loads must be appropriate for the attachment and carefully distributed.
- The operator shall not ride, nor shall he allow others to ride any attachment.
- Do not allow the attachment or load to come into contact with any obstruction.
- Never leave a suspended load unattended.
- Before leaving, attempting to lock out, turning off or otherwise stop use of the machine, the operator should land any attached load and place it on a firm base.

Service and Maintenance Guidelines

Installation, removal, service and repair of all attachments and other components must be performed by qualified personnel, wearing appropriate personal protective equipment (including safety glasses).

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

Loose or over torqued bolts can cause parts to separate which can result 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.
- Appropriate personal protective equipment should be worn at all times when working on or around the rotator.
- Check the machine for damages at the beginning of each shift.
- Make sure that the hydraulic pressure and flow in the rotator is adjusted according to specifications. If the pressure is too low, the rotator will not perform adequately. If the pressure is too high, the rotator will be overloaded, which could result in structural failures, personal injuries and also void the warranty of the equipment.
- All service and repairs must be performed only by qualified personnel with suitable tools and lifting devices, at an appropriate service facility/location.

CAUTION

It is strongly recommended to activate the rotator for almost 10 turns on the same side, to bring fresh hydraulic oil from the tank to the hydraulic motor. It must be done daily. This way, the operating life of the hydraulic motor will be greatly increased.

⚠ DANGER

Hydraulic fluid under pressure can penetrate the skin or eyes and cause serious injury, blindness, gangrene or death. Fluid leaks under pressure may not be visible. Wear gloves and a face shield or safety goggles. Use a piece of cardboard or wood to find leaks. Do not use your hand. If any fluid is injected into the skin, it must be surgically removed within a few hours by medical personnel familiar with this type of injury.

⚠ WARNING

Hot hydraulic oil can cause severe burns. DO NOT work on the hydraulic system if oil temperature exceeds 120°F (49°C).

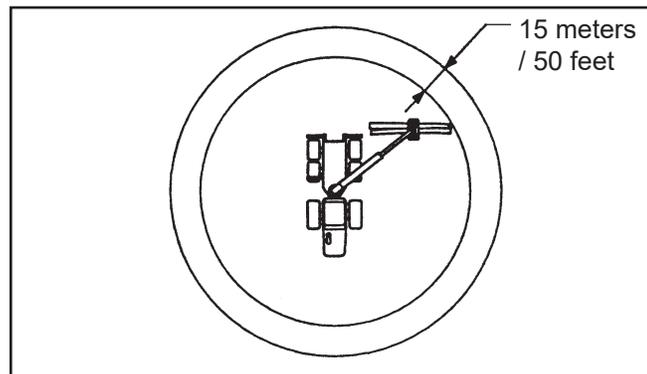
⚠ DANGER

- 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 an inadvertent activation of the controls or otherwise.
- Stop all operations immediately if any bystanders enter the work zone.

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 inadvertent activation of the controls or otherwise.

Stop all operations immediately if any bystanders enter the work zone.



Work Zone

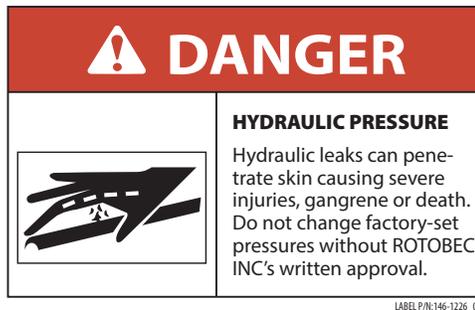
Operation Guidelines

- Locate the safety label on the rotator and observe the warnings.

The label below warns of areas that can crush a limb or other body parts.



The label below warns of the presence of high-pressure hydraulic liquid.



- Never touch or stand close to a pressurized rotator and its hydraulic hoses. High-pressure hydraulic oil can penetrate the skin causing severe injury, gangrene or death.
- Inspect the rotator daily for cracks, wear, loose or missing parts, vandalism or other damage (refer to the *Maintenance section of this manual*). Do not operate the rotator until it is repaired.
- Exceeding the load capacity of the rotator could result in death, severe injury, or mechanical failure.

NOTICE

Rotobec has the rotator and attachment with the load capacity to match your carrier. For more information, see our list of branches on the back cover.

Overview

The Rotobec RT series installed on OQC system is a quick-coupler continuous rotator that is mounted on a loader or excavator using a yoke (link).

This model has a 5000 psi floating hydraulic swivel joint and a heavy duty slewing ring, designed to withstand intense force from side-loads.

Rotobec RT Series rotators are designed to provide easy access to the main components for maintenance and repair procedures.

Key to reading the Rotobec codes

Models:

- QC-RT504HFE08-OQC65-1
- QC-RT1004HFE08-OQC65-1
- QC-RT-1204HFE08-OQC90-1
- QC-RT-1504HFE08-OQC90-1
- QC-RT-1204HFE08-OQC70-55-1

QC - Quick coupler

RT504HF - The 50 in RT504HF stands for its axial load capacity of 50000 lbs. The final 4HF stands for its 2 high flow hydraulic passages and its 2 hydraulic passages for the quick coupler locking system.

RT1004HF - The 100 in RT1004HF stands for its axial load capacity of 100000 lbs. The final 4HF stands for its 2 high flow hydraulic passages and its 2 hydraulic passages for the quick coupler locking system.

RT1204HF - The 120 in RT1204HF stands for its axial load capacity of 120000 lbs. The final 4HF stands for its 2 high flow hydraulic passages and its 2 hydraulic passages for the quick coupler locking system.

RT1504HF - The 150 in RT1504HF stands for its axial load capacity of 150000 lbs. The final 4HF stands for its 2 high flow hydraulic passages and its 2 hydraulic passages for the quick coupler locking system.

E08 - The E08 means that the rotator is equipped with an 8 channel electrical swivel that few are combined to give two 100 A (230VDC) channels, one 50 A (230VDC) channel and four 4 A (24 VDC) channels.

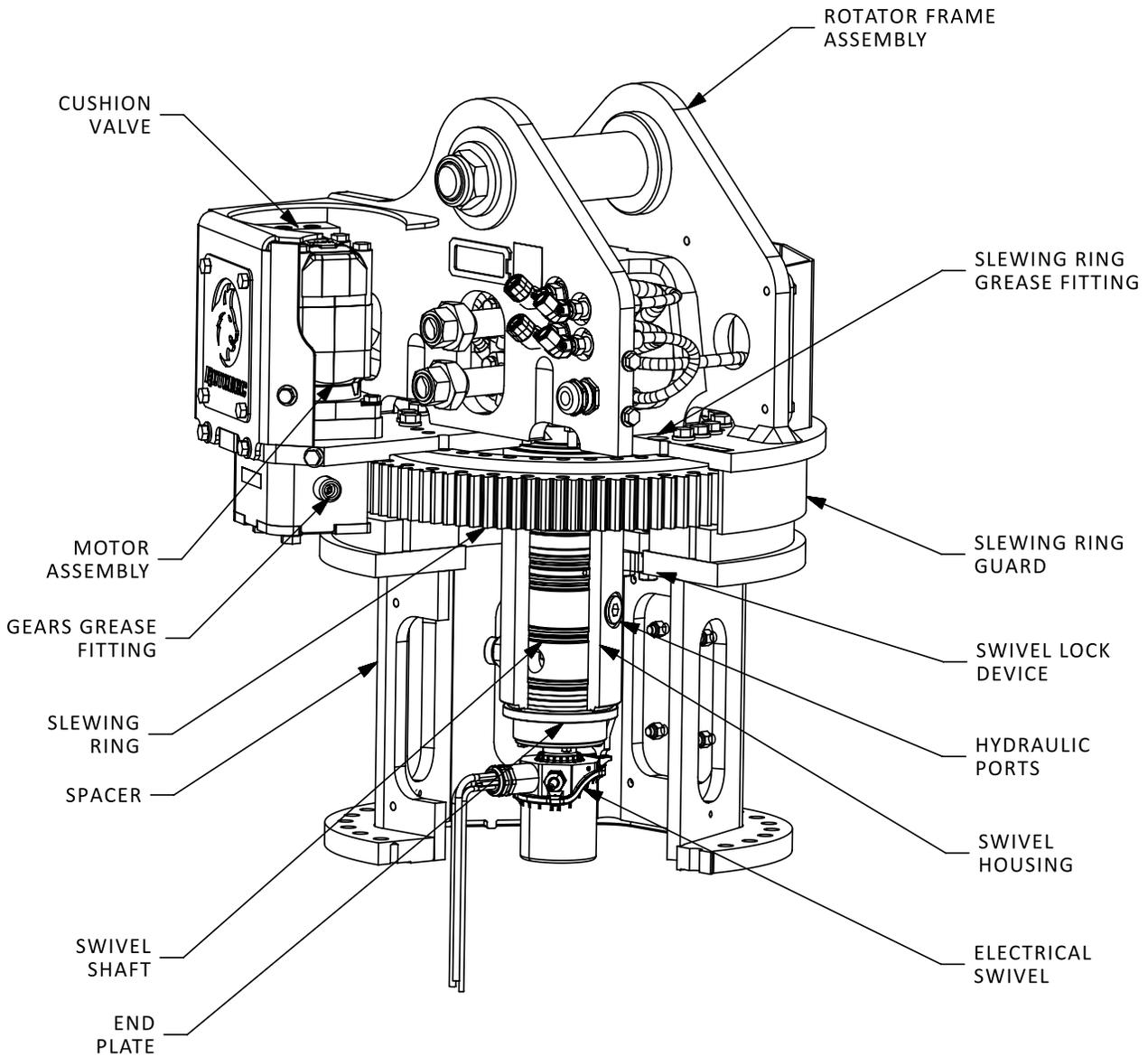
OQC90 - The OQC stands for the quick coupler brand OilQuick coupler, 90 model.

OQC70-55 - The OQC stands for the quick coupler brand OilQuick coupler, the 70 is the receiver pins diameter in mm and the 55 is the width of the quick coupler in cm.

OQC65 - The OQC stands for the quick coupler brand OilQuick coupler, 65 model.

1 - The last digit is the version of the assembly.

Visual Overview of RT Series on OQC System



Technical Specifications

OQC90

Dangling Rotator		RT-1204HFE08		RT-1504HFE08	
Dimensions		Inches	Millimeter	Inches	Millimeter
A	in./mm	33 1/4	845	35 1/2	904
B (radius)	in./mm	19 3/4	502	21	532
C	in./mm	41 1/2	1051	41 1/2	1051
D	in./mm	56	1423	57 3/4	1464
E	in./mm	51 3/4	1315	52 1/4	1329
F	in./mm	11 3/4	300	10 1/4	259
G	in./mm	9 3/4	249	29 1/2	749
H	in./mm	8 1/4	208	4 1/2	114
I	in./mm	3 1/2	89	21 1/4	541
J	in./mm	4 3/4	121	---	---

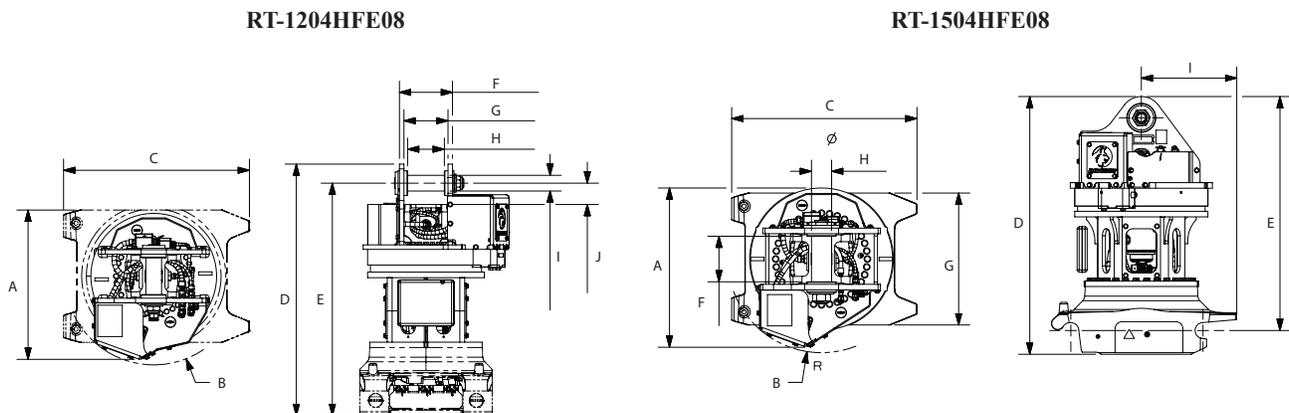


Figure 1 - Reference drawings

OQC70-55

Dangling Rotator		RT-1204HFE08	
Dimensions		Inches	Millimeter
A	in./mm	32 1/2	826
B	in./mm	8 1/4	208
C	in./mm	3 1/2	89
D	in./mm	21 5/8	549
E	Radius in.	19 3/4	502
F	in./mm	52 1/4	1326
G	in./mm	23 1/2	597
H	in./mm	42 1/4	1072
I	in./mm	40	1015

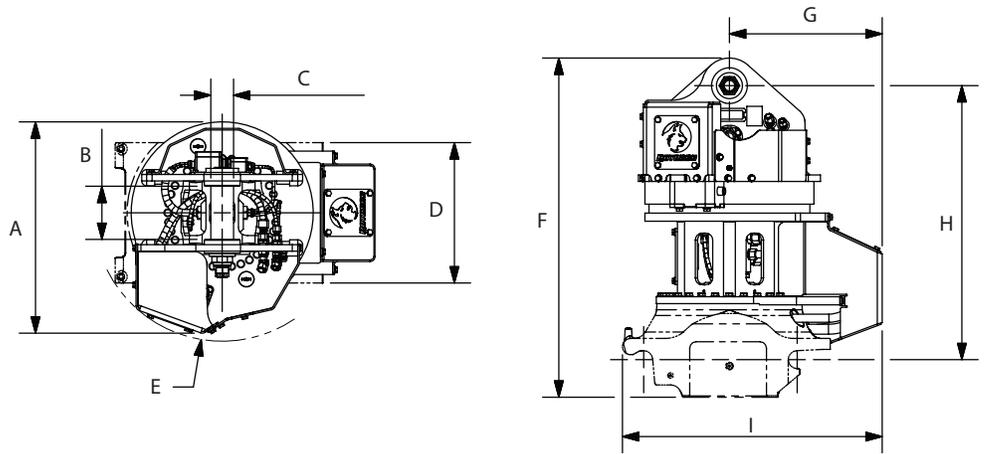


Figure 2 - Reference drawings

OQC65

Dangling Rotator		RT-504HFE08		RT-1004HFE08	
Dimensions		Inches	Millimeter	Inches	Millimeter
A	in./mm	20 1/2	523	22	556
B (radius)	in./mm	6	156	6 1/4	156
C	in./mm	2 1/2	64	3	76
D	in./mm	17 1/4	439	17 1/4	439
E	in./mm	43	1093	46 3/4	1185
F	in./mm	21 1/2	546	21 1/2	546
G	in./mm	35	889	37 3/4	962
H	in./mm	35 1/4	895	35 1/4	895

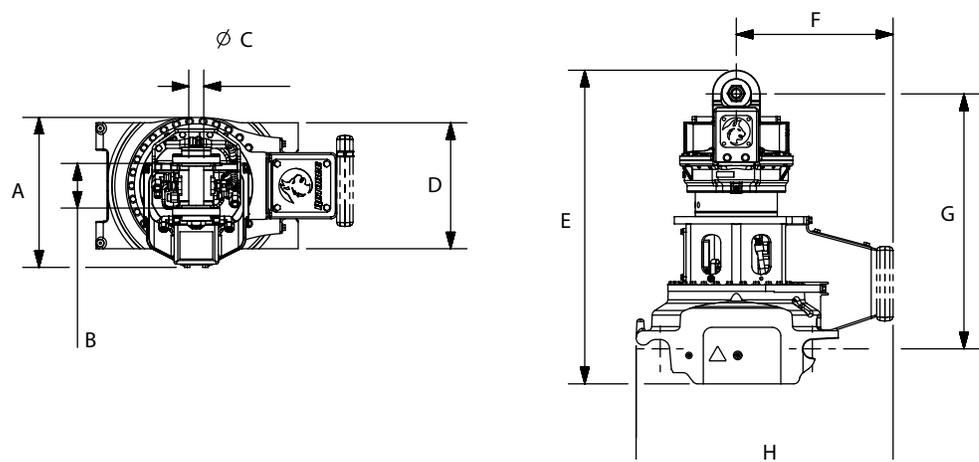


Figure 3 - Reference drawings

CAUTION

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

Specifications	RT-504HFE		RT1004HFE		RT-1204HFE		RT-1504HFE	
Maximum lift capacity	50,000 lb.	22,680 kg	100,000 lb	45,359 kg	120,000 lb.	54,431 kg	150000 lb.	68039 kg
Maximum pressure to rotator	5000 psi	345 bar	5000 psi	345 bar	5000 psi	345 bars	5000 psi	345 bars
Maximum torque at 1800 psi	---	---			51,150 in-lbs	5779 Nm	59230 in-lbs	6692 Nm
Maximum torque at 1450 psi	18,630 in-lbs	2105 Nm	22,360 in-lb	2526 Nm	---	---	---	---
Recommended flow to motor	9 gpm	34 l/min	8 gpm	30 l/min	12 gpm	45 l/min	13 gpm	49 l/min
Speed at recommended flow	25 rpm		20 rpm		15 rpm		15 rpm	
Maximum pressure to grapple	5000 psi	345 bar	5000 psi	345 bar	5000 psi	345 bars	5000 psi	345 bar
Rotator connections								
Rotator motor inlet ports	2 x 10 ORFS		2 x 10 ORFS		2 x 10 ORFS		2 x 10 ORFS	
Attachment inlet ports	2 X 12 ORFS		2 X 16 ORFS		2 x 20 ORFS		2 x 20 ORFS	
Attachment output ports (OQC65)	2 X 12 ORFS+ 2 x 04 ORFS		2 X 12 ORFS+ 2 x 04 ORFS		---		---	
Attachment output ports (OQC70)	---		---		2 x 16 ORFS + 2 x 06 ORFS		---	
Attachment output ports (OQC90)	---		---		4 x 16 ORFS + 2 x 06 ORFS		4 x 16 ORFS + 2 x 06 ORFS	
Electrical slip ring:	2 x 230VDC / 100A 1 x 230VDC / 50A (GND) 4 x 24VDC / 4A (CAN)		2 x 230VDC / 100A 1 x 230VDC / 50A (GND) 4 x 24VDC / 4A (CAN)		2 x 230VDC / 100A 1 x 230VDC / 50A (GND) 4 x 24VDC / 4A (CAN)		2 x 230VDC / 100A 1 x 230VDC / 50A (GND) 4 x 24VDC / 4A (CAN)	
Weight (OQC70-55)	---	---	---	---	1670 lbs	757 kg	---	---
Weight (OQC90)	---	---	---	---	1580 lbs	717 kg	1924 lbs	873 kg
Weight (OQC65)	715 lb	324 kg	967 lb	439 kg	---	---	---	---
Electrical Specifications								
Maximum speed	20 RPM							
Temperature range	-40°C to 80°C -40°F to 176°F							
Housing protection	IP69K							

* The flow must be adjusted according to the grapple specifications

Installation

This chapter explains how to install the Rotobec RT Series rotator onto an attachment and how to install the joined rotator and attachment onto a carrier (a loader or excavator).

Installation involves the following steps:

- Preparing for installation
- Securing the rotator onto the attachment
- Connecting the hydraulic hoses from the attachment to the rotator
- Securing the joined rotator and attachment unit to the carrier
- Connecting the hydraulic hoses and electric cable from the carrier to the rotator
- Creating a benchmark

NOTICE

Contact your dealer for information on the Rotobec line of products.

⚠ DANGER

Only experienced hydraulic mechanics with the correct tools should perform the installation describe in this section. Incorrect installation can cause damage to the equipment, personal injury, or death. Rotobec is not responsible for the consequences of incorrect installation.

Preparing for Installation

To prepare for installation, do the following:

- Assemble the necessary parts and tools
- Lower the hydraulic pressure from the carrier
- Check the hydraulic hoses
- Check hydraulic pressures and flows
- Maximize RPM for low pressure ranges (optional).

Securing the Rotator Onto the Carrier

Secure the rotator to the carrier in the following manner:

1. Bolt the yoke (link) to the carrier with the carrier pin and nut (refer to *Figure 4*).
2. With the hydraulic motor on the rotator facing forward and away from the carrier, bolt the rotator to the yoke with the rotator pin and nut (see *Figure 4*).

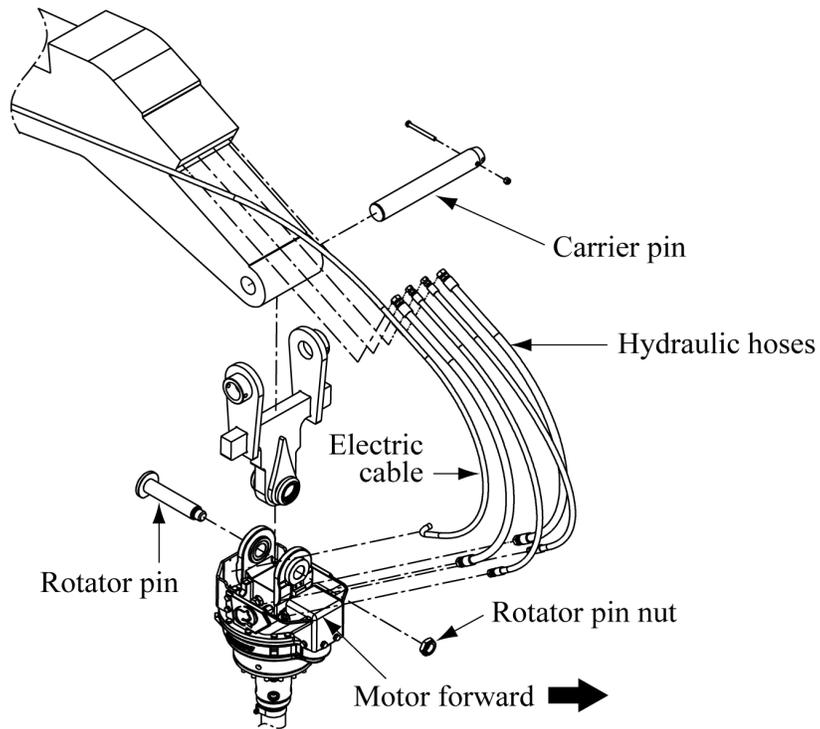


Figure 4 - Bolting the yoke to the carrier

Connecting the Hydraulic Hoses and the Electric Cable From the Carrier

Connecting the hydraulic hoses and the electric cable from the carrier to the rotator by doing the following:

1. Connect the hydraulic hoses from the carrier to the rotator's hydraulic ports.
2. Connect the electric cable:
 - Insert the electric strands into the cable junction box
 - Connect the cable junction box to the wires using the wire connectors.

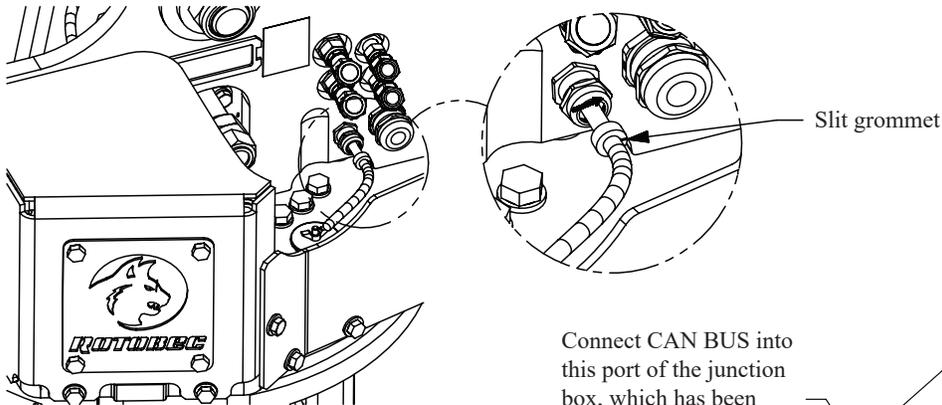
NOTICE

Due to the use of DC current, the (+) and (-) can be reversed.

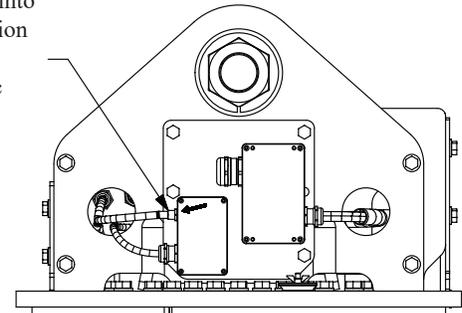
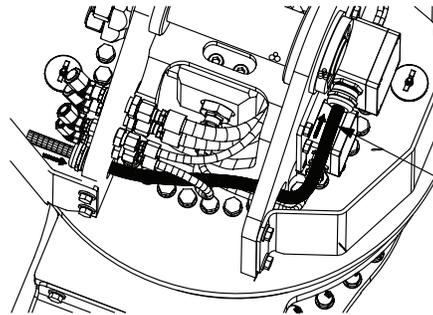
3. Test all the rotator and attachment functions at reduced speed and power. Ensure all functions:
 - Operate normally according to the specifications, and
 - Are matched to the correct joystick controls at the operator seat.

Electrical Connection Instructions

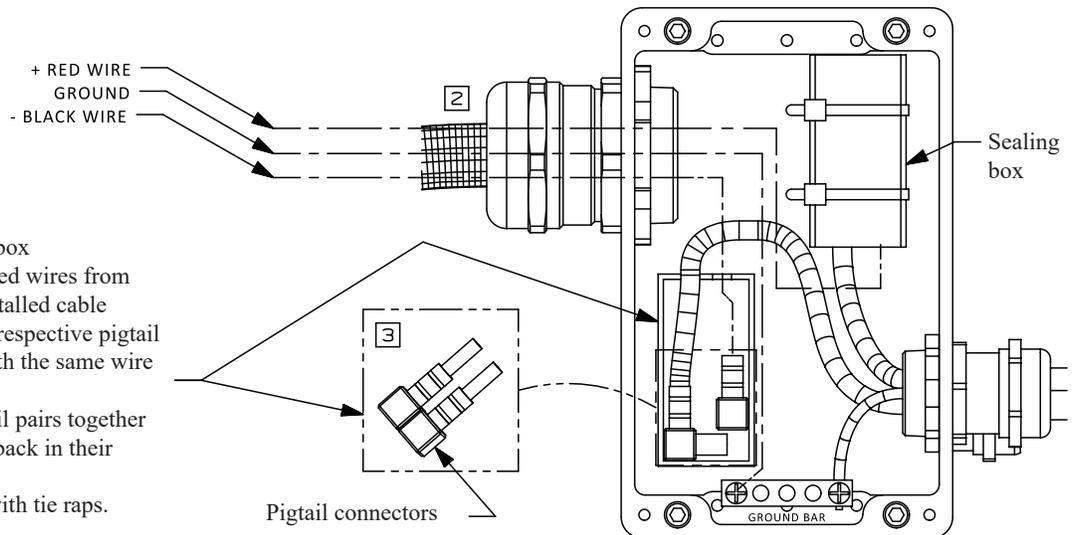
Make sure to remove the slit grommet before passing can bus cable through it as well as through its cable gland. Once done, put the grommet back in place then tighten the cable gland.



Connect CAN BUS into this port of the junction box, which has been prepared by Rotobec beforehand



Pass this cable through the appropriate cable gland, then tighten them in order to make the connection leak-proof. (This step must be done by the integrator).



1. Open sealing box
2. Connect colored wires from previously installed cable gland to their respective pigtail connectors with the same wire color.
3. Connect pigtail pairs together and put them back in their sealing box.
4. Close boxes with tie raps.

Creating a Benchmark

You must be familiar with the equipment, its rating, performance, operation and instructions before value judgments can be made on the equipment.

Create a benchmark for comparison. When the system is first installed or known to be operating well, record reading of the system for future reference.

For example: Record magnet resistance and ground resistance (check against the supplier's test records); record DC voltage at full load and no load; record current, at initial set-up and when "hot".

Keep a technical folder related to the equipment on each crane.

The information in the technical folder includes:

- Wiring diagrams
- Operating instructions
- Ratings such as power (in watts)
- Current (in amps)
- Resistance (in ohms)
- Lifting capacities
- Ground resistance
- A history and dates of prior problems.

Maintenance

This section explains how to prolong the life of your Rotobec RT Series rotator. Maintenance involves these tasks:

- Inspecting all parts of the rotator to find damage or wear
- Lubricating the grease fittings of the rotator to prevent damage and wear.
- Lubricating the electric swivel to prevent damage and wear
- Testing the magnet and electrical collector to find damage or wear.

NOTICE

Rotobec requires that a qualified worker perform the maintenance.

Maintenance Schedule

Follow this maintenance schedule to keep your rotator in peak working condition:

- **Inspect** the rotator every 12 working hours or at the end of each working day (whichever occurs first).
- **Lubricate** the rotator every 60 working hours or once a week (whichever occurs first).
- **Lubricate** the electric swivel every year or 2000 working hours (whichever occurs first)
- **Test** the magnet and electrical collector as needed.

NOTICE

If your rotator is used in extreme temperatures (either below 0°F/-20°C or above 100°F/40°C) or difficult conditions (a foundry or mill yard for example), inspect and lubricate the rotator at shorter intervals than those given above.

Inspecting the Rotator

Repair any damage that you find during your inspection before operating the rotator again (see Repair on page 45). Look for the following problems when you inspect the rotator:

- Check that all the installation screws are torqued to the correct value.
- Check for cracks around the screw holes.
- Check the hydraulic hoses for bubbles, cracks, or wear.
- Check that there is no leaking around the hydraulic fittings and that they are tight.
- Check for damage or cracks on the rotator housing.
- Check for leaking oil. It could indicate a leak from the swivel shaft or swivel housing, or the hydraulic motor.

Lubricating the Rotator

Lubricate the rotator after it has been working for several hours because the new grease penetrates more easily when the old grease is hot. The exception to this is the first lubrication done after the rotator has been in storage, which is done before using the rotator.

Materials needed

- An extreme pressure grease with a lithium complex like an ISO grade E.P.2 or NLGI class 2 with a temperature range between -30°C to 100°C (-22°F to 230°F).

The grease should have excellent water-repulsion durability, anti-rust capabilities, good adhesive abilities, and mechanical stability.

- A grease gun adjusted to eject 2 cc/0.12 cubic inches of grease per pump. If you are using an automatic grease gun, verify that it pumps the correct amount.

Lubricating the RT Rotator

Lubricate the RT 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 RT rotator. This grease can also 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.

Grease manufacturer recommendations

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

Table 1: Grease manufacturer recommendations

Procedures

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

Weekly Lubrication Chart

RT-1204/RT-1504 Rotator	Quantity of nipples	Shots of grease gun per interval of 40 operating hours
Slewing ring raceway	2	4
Slewing ring and pinion gear teeth	1	6

Table 2: Lubrication chart

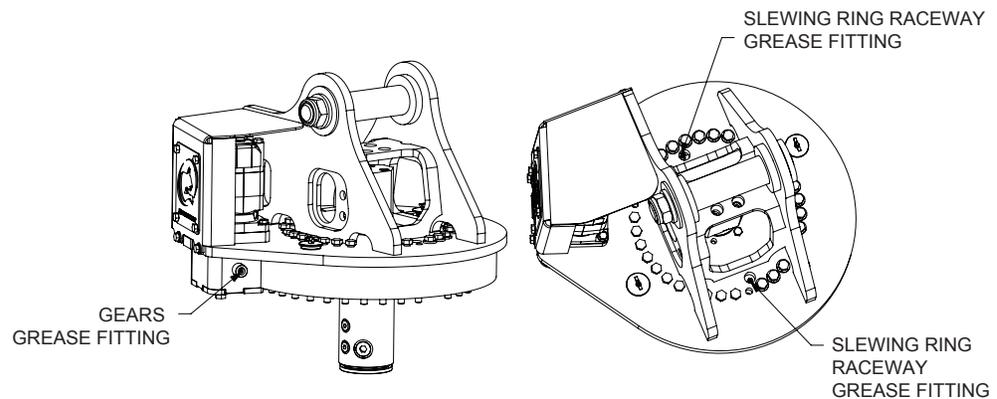


Figure 5 - Location of grease fittings

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 *Table 2* above for quick reference).

Gear

The meshing action and usual position of the gear tends to purge the lubricant; thus, the gear should be re-greased frequently with a small amount of lubricant. It is recommended that the grease be introduced at the point of mesh of the **pinion and gear every 10 hours** of slow or intermittent operation, and more often for rapidly or continuously rotating applications. (Please refer to *Table 2* above for quick reference).

Before and after prolonged stoppage of the equipment, re-lubrication 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.

Lubricating the Electric Swivel

Theoretically, the electrical swivel is maintenance free until 5,000,000 revolutions. But according to the application and the working environment, it could be less.

Lubricate the electric swivel every year or 2000 hours whichever occurs first. After the electric swivel has been in storage, the first lubrication is done before using the electric swivel.

Materials needed

- Contact Oil Electrolube EML 2

Application procedure

To lubricate the electric swivel, first use the following procedure:

⚠ WARNING**ELECTRIC SHOCK HAZARD!**

The magnet's power source is 230V which will cause severe injury or death. The carrier's master switch must be turned off before checking connection. Always refer to the manual for the magnet power source to ensure that there is no power left on the magnet.

-
1. Ensure the carrier's master switch and the magnet's power source are turned off before adjusting the electric cable.
 2. Remove the electric swivel cover.
 3. Clean the slip rings with compressed air.
 4. Lubricate the slip rings with "Contact Oil Electrolube EML2".
 5. Reassemble the electrical swivel cover.

Storage

The following information explains how to store your rotator. Proper storage ensures the safety of personnel and prolongs the RT rotator's working life.

Before storing the RT rotator, do the following:

1. To prevent the RT 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 RT rotator. Debris can hide cracks, leaks, loose bolts, and other problems.
3. Repair any damage found during the inspection before storing the RT rotator.
4. Lubricate the RT rotator according to the *Table 2 on page 28*. 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 the *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 RT 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 RT rotator again, follow these procedures:

1. Inspect the RT rotator for cracks, wear, loose or missing parts, vandalism, leaks, or other damage. Follow the guidelines for *Lubricating the Rotator on page 26*.
2. If the RT rotator has been in storage for three months or more, lubricate it according to the *Table 2 on page 28*.
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

This section covers problems that may affect the rotator and the probable solutions to those problems. It covers the following:

- The rotator is leaking hydraulic fluid
- The rotator lacks torque
- The rotator has adequate torque but doesn't stop when loaded
- The rotator doesn't turn or turns slowly
- The attachment drops its load or does not work properly because of a problem with the rotator.
- The motor guard screws are broken.
- The magnet system has poor lift capacity
- The magnet system does not lift

Rotator Leaks Hydraulic Fluid

Cause	Solution
<p>The hydraulic swivel joint is not performing properly because the seals are damaged.</p>	<p>Inspect the hydraulic swivel joint to see which seal is damaged by doing the following:</p> <p>Pressurize hydraulic port 1 and check if oil flows out from adjacent port 2 or from the rotator case.</p> <p>Repeat the procedure for port 2 of the shaft.</p> <p>Repair: Replace the hydraulic swivel shaft seal kit.</p>
<p>The hydraulic motor is not performing properly because the seals are damaged.</p>	<p>Inspect the hydraulic motor seals for damage, especially the U-cup seal between the motor base and the pinion gear.</p> <p>Repair: Replace the damaged seals.</p>

Rotator Lacks Torque

Cause	Solution
<p>The hydraulic pressure or oil flow is low because the control valve on the carrier is not supplying enough pressure or oil</p> <p>Because the relief valve cartridges or the cartridge seats, located on the rotator hydraulic motor base, are damaged</p>	<p>Inspect the hydraulic pressure on the control valve, or for oil leakage around the valve (see the carrier’s manual).</p> <p>Repair: See the carrier’s manual.</p> <p>Inspect the relief valve cartridges and the cartridge seats.</p> <p>Repair: Clean or replace the relief valve cartridges, or repair the cartridge seats.</p>
<p>The hydraulic motor is not performing properly because there is wear, scratches, or cracks on the internal components of the hydraulic motor.</p>	<p>Inspect the internal components of the hydraulic motor.</p> <p>Repair: Replace the damaged components or replace the motor.</p>

Rotator has Torque But Does Not Stop When Loaded

Cause	Solution
<p>The control valve on the carrier is leaking because the seals are damaged.</p>	<p>Inspect the control valve for leakage (refer to the carrier’s manual for location).</p> <p>Repair: See the carrier’s manual.</p>

Rotator does not turn or turns slowly

Cause	Solution
<p>The hydraulic pressure or oil flow is low because the connections of the hoses on the rotator and the carrier are loose</p>	<p>Inspect the connections for oil leaking around them. Repair: Tighten the fittings.</p>
<p>Because the hydraulic hoses are damaged.</p>	<p>Inspect the outside of the hoses for oil leakage, which indicates breaks or tears. Inspect the oil flowing from the disconnected hoses for bits of rubber, which indicates interior damage to the hoses. Repair: Replace the hoses.</p>
<p>Because the control valve on the carrier is not supplying enough pressure or there is not enough oil flow.</p>	<p>Inspect the hydraulic pressure and oil flow on the control valve (see the carrier's manual). Repair: See the carrier's manual.</p>
<p>Because there is dirt in the flow restrictor and/or the relief valve cartridges located in the rotator hydraulic motor base.</p>	<p>Inspect the flow restrictors. Inspect the relief valve cartridges. Repair: Clean the flow restrictors or increase their flow. Repair: Clean or replace the relief valve cartridges.</p>
<p>The hydraulic motor is not performing properly because there is wear, scratches, or cracks on the internal components of the hydraulic motor.</p>	<p>Inspect the internal components of the hydraulic motor. Repair: Replace the damaged components or the hydraulic motor.</p>

Attachment Drops Its Load Or Does Not Work Properly

Cause	Solution
<p>The hydraulic pressure or oil flow is low because the connections of the hoses on the rotator and the carrier are loose.</p>	<p>Inspect the connections for oil leaking around them. Repair: Tighten the fittings.</p>
<p>Because the hydraulic hoses are damaged</p>	<p>Inspect the outside of the hoses for oil leakage, which indicates breaks or tears. Inspect the oil flowing from the disconnected hoses for bits of rubber, which indicates interior damage to the hoses. Repair: Replace the hoses.</p>
<p>Because the control valve on the carrier is not supplying enough pressure.</p>	<p>Inspect the hydraulic pressure and oil flow on the control valve (see the carrier’s manual). Repair: See the carrier’s manual.</p>
<p>Because the control valve on the carrier is leaking hydraulic oil.</p>	<p>Inspect the control valve for leaking hydraulic oil. Repair: See the carrier’s manual.</p>
<p>Because the relief valve or O-rings are defective on the open circuit of the cylinders.</p>	<p>Inspect the relief valve and O-rings. Repair: replace the defective part.</p>
<p>The swivel shaft is not performing properly because the seals on the shaft itself are damaged</p>	<p>Inspect the shaft to see which seal is damaged by doing the following: Pressurize one hydraulic port (i.e. port 1) and check if oil flows out from the adjacent ports (2, 3 and 4). Repeat the procedure for every port of the shaft. Repair: Replace the broken seal(s) on the shaft.</p>
	<p>Inspect for damaged O-rings by opening and closing the grapple, then check the bearing housing seal for leaking hydraulic fluid. Repair: Replace the damaged hydraulic passage O-ring(s).</p>

Cause	Solution
<p>The problem is with the attachment because the hose connections to the attachment's cylinder are not performing properly.</p> <p>Because the hoses are damaged</p>	<p>Inspect the hose connections for oil leaking around them.</p> <p>Repair: See the attachment's manual.</p> <p>Inspect the outside of the hoses for oil leakage, which indicates breaks or tears.</p> <p>Inspect the oil flowing from the disconnected hoses for bits of rubber, which indicates interior damage to the hoses.</p> <p>Repair: Replace the hoses.</p>
<p>Because the attachment's cylinder is not working</p>	<p>Inspect the attachment's cylinder for external leakage.</p> <p>Inspect the attachment's cylinder piston seal or the cylinder tubing for scratches.</p> <p>Repair: See the attachment's manual.</p>

Guard Screws Are Broken

Cause	Solution
<p>The hose guard or motor guard has received a strong impact because, due to the yoke's design or length, the yoke hits the guards.</p> <p>Because the carrier's boom hits the guard due to the boom's design or width</p>	<p>Inspect the yoke design and its length.</p> <p>Repair: Replace the broken screws. Change the design or length of the yoke.</p> <p>Inspect the length of the yoke.</p> <p>Repair: Replace the broken screws. Increase the length of the yoke.</p>

Magnet System Has Poor Lift Capacity

Cause	Solution
<p>Poor lift capacity because the voltage and current are low</p>	<p>Inspect: Check for excessive line loss (wiring too small), loose connections, worn cable reel brushes</p> <p>Repair: Refer to magnet and/or generator manufacturer</p> <p>Inspect: Check the DC generator</p> <ul style="list-style-type: none"> • Overloaded (too small) • Belt slipping or improper pulley ration (low speed) • Adjust rheostat <p>Repair: Refer to generator manufacturer</p> <p>Inspect Rectified Power Supply for:</p> <ul style="list-style-type: none"> • Low AC voltage • One AC fuse blown • Defective diodes • Capacity too small -- overloaded <p>Repair: Refer to generator manufacturer</p>
<p>Because the DC Volts are correct, but the current is high</p>	<p>Inspect: Check the magnet for shorted turns</p> <p>Repair: Refer to magnet manufacturer</p>
<p>Because the electric current is high although the DC Volts are correct</p>	<p>Inspect: Check the magnet for shorted turns</p> <p>Repair: Refer to magnet manufacturer</p>

Cause	Solution
<p>Because of fluctuating Voltage or Excessive Voltage Drop from No Load to Full Load</p>	<p>Inspect:</p> <ul style="list-style-type: none"> • Check for excessive line loss (wiring too small) • Loose connections • Worn cable reel brushes <p>Repair: Replace when necessary</p> <p>Inspect:</p> <ul style="list-style-type: none"> • Check to see if the DC generator is too small (overloaded) • The engine is too small • The engine compression is poor (requires an overhaul) • The engine governor is defective, • The belts are slipping, loose or insufficient in quantity <p>Repair: Refer to generator manufacturer</p>
<p>Because of defective ammeter or shunt (Low DC Amperes, but DC Volts correct)</p>	<p>Inspect Electromagnet:</p> <ul style="list-style-type: none"> • Check magnet resistance for partially open (high resistance) and/or grounded condition • Check magnet terminals for high resistance connections <p>Repair: Refer to generator manufacturer</p>

Magnet System Does Not Lift

Cause	Solution
<p>No lift because there is no voltage and/or no current</p>	<p>Inspect: Check for broken wire or connection, and for worn cable reel brushes</p> <p>Repair: Replace if necessary</p> <p>Inspect DC Generator: Check DC Generator for worn bushes or broken spring, broken belts or drive coupling, open rheostat, , open armature or field winding, and loss of residual magnetism</p> <p>Repair: Refer to generator manufacturer</p> <p>Inspect rectifier: Push reset or ON button and check for:</p> <ul style="list-style-type: none"> • No AC voltage • Blown AC fuses • Defective AC contactor • Defective diodes <p>Repair: Refer to generator manufacturer</p>
<p>Because there is no DC Amperes but the DC Volts are OK</p>	<p>Inspect:</p> <ul style="list-style-type: none"> • Check power connections from controller to cable reel and magnet • Check ammeter <p>Repair: Check for cable damage and replace if necessary</p> <p>Inspect controllers: Check master controller for operation</p> <p>Repair: Refer to generator manufacturer</p> <p>Inspect cable reel: Check for worn-out brushes</p> <p>Repair: Replace if necessary</p> <p>Inspect Electromagnet: Check</p> <ul style="list-style-type: none"> • For broken terminal connections • Magnet resistance for open condition <p>Repair: Refer to magnet manufacturer</p>

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