

IMPORTANT INFORMATION:

- A copy of our “Safe Operating Practices” Manuals are always available free of charge either by downloading it from our Technical Publications website @ www.airwinch.com or by contacting the Factory at (800) 866-5457 for North America and (206) 624-0466 for International. The Safe Operating Practices manual must be read prior to anyone operating a **Ingersoll-Rand** winch or hoist. The manual form numbers are as follows:

“Safe Operating Practices Non-Man Rider™ Winches” Manual, Form No. MHD56250

“Safe Operating Practices for Man Rider™ Winches” Manual, Form No. MHD56251

“Safe Operating Practices for Pneumatic, Hydraulic and Electric Hoists” Manual, Form No. MHD56295

- Available winch options may require additional supplements to the basic winch manual.
- For Man Rider™ winches ensure a copy of the Man Rider™ supplement is made available to the operator prior to winch operation.

Winch Man Rider™ Supplements:

Model:	Publication No.
FA2, FA2.5, FH2, FH2.5	MHD56046
FA5	MHD56042 and MHD56220
FA10	MHD56252
FA2.5A	MHD56236
FA2B and HU40A	MHD56207
FH10MR	MHD56212
Fulcrum Electric	MHD56277
LS500HLP/ LS1000HLP	SAM0004

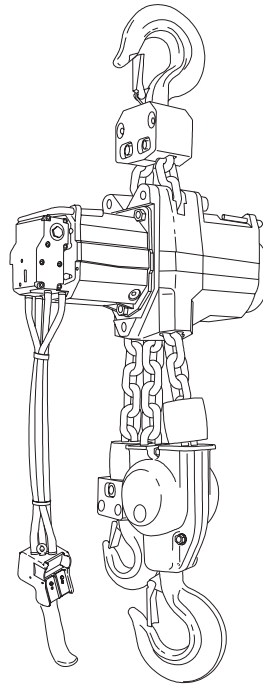
Model:	Publication No.
LS500RLP	SAM0011
LS1000RLP	SAM0012
LS150RLP	SAM0082
LS150RLP/500/ 1000	SAM0115
LS150RLP and LS150PLP-PH	SAM0120
LS500RLP-E	SAM0122
LS150RLP- DP5M-F	SAM0184
LS150HLP	SAM0222

- We strongly recommend that ALL maintenance on **Ingersoll-Rand** equipment be carried out by personnel certified by **Ingersoll-Rand**, or by **Ingersoll-Rand** Authorized Service Centers.
- Contact the Factory if in doubt about installation, operation, inspection and maintenance instructions.
- Use only Genuine **Ingersoll-Rand** parts when maintaining or repairing a winch, hoist or any component of a winch or hoist.
- ANSI / ASME recommends that a winch or hoist (or any components of a winch or hoist) that has been repaired be tested prior to being placed into service:
 - * **Winches** - ANSI / ASME B30.7 (BASE MOUNTED DRUM HOISTS) Refer to section 7.2.2 - Testing.
 - * **Hoists** - ANSI / ASME B30.16 (OVERHEAD HOISTS - UNDERHUNG) Refer to section 16.2.2 - Testing.

PARTS, OPERATION AND MAINTENANCE MANUAL for LIFTCHAIN MINING AIR HOIST MODELS

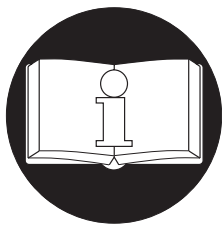
LCA015
(1.5 metric tons)

LCA060
(6 metric tons)



LCA030
(3 metric tons)

LCA120
(12 metric tons)



READ THIS MANUAL BEFORE USING THESE PRODUCTS. This manual contains important safety, installation, operation and maintenance information. Make this manual available to all persons responsible for the operation, installation and maintenance of these products.

⚠ WARNING

Do not use this hoist for lifting, supporting, or transporting people or lifting or supporting loads over people.

Always operate, inspect and maintain this hoist in accordance with American National Standards Institute Safety Code (ASME B30.16) and any other applicable safety codes and regulations.

Refer all communications to the nearest Ingersoll-Rand Material Handling Office or Distributor.

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INGERSOLL-RAND

MATERIAL HANDLING

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SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read this manual before operating the product.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in a hazard. The following signal words are used to identify the level of potential hazard.

DANGER

Danger is used to indicate the presence of a hazard which *will* cause *severe* injury, death, or substantial property damage if the warning is ignored.

WARNING

Warning is used to indicate the presence of a hazard which *can* cause *severe* injury, death, or substantial property damage if the warning is ignored.

CAUTION

Caution is used to indicate the presence of a hazard which *will* or *can* cause injury or property damage if the warning is ignored.

NOTICE

Notice is used to notify people of installation, operation, or maintenance information which is important but not hazard-related.

Safety Summary

WARNING

- **Do not use this hoist or attached equipment for lifting, supporting, or transporting people or lifting or supporting loads over people.**
- **The supporting structures and load-attaching devices used in conjunction with this hoist must provide an adequate safety factor to handle the rated load, plus the weight of the trolley and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.**

NOTICE

- **Lifting equipment is subject to different regulations in each country. These regulations may not be specified in this manual.**

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: Employees who work near suspended loads or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting or pulling operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under a raised load and keep out of the intended path of any load.

Ingersoll-Rand Material Handling hoists are manufactured in accordance with the latest ASME B30.16 standards.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the user, not the manufacturer. Many OSHA requirements are not concerned or connected with the manufactured product but are, rather, associated with the final installation. It is the owner's and user's responsibility to determine the suitability of a product for any particular use. It is recommended that all applicable industry, trade association, federal, state and local regulations be checked. Read all operating instructions and warnings before operation.

Rigging: It is the responsibility of the operator to exercise caution, use common sense and be familiar with proper rigging techniques. Refer to ASME B30.9 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

This manual has been produced by **Ingersoll-Rand** to provide dealers, mechanics, operators and company personnel with the information required to install, operate, maintain and repair the products described herein.

It is extremely important that mechanics and operators be familiar with the servicing procedures of these products, or like or similar products, and are physically capable of conducting the procedures. These personnel shall have a general working knowledge that includes:

1. Proper and safe use and application of mechanics common hand tools as well as special **Ingersoll-Rand** or recommended tools.
2. Safety procedures, precautions and work habits established by accepted industry standards.

Ingersoll-Rand cannot know of, or provide all the procedures by which product operations or repairs may be conducted and the hazards and/or results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation or maintenance procedure or step, personnel should place the product in a safe condition and contact supervisors and/or the factory for technical assistance.

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions have been adapted in part from American National (Safety) Standard ASME B30.16 and are intended to avoid unsafe operating practices which might lead to injury or property damage.

Ingersoll-Rand recognizes that most companies who use hoists have a safety program in force at their facility. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

Safe Operating Instructions are provided to make an operator aware of dangerous practices to avoid and are not necessarily limited to the following list. Refer to specific sections in the manual for additional safety information.

1. Only allow personnel trained in safety and operation of this product to operate and maintain the hoist.
2. Only operate a hoist if you are physically fit to do so.
3. When a **“DO NOT OPERATE”** sign is placed on the hoist, or controls, do not operate the hoist until the sign has been removed by designated personnel.
4. Before each shift, check the hoist for wear and damage. Never use a hoist that inspection indicates is worn or damaged.
5. Never lift a load greater than the rated capacity of the hoist. Refer to **“SPECIFICATIONS”** section.
6. Keep hands, clothing, etc., clear of moving parts.
7. Never place your hand in the throat area of a hook.
8. Always rig loads properly and carefully.
9. Never use the load chain as a sling.
10. Be certain the load is properly seated in the saddle of the hook. Do not tiplod the hook as this leads to spreading and eventual failure of the hook.
11. Do not **“side pull”** or **“yard”**.
12. Make sure everyone is clear of the load path and there are no objects in the way of the load. Do not lift a load over people.
13. Never use the hoist for lifting or lowering people, and never allow anyone to stand on a suspended load.
14. Ease the slack out of the chain when starting a lift. Do not jerk the load.
15. Do not swing a suspended load.
16. Never suspend a load for an extended period of time.
17. Never leave a suspended load unattended.
18. Pay attention to the load at all times when operating the hoist.
19. After use, properly secure hoist and all loads.
20. The operator must maintain an unobstructed view of the load at all times.
20. Never operate a hoist with twisted, kinked or damaged chain.
21. After use, or when in a non-operational mode, the chain hoist should be secured against unauthorized and unwarranted use.
22. Do not do anything you believe may be unsafe.
23. Never splice a hoist chain by inserting a bolt between links or by any other means.
24. Do not force a chain or hook into place by hammering. Do not insert the point of the hook into a chain link.
25. Do not expose the sling chain to freezing temperatures, and do not apply sudden loads to a cold chain.
26. Follow the lubrication instructions.
27. Do not attempt to repair load chains or hooks. Replace them when they become worn or damaged.
28. Periodically inspect the hoist thoroughly and replace worn or damaged parts.
29. Shut off air supply before performing maintenance on the hoist.
30. Do not use the load chain as a ground (earth) for welding. Do not attach a welding electrode to a hoist or chain.

WARNING TAG AND LABEL

Each hoist is supplied from the factory with the warning tag and label shown. If the tag or label is not attached to your unit, order a new tag or label and install it. Refer to the Parts List for the part number. Read and obey all warnings and other safety information attached to this hoist. Tag and label are shown smaller than actual size.



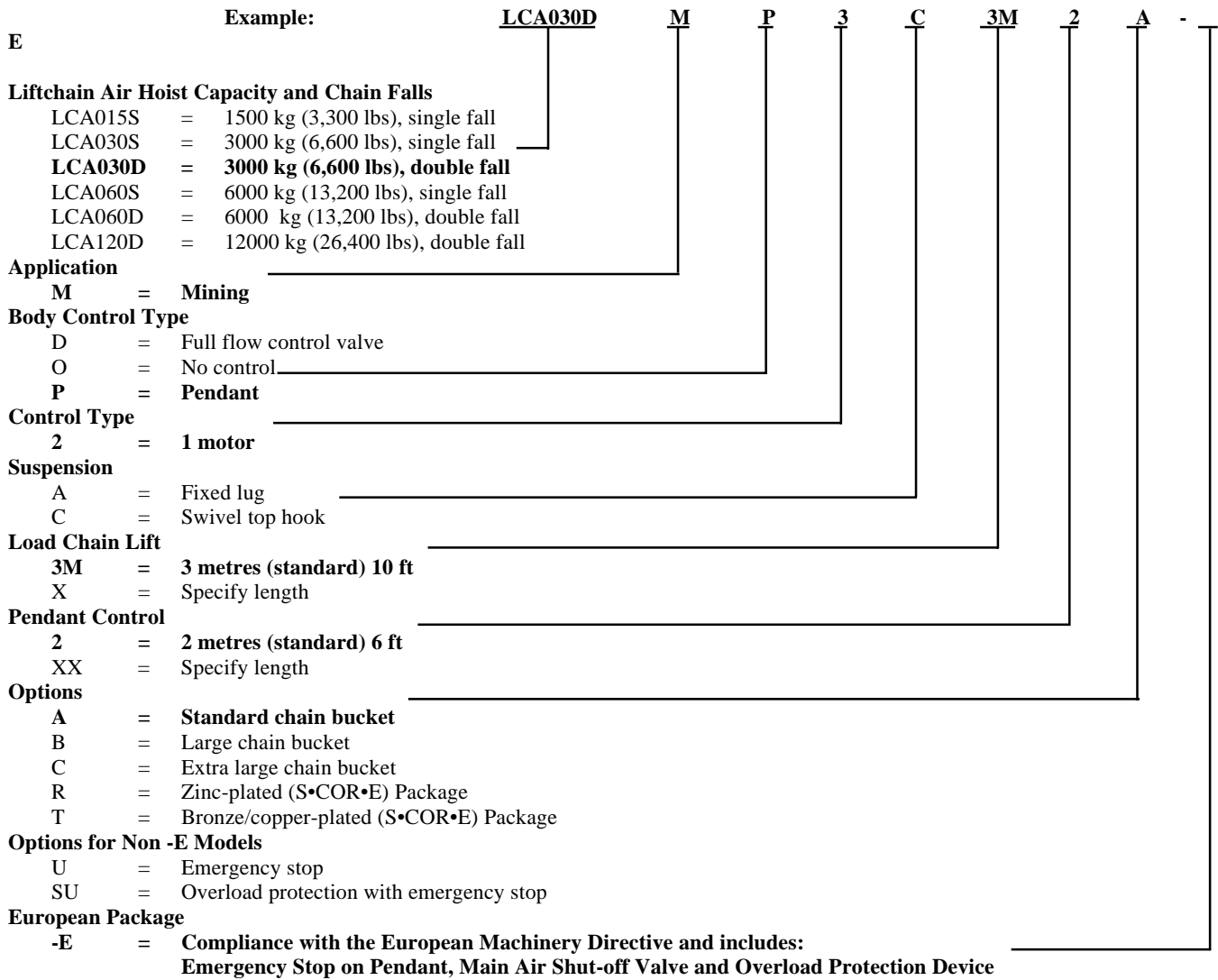
Part Number:
04306445



Part Number:
71059612

SPECIFICATIONS

Model Code Explanation



Description

The Liftchain hoist is air-powered and designed to suit industrial or mining applications. The Liftchain hoist can be hook-mounted to a permanent mounting structure or any attachment point capable of supporting the hoist rated capacity with an adequate safety factor. Mining hoists are equipped with a mounting arrangement in the form of a flexible chain link connection between the top hook and the hoist body. Retractable lifting handles are built into the hoist body.

The air supply line can be strung to the hoist using cable hangers, cable trolleys or any festooning system that will ensure the air line remains free of kinks or sharp bends and is protected from being pinched or crushed by other equipment.

Liftchain hoists are driven by a lube-free gear motor which is connected to a pinion shaft which in turn drives the planetary

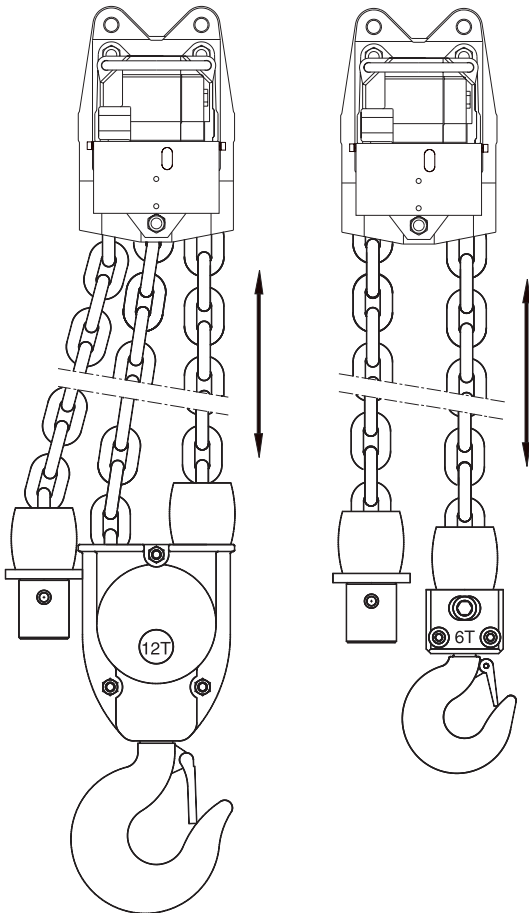
reduction gear. The output from the planetary reduction gear drives the load chain sprocket. The pinion shaft from the planetary reduction is also coupled to the brake discs. The brake is engaged at all times, until the hoist is powered in either the raise or lower direction. System pressure acts on the brake piston to release the spring-applied brake. The brake and gear components run in an oil bath.

The optional overload protection kit is completely integrated into the motor body.

Reversible Pulling Applications

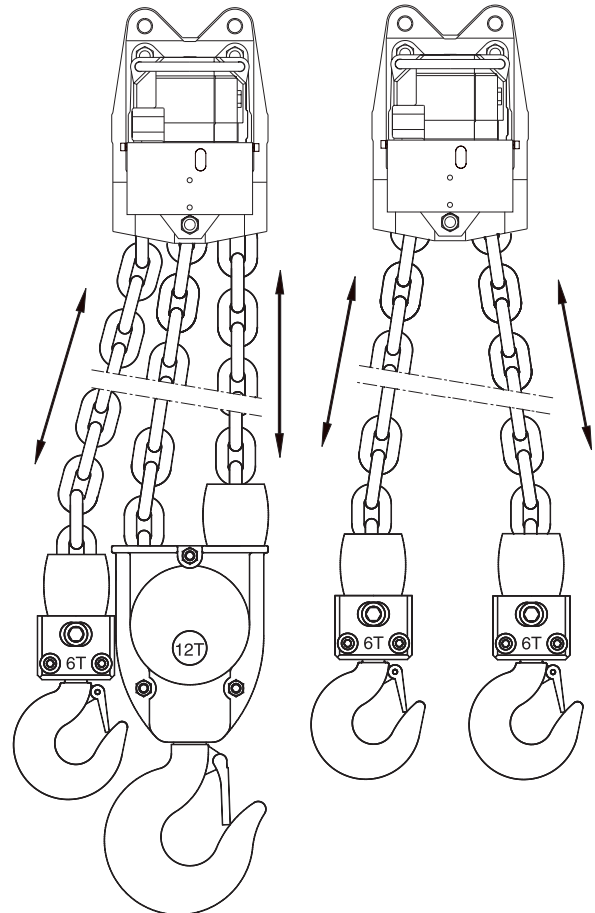
Using either a single or a double chain fall, load hooks can be attached to both ends of the chain. Refer to Dwg. MHP1435. If the motor is equipped with an overload device and/or emergency stop, both will function while paying out or hauling in a load.

Single Hook Lifting or Pulling Applications



(Dwg. MHP1435)

Double Hook Reversible Pulling Applications



Note: For double fall/double hook units, pull only 50% of maximum hoist capacity with free end hook.

Specifications

Hoist Model	Rated Capacity metric tons	Load Chain Falls	Pressure		Air Flow		Chain Size mm	Wt. of Chain		Unit Net Wt. without Chain	
			psi	bar	cu ft/min	cu m/min		per ft (lb)	per metre (kg)	lbs	kg
LCA015S	1.5	1	58	4	53	1.5	8 x 24	1.01	1.5	84	38
LCA030D	3	2									
LCA030S		1									
LCA060D	6	2			71	2	13 x 36	2.59	3.85	130	59
LCA060S		1									
LCA120D	12	2			16 x 45	3.86	5.75	213	97		

Hoist Performance at 58 psi (4 bar) Air Pressure

Hoist Model	Rated Capacity metric tons	Air Flow		Max. Lifting Speed with Rated Load		Max. Lowering Speed with Rated Load		Max. Speed with No Load	
		cu ft/min	cu m/min	ft/min	m/min	ft/min	m/min	ft/min	m/min
LCA150S	1.5	53	1.5	8.2	2.5	21	6.4	15.1	4.6
LCA030D	3			4	1.2	10.5	3.2	7.5	2.3
LCA030S		6	70.6	2	6.6	2	23	7	14.8
LCA060D	3.3				1	11.5	3.5	7.2	2.2
LCA060S	9.8				3	5.2	1.6		
LCA120D	12	16.5	0.5	4.9	1.5	2.6	0.8		

INSTALLATION

Prior to installing the hoist, carefully inspect it for possible shipping damage.
 Hoists are supplied fully lubricated from the factory.
 Lubrication of the load chain is recommended before initial hoist operation.

⚠ CAUTION

• Owners and users are advised to examine specific, local or other regulations, including American National Standards and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting hoist to use.

⚠ WARNING

• A falling load can cause injury or death. Before installing, read "Safety Information."

Mounting

Make certain your hoist is properly installed. A little extra time and effort in doing so can contribute a lot toward preventing accidents and helping you get the best service possible.

Always make certain the supporting member from which the hoist is suspended or attached is strong enough to support the weight of the hoist plus the weight of the maximum rated load plus a generous factor of at least 500% of the combined weights.

If the hoist is suspended by a top hook, the supporting member should rest completely within the saddle of the hook and be centered directly above the hook shank. Do not use a supporting member that tilts the hoist.

🔗 Hook Mounted Hoist Installation

Place hook over mounting structure. Make sure hook latch is engaged.

Air System

The supply air must be clean, lubricated and free from moisture. A minimum of 58 psi (4 bar/400 kPa) at the hoist motor is required to provide rated hoist capacity. Air inlet port size for LCA015S and LCA030D units is 1/2 in. BSP. On all other units the inlet port size is 3/4 in. BSP.

Air Lines

The inside diameter of the hoist air supply lines must not be smaller than 3/4 in. (19 mm). Before making final connections, all air supply lines should be purged before connecting to

inlet. Supply lines should be as short and straight as installation conditions will permit. Long transmission lines and excessive use of fittings, elbows, tees, globe valves, etc. cause a reduction in pressure due to restrictions and surface friction in the lines.

Air Line Lubricator

The air motor may be operated without lubrication. If an air line lubricator is used, it should be replenished daily with SAE 30W Grade ISO VG 100 oil (minimum viscosity 135 Cst at 104° F (40° C)).

CAUTION

- Shut off air supply before filling air line lubricator.

Air Line Filter

It is recommended that an air line strainer/filter be installed within 3 ft (1 m) of the motor air inlet port to prevent dirt from entering the motor. The strainer/filter should provide 20 micron filtration and include a moisture trap. Clean the strainer/filter monthly to retain its operating efficiency.

Moisture in Air Lines

Moisture that reaches the air motor through the supply lines is the chief factor in determining the length of time between service overhauls. Moisture traps can help eliminate moisture. Other methods, such as an air receiver which collects moisture before it reaches the motor, or an aftercooler at the compressor that cools the air prior to distribution through the supply lines, are also helpful.

Motor

For optimum performance and maximum durability of parts, operate the air motor within the operating specifications provided in the "SPECIFICATIONS" section. The air motor should be installed as near as possible to the compressor or air receiver.

Overload Device

(Optional feature)
Overload protection is integrated into the motor body and is standard on -E versions. The overload system is based on detection of the difference in air pressure between the inlet and outlet ports. It consists of a valve which is normally closed. The valve senses pressure at the motor inlet and outlet and compares the difference between the two pressures to the index value established by spring adjustment. A difference in pressure greater than the index value causes the emergency stop to be activated. This then exhausts the air and hoist operation stops. Overload protection is adjusted at the factory to 120% of the safe working load (SWL). It is also able to operate on both sides for mining versions with two bottom hooks. Refer to the "MAINTENANCE" section for adjustment procedures.

Main Air Shut-off Valve

The main air shut-off valve is completely integrated into the motor body and is standard on -E versions.

Chain Container

Refer to Dwgs. MHP1441 or MHP1442 in the "PARTS" section.

1. Check the chain container size to make sure the length of the load chain is within the capacity of the chain container. Replace with a larger chain container if required.
2. When a chain bucket is used, always connect the free end of the chain to the hoist. Install a chain buffer on the ninth link from the end of the chain.
3. Attach the chain container to the hoist.
4. Run bottom block to the lowest point and run hoist in the "UP" direction to feed the chain back into the container.

NOTICE

- Make certain to adjust the balance chain so that the chain container does not contact the load chain.
- Allow chain to pile naturally in the chain container. Piling the chain carelessly into the container by hand may lead to kinking or twisting that will jam the hoist.

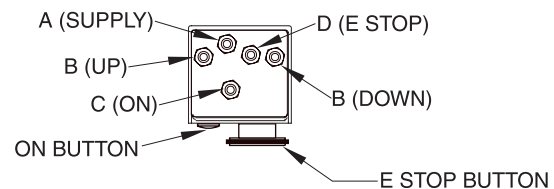
Pendant

Check that all hose connections are tight and that hoses are not twisted or crimped. Refer to Dwg. MHP1506 for hose connections. Pendant lengths up to 66 ft (20 m) are available. Contact the factory for pendant lengths greater than 66 ft (20 m).

CAUTION

- To avoid damaging the pendant hose, make sure the strain relief cable, not the pendant hose, is supporting the weight of the pendant.

Single Motor Pendant PHS2E(-U) (Top View)



(Dwg. MHP1506)

Storing the Hoist

1. Always store the hoist in a no load condition.
2. Wipe off all dirt and water.
3. Oil the chain, hook pins and hook latch.
4. Place in a dry location.
5. Plug hoist air inlet port.
6. Before returning hoist to service, follow instructions for hoists not in regular service in the "INSPECTION" section.

OPERATION

The four most important aspects of hoist operation are:

1. Follow all safety instructions when operating the hoist.
2. Allow only people trained in safety and operation of this product to operate the hoist.
3. Subject each hoist to a regular inspection and maintenance program as outlined in ASME B30.16.
4. Be aware of the hoist capacity and weight of load at all times.

Operators must be physically competent. Operators must have no health condition which might affect their ability to act, and they must have good hearing, vision and depth perception. The hoist operator must be carefully instructed in his or her duties and must understand the operation of the hoist, including a study of the manufacturer's literature. The operator must thoroughly understand proper methods of hitching loads and should have a good attitude regarding safety. It is the operator's responsibility to refuse to operate the hoist under unsafe conditions.

Initial Operating Checks

Hoists are tested for proper operation prior to leaving the factory. Before the hoist is placed in service the following initial operating checks should be performed.

1. Check for air leaks in the supply hose and fittings to pendant, as well as from pendant to manifold.
2. When first running the hoist motor, some light oil should be injected into the inlet connection to allow good lubrication.
3. When first operating the hoist it is recommended that the motor be driven slowly in both directions for a few minutes.
4. Inspect hoist performance when raising, moving and lowering test loads. Hoist must operate smoothly and at rated specifications prior to being placed in service.
5. Check that hook movement is in the same direction as arrows and pendant control labels.
6. Raise and lower a light load to check operation of the hoist brake.
7. Check hoist operation by raising and lowering a load equal to the rated capacity of the hoist a few inches (cm) off the floor.
8. Check to see that the hoist is directly over the load. Do not lift the load at an angle (side pull or "yard").
9. Check to see the hoist is securely connected to the supporting member.
10. Check to see that the load is securely inserted in the hook, and that the hook latch is engaged.

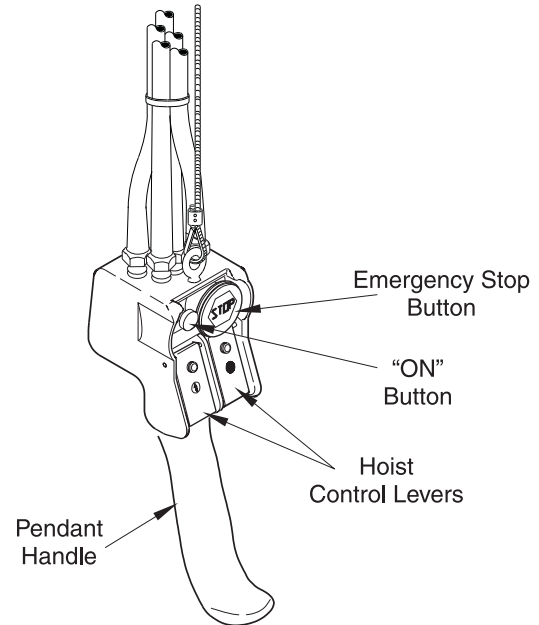
WARNING

- Allow only personnel trained in safety and operation of this product to operate hoist.
- The hoist is not designed and not suitable for lifting, lowering or moving people. Never lift loads over people.
- The hook latch is intended to retain loose slings or devices under slack conditions. Hook latches are not intended to be anti-fouling devices, so caution must be used to prevent the latch from supporting any of the load.

Pendant

The pendant is a remote control that allows the operator to control the positioning of a load. It will allow the operator to control hoist movements from a distance, thereby allowing exact positioning of a hook.

The two-lever pendant controls raising and lowering of the hook. Refer to Dwg. MHP1546.



(Dwg. MHP1546)

Emergency Stop

The Emergency Stop button, when activated, will immediately stop all operations of the hoist. The Emergency Stop button will remain depressed after activation.

To reset Emergency Stop button, twist (rotate) Emergency Stop button clockwise until button releases and spring returns to its original position. Depress "ON" button.

INSPECTION

Inspection information is based in part on American National Standards Institute Safety Codes (ASME B30.16).

⚠ WARNING

- All new, altered or modified equipment should be inspected and tested by personnel instructed in safety, operation and maintenance of this equipment to ensure safe operation at rated specifications before placing equipment in service.
- Never use a hoist that inspection indicates is damaged.

Frequent and periodic inspections should be performed on equipment in regular service. Frequent inspections are visual examinations performed by operators or personnel trained in safety and operation of this equipment and include observations made during routine hoist operation. Periodic inspections are thorough inspections conducted by personnel trained in the safety, operation and maintenance of this equipment. ASME B30.16 states inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage. The inspection intervals recommended in this manual are based on intermittent operation of the hoist eight hours each day, five days per week, in an environment relatively free of dust, moisture and corrosive fumes. If the hoist is operated almost continuously or more than the eight hours each day, more frequent inspections will be required.

Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.

Deficiencies revealed through inspection, or noted during operation, must be reported to designated personnel instructed in safety, operation and maintenance of this equipment. A determination as to whether a condition constitutes a safety hazard must be made, and the correction of noted safety hazards accomplished and documented by written report before placing the equipment in service.

Records and Reports

Inspection records, listing all points requiring periodic inspection should be maintained for all load bearing equipment. Written reports, based on severity of service, should be made on the condition of critical parts as a method of documenting Periodic Inspections. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available for review.

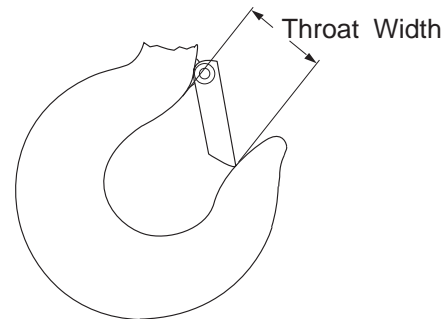
🔗 Load Chain Reports

Records should be maintained documenting the condition of load chain removed from service as part of a long-range load chain inspection program. Accurate records will establish a relationship between visual observations noted during frequent inspections and the actual condition of the load chain as determined by periodic inspection methods.

Frequent Inspection

On hoists in continuous service, frequent inspections should be made by operators at the beginning of each shift. In addition, visual inspections should be conducted during regular service for any damage or evidence of malfunction.

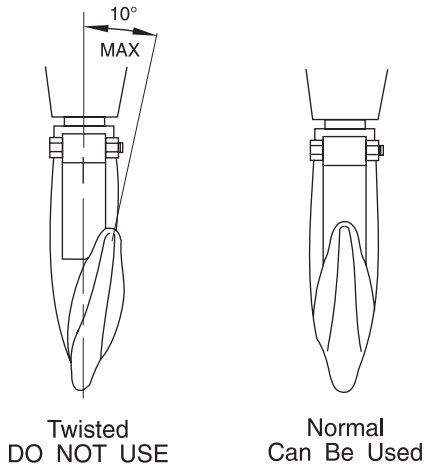
1. OPERATION. Check for visual signs or abnormal noises (grinding, etc.) which could indicate a potential problem. Make sure all controls function properly and return to neutral when released. Check chain feed through the hoist and bottom block. If chain binds, jumps, is excessively noisy or "clicks," clean and lubricate the chain. If the problem persists, replace the chain. Do not operate the hoist until all problems have been corrected.
2. HOOKS. Check for wear or damage, increased throat width, bent shank or twisting of hook. Replace hooks which exceed the throat opening discard width specified in Table 4 (refer to Dwg. MHP0040) or which exceed a 10° twist (refer to Dwg. MHP0111). If the hook latch snaps past the tip of the hook, the hook is sprung and must be replaced. Refer to the latest edition of ASME B30.10 "HOOKS" for additional information. Check hook support bearings for lubrication or damage. Ensure that they swivel easily and smoothly.



(Dwg. MHP0040)

Table 4

Hoist Model	Capacity metric tons	Throat Width		Discard Width	
		in.	mm	in.	mm
LCA015S	1.5	1.06	27	1.22	31
LCA030S	3	1.26	32	1.45	36.8
LCA030D					
LCA060S	6	1.61	40	1.81	46
LCA060D					
LCA120D	12	2.24	57	2.58	65.5



(Dwg. MHP0111)

- HOOK LATCH. Make sure hook latch is present and operating. Replace if necessary.

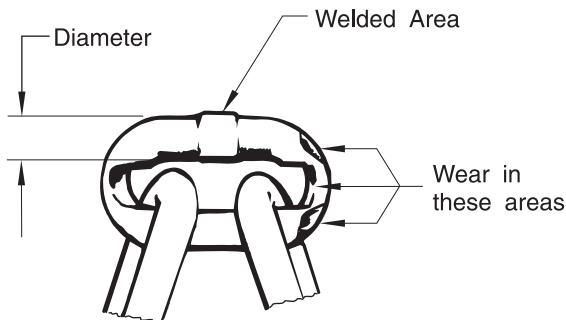
CAUTION

• Do not use hoist if hook latch is missing or damaged.

- CONTROLS. During operation of the hoist, verify that response to pendant is quick and smooth. Ensure controls return to neutral when released. If hoist responds slowly or movement is unsatisfactory, do not operate the hoist until all problems have been corrected.
- AIR SYSTEM. Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any air leaks found. Check and clean the filter.
- LOAD CHAIN. Examine each of the links for bending, cracks in weld areas or shoulders, traverse nicks and gouges, weld splatter, corrosion pits, striation (minute parallel lines) and chain wear, including bearing surfaces between chain links. Refer to Dwg. MHP0102. Replace a chain that fails any of the inspections. Check chain lubrication and lubricate if necessary. Refer to "Load Chain" in the "LUBRICATION" section.

NOTICE

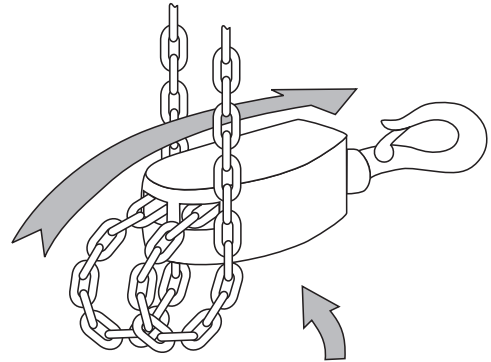
• The full extent of load chain wear cannot be determined by visual inspection. At any indication of load chain wear, inspect the chain and chain wheel in accordance with instructions in "Periodic Inspection."



(Dwg. MHP0102)

- LOAD CHAIN REEVING. Ensure welds on standing links are away from load sheave. Reinstall chain if necessary. Make sure chain is not capsized, twisted or kinked. Adjust as required. Refer to Dwg. MHP0043.

Capsized Hook



Make certain the bottom block has NOT been flipped through the chain falls

(Dwg. MHP0043)

Periodic Inspection

According to ASME B30.16, frequency of periodic inspection depends on severity of usage:

NORMAL	HEAVY	SEVERE
yearly	semiannually	quarterly

Disassembly may be required for HEAVY or SEVERE usage. Keep accumulative written records of periodic inspections to provide a basis for continuing evaluation. Inspect all the items in "Frequent Inspection." Also inspect the following:

- FASTENERS. Check all rivets, split pins, capscrews and nuts. Replace if missing or tighten if loose.
- ALL COMPONENTS. Inspect for wear, damage, distortion, deformations and cleanliness. If external evidence indicates the need, disassemble. Check gears, shafts, bearings, sheaves, chain guides, springs and covers. Replace worn or damaged parts. Clean, lubricate and reassemble.
- HOOKS. Inspect hooks carefully for cracks using magnetic particle or other suitable non-destructive method. Inspect hook retaining parts. Tighten or repair if necessary.
- LOAD CHAIN SPROCKET. Check for damage or excessive wear. Replace if necessary. Observe the action of the load chain feeding through the hoist. Do not operate a hoist unless the load chain feeds through the hoist and hook block smoothly and without audible clicking or other evidence of binding or malfunctioning.
- MOTOR. If performance is poor, disassemble the motor and check for wear or damage to bearings and shafts. The parts should be cleaned, lubricated and reassembled. Replace worn or damaged parts.
- BRAKE. Raise a load equal to the rated capacity of the hoist a few inches (cms) off the floor. Verify hoist holds the load without drift. If drift occurs, disassemble. Remove the brake discs as described in the "MAINTENANCE" section. Check and clean the brake parts each time the hoist is disassembled. Replace the brake discs if the grooves are no longer visible.
- SUPPORTING STRUCTURE. Check for distortion, wear and continued ability to support a load.

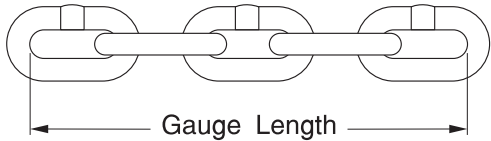
8. LABELS AND TAGS. Check for presence and legibility. Replace if necessary.
9. LOAD CHAIN END ANCHORS. Ensure both ends of the load chain are securely attached. Secure if loose, repair if damaged, replace if missing. Check chain stoppers are correctly installed and functional.
10. LOAD CHAIN. Measure the chain for stretching. Measure the load chain over the outside of five link sections all along the the chain, paying particular attention to the most frequently reeved links. Refer to Dwg. MHP0041. When any five links in the working length reaches or exceeds the discard length, replace the entire chain. Refer to Table 5. Always use genuine **Ingersoll-Rand** Material Handling replacement chain. Zinc plated load chain is standard on Liftchain hoists.

Hoists Not in Regular Use

1. A hoist which has been idle for a period of one month or more, but less than one year, should be given an inspection conforming to the requirements of "Frequent Inspection" prior to being placed in service.
2. A hoist which has been idle for a period of more than one year should be given an inspection conforming to the requirements of "Periodic Inspection" prior to being placed in service.
3. Standby hoists should be inspected at least semiannually in accordance with the requirements of "Frequent Inspection." In abnormal operating conditions, hoists should be inspected at shorter intervals.

Table 5

Hoist Model	Chain Size	Normal Length		Discard Length	
	mm	in.	mm	in.	mm
LCA015S	8 x 24	4.72	120	4.8	122
LCA030D					
LCA030S	13 x 36	7.09	180	7.2	183
LCA060D					
LCA060S	16 x 45	8.85	225	8.99	228
LCA120D					



(Dwg. MHP0041)

11. CHAIN CONTAINER. Check for damage or excessive wear and that chain container is securely attached to the hoist. Secure or replace if necessary.

INSPECTION AND MAINTENANCE REPORT

Ingersoll-Rand Liftchain Air Hoist

Model Number:			Date:		
Serial Number:			Inspected By:		
Reason for Inspection: (Check Applicable Box)					
	1. Scheduled Periodic Inspection: _____ Quarterly _____ Semiannually _____ Yearly	Operating Environment: _____ Normal _____ Heavy _____ Severe			
	2. Discrepancy(ies) noted during Frequent Inspection				
	3. Discrepancy(ies) noted during Maintenance				
	4. Other: _____				
Refer to the Parts, Operation and Maintenance Manual "INSPECTION" section for general inspection criteria. Refer to appropriate National Standards and Codes of practice. If in doubt about an existing condition contact the nearest Ingersoll-Rand Distributor or the factory for technical assistance.					
COMPONENT	CONDITION		CORRECTIVE ACTION		NOTES
	Pass	Fail	Repair	Replace	
Fasteners					
Gears					
Shafts					
Bearings			---		
Load Bearing Sheaves					
Chain Guides					
Springs			---		
Covers/Housings					
Hooks			---		
Top	Actual Hook Throat Width: _____ inches / _____ mm (Refer to Table 4 for minimum/maximum acceptable widths.)				
	Hook Twist			---	(maximum 10%)
	Hook Crack Test Method Used: Dye Penetrant _____ Magnetic Particle _____ Other: _____				
Bottom	Actual Hook Throat Width: _____ inches / _____ mm (Refer to Table 4 for minimum/maximum acceptable widths.)				
	Hook Twist			---	(maximum 10%)
	Hook Crack Test Method Used: Dye Penetrant _____ Magnetic Particle _____ Other: _____				
Hook Latch			---		
Brake (100% Load Test)			---		
Brake (Visual Inspection)					
Load Chain:			---		
Working length(s) maximum wear: _____ inches / _____ mm (Refer to Table 5)					
Supporting Structure					
Labels and Tags			---		
Other Components (List in NOTES section)					

Testing:	Pass	Fail	NOTES
Operational (No Load)			
Operational (100% Load)			
Operational (Maximum Test Load*)			

* Refer to 'Load Test' in the "MAINTENANCE" section for testing information.

This page may be photocopied and used by inspectors or maintenance personnel.

LUBRICATION

To ensure continued satisfactory operation of the hoist, all points requiring lubrication must be serviced with the correct lubricant at the proper time intervals indicated for each assembly. Correct lubrication is one of the most important factors in maintaining efficient operation.

The lubrication intervals recommended in Table 6 are based on intermittent operation of the hoist eight hours each day, five days per week. If the hoist is operated almost continuously, or for more than eight hours each day, or under severe conditions, more frequent lubrication will be required.

Table 6

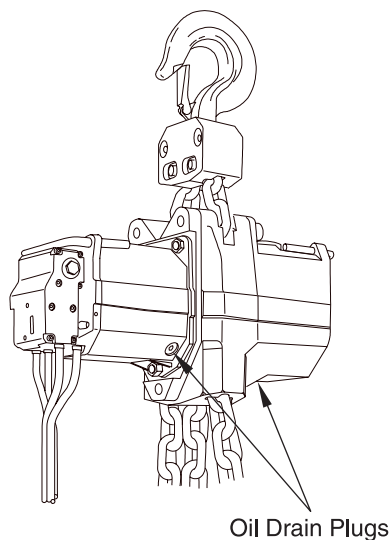
Component	Lubrication Frequency by Usage Level		
	Severe	Heavy	Normal
Load Chain	Daily	Weekly	At Usage
Hook and Hook Latch	Daily	Weekly	At Usage
Gear Case	Yearly	Every 3 Years	Unnecessary

Lubricant types and change intervals are based on operation in an environment relatively free of dust, moisture and corrosive fumes. Use only those lubricants recommended. Other lubricants may affect performance of the hoist. Approval for the use of other lubricants must be obtained from your **Ingersoll-Rand** Technical Support Department or distributor. Failure to observe this precaution may result in damage to the hoist and/or its associated components.

Whenever a hoist is disassembled for overhaul or replacement of parts, lubricate as follows:

Brake and Gear Assemblies

The gear and brake assemblies share a common oil bath. On larger capacity hoists, the output shaft from the motor is offset and utilizes a pinion gear to drive the sun gear. These gears operate in the motor casing oil bath. Refer to Table 7 for oil quantities. Refer to Dwg. MHP1473 for position of gear box oil drain plugs.



(Dwg. MHP1473)

Table 7

Model	Gear Casing		Motor Casing	
	Pints	ml	Pints	ml
LCA015S and LCA030D	0.3	150	N/A	N/A
LCA030S and LCA060D	0.8	400	0.4	150
LCA060S and LCA120D	1.6	750		

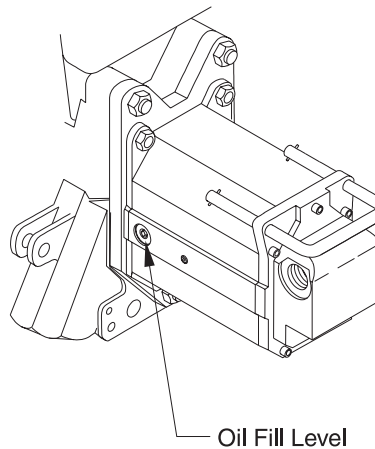
LCA015S and LCA030D Hoists Oil Fill Level Position

Fill to the level of the plug on the side of the gear housing.

LCA030S and Larger Hoists Oil Fill Level Position

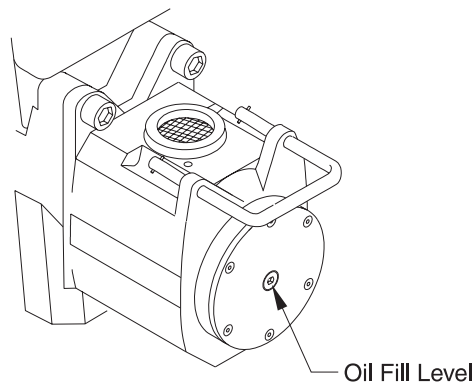
Fill to the level of the plug on the side of the motor housing and on the gear end in the center of the brake end cover. Refer to Dwgs. MHP1439 and MHP1440.

Oil Fill Level Position on Motor Housing



(Dwg. MHP1439)

Oil Fill Level Position on Brake End Cover



(Dwg. MHP1440)

Replace the oil in the brake and gear housing in accordance with the recommendations in Table 6. Refer to Table 8 for recommended oil type. If hoist use is at normal frequency, the oil in the reduction housing need not be changed. However, when hoist use is at greater frequency, or under severe conditions, the oil may will need to be changed.

To ensure correct performance, highest efficiency and long life, it is essential that the lubricating oil be maintained at the correct level. The recommended grade of oil must be used at all times since the use of unsuitable oil may result in excessive temperature rise, loss of efficiency and possible damage to the gears.

Liftchain hoists are shipped from the factory with oil in the brake and reduction gear assembly.

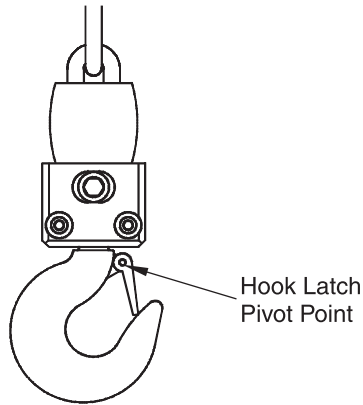
Table 8

Ambient Temperature	Recommended Oil Type
Below 32° F (0° C)	ISO VG 22 (50W)
30° to 80° F (0° to 26° C)	ISO VG 150 (90W)
Above 80° F (26° C)	ISO VG 460 (140W)

Hook Assemblies

Hoist top and bottom hooks must be packed with **Ingersoll-Rand** No. 68 Grease or a standard No. 2 multi-purpose grease at regular intervals. Neglect of proper lubrication can lead to excessive wear.

1. Lubricate the hook and latch pivot points. Refer to Dwg. MHP1300. Hook and latch should swivel/pivot freely.
2. Use **Ingersoll-Rand** LUBRI-LINK-GREEN® or ISO VG 220 (50W) lubricant.
3. To lubricate hooks, separate hook halves and pack with grease.



(Dwg. MHP1300)

Air Line Lubricator

If an air line lubricator is used, it should be replenished daily with ISO VG 100 (30W) lubricant (minimum viscosity 135 Cst at 104° F (40° C)).

Load Chain

! WARNING

• **Failure to maintain a clean and well-lubricated load chain will result in rapid load chain wear that can lead to chain failure which can cause severe injury, death or substantial property damage.**

1. Lubricate each link of the load chain weekly. Apply new lubricant over existing layer.
2. In severe applications or corrosive environments, lubricate more frequently than normal.
3. Lubricate hook and hook latch pivot points with same lubricant used on the load chain.
4. If required, clean chain with acid free solvent to remove rust or abrasive dust buildup and lubricate the chain.
5. Use **Ingersoll-Rand** LUBRI-LINK-GREEN® or ISO VG 220 (50W) oil.

TROUBLESHOOTING

This section provides basic troubleshooting information. Specific causes to problems are best identified by thorough inspections performed by personnel instructed in safety, operation and maintenance of this equipment. The chart below provides a brief guide to common hoist symptoms, probable causes and remedies.

SYMPTOM	CAUSE	REMEDY
Hoist will not operate.	No air supply to hoist, or too little CFM or PSI.	Check PSI (bar) at hoist inlet. Refer to "SPECIFICATIONS" section for correct CFM (cu.m/min) and PSI (bar).
	Pendant lever sticking.	Check pendant lever and restore free movement.
	Pendant malfunction.	Check PSI (bar) at pendant. Minimum operating pressure in pendant line is 55 PSI (3.8 bar).
	Hoist is overloaded.	Reduce load to within rated capacity.
	Motor is damaged.	Repair or replace. Refer to "MAINTENANCE" section.
	Brake is not releasing.	Check brake release circuit and PSI (bar) at brake inlet (55 PSI (3.8 bar) minimum).
Load continues to move when hoist is stopped. "UP" direction.	Pendant lever sticking.	Check lever and restore free movement.
Load continues to move when hoist is stopped. "DOWN" direction.	Pendant lever sticking.	Check lever and restore free movement.
	Hoist is overloaded.	Reduce load to within rated capacity.
	Brake is slipping.	Check brake springs and brake disc linings for wear. Refer to "MAINTENANCE" section.
Hoist will not lift rated capacity.	Hoist is overloaded.	Reduce load to within rated capacity.
	No air supply to hoist or too little CFM or PSI.	Check PSI (bar) at hoist inlet. Refer to "SPECIFICATIONS" section for correct CFM (cu.m/min) and PSI (bar).
	Brake is not releasing.	Check brake release circuit and PSI (bar) at brake inlet (55 PSI (3.8 bar) minimum).
	Exhaust is restricted.	Inspect vents and replace muffler.
	Motor is damaged.	Check for worn motor bearings.
Hook lowers but will not raise.	Hoist is overloaded.	Reduce load to within rated capacity.
	No air supply to hoist or too little CFM or PSI.	Check at hoist power supply connection with hoist under load. Raise pressure to rated capacity.
	Pendant malfunction.	Check PSI (bar) at air inlet connection on pendant.
Load chain jumps on sprocket or is making a snapping sound.	Worn or rusted chain.	Refer to "INSPECTION" section to determine wear limit. Replace if necessary.
	Incorrect chain.	Replace with correct chain.
	Worn sprocket or chain guide.	Replace worn parts.
	Capsized hook.	Correct as described in "MAINTENANCE" section.
	Hoist not in line with load.	Align hoist with load. Do not "yard" or side pull.
	Incorrectly reeved load chain.	Check load chain is correctly reeved.
	No oil on load chain.	Lubricate load chain.

⚠ WARNING

- Never perform maintenance on the hoist while it is supporting a load.
- Before performing maintenance, tag controls:
DANGER - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.
- Only allow personnel trained in operation and service of this hoist to perform maintenance.
- After performing any maintenance on the hoist dynamically test the hoist to 100% of its rated capacity, in accordance with ASME B30.16 standards, before returning hoist to service. Testing to more than 100% of rated capacity is required to set overload device and may be required to comply with standards and regulations set forth in areas outside the USA.
- Shut off air system and depressurize air lines before performing any maintenance.

Proper use, inspections and maintenance increase the life and usefulness of your **Ingersoll-Rand** equipment. During assembly, lubricate gears, bearings and shafts with applicable lubricants. Use of a thread locking compound and/or thread lubricant on capscrew and nut threaded areas helps prevent corrosion of components.

🔧 Maintenance Intervals

The Maintenance Interval Chart below is based on intermittent operation of equipment for eight hours each day, five days per week. If the equipment is in operation for more than eight hours a day or is operated in severe applications or environments, more frequent maintenance should be performed.

INTERVAL	MAINTENANCE CHECK
Start of each shift	Make a thorough visual inspection of the hoist for damage. Do not operate the hoist if damage is found.
	Operate in both directions. Hoist must operate smoothly without sticking, binding or abnormal noises.
	Check the operation of the brake.
Quarterly	Remove, clean or replace muffler in top of gear housing.
Yearly	Inspect the hoist gearing, shafts and bearings for damage or wear. Repair or replace as necessary.
	Check all of the supporting members. Repair or replace as required.

Adjustments

🔧 Brake

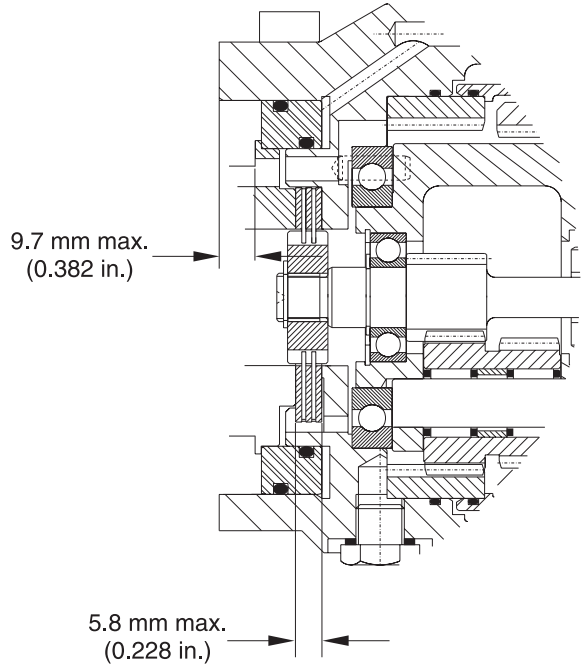
No brake adjustment is required.

Annual Maintenance is limited to:

1. A general cleaning.
2. The friction discs have a 0.2 mm (0.079 in.) deep groove on each side. Replace the friction discs if the grooves are no longer visible. Refer to Dwgs. MHP1415 and MHP1416.

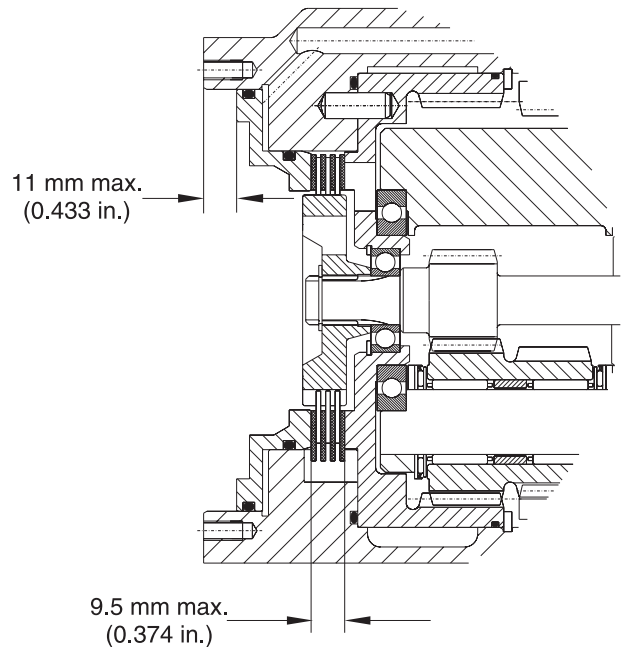
3. Measure total brake and steel plate stack up. Check that measurement is not below minimum shown.

LCA015S and LCA030D Hoists



(Dwg. MHP1415)

LCA030S, LCA060S, LCA060D and LCA120D Hoists



(Dwg. MHP1416)

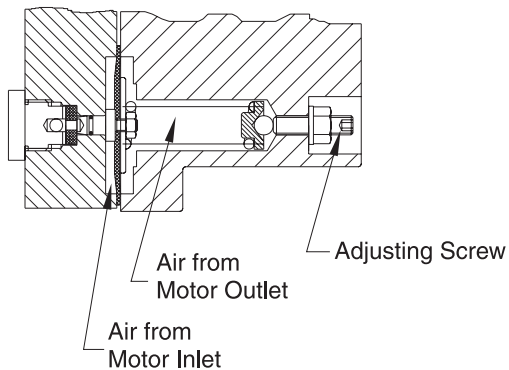
Overload Device

Refer to Dwg. MHP1302.

1. Connect the hoist to the air supply.
2. Release the locknut and turn the adjustment screw in order to increase or decrease the SWL (increase the SWL by tightening the adjustment screw). The adjustment must be made for an overload of 20% maximum of the SWL.
3. Tighten the locknut securing the adjustment screw.
4. Check hoist operation at rated load. If necessary repeat the adjustment.

NOTICE

- **Do not change factory settings unless hoist is tested and recertified at an authorized repair facility.**



(Dwg. MHP1302)

Disassembly

General Instructions

WARNING

- **Disconnect the air supply hose before performing any maintenance or repairs on this hoist.**

All maintenance work done on the Liftchain hoist should be performed on a bench in a clean dust free work area. In the process of disassembling the hoist, observe the following:

1. Never disassemble the hoist any further than is necessary to accomplish the needed repair. A good part can be damaged during the course of disassembly.
2. Never use excessive force when removing parts. Tapping gently around the perimeter of a cover or housing with a soft hammer, for example, is sufficient to break the seal.
3. Do not heat a part with a flame to free it for removal, unless the part being heated is already worn or damaged beyond repair and no additional damage will occur to other parts.

In general, the hoist is designed to permit easy disassembly and assembly. The use of heat or excessive force should not be required.

4. Keep the work area clean to prevent dirt and other foreign matter from getting into bearings and other moving parts.
5. All seals and 'O' rings should be discarded once they have been removed. New seals and 'O' rings should be used when assembling the hoist.

6. When grasping a part in a vise, always use leather- or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members, machined surfaces and housings.
7. Do not remove any part which is press fit in or on a subassembly unless the removal of the part is necessary for repairs or replacement.
8. To avoid damaging bearings during hoist assembly or disassembly always tap or press on the bearing inner race for shaft fit bearings or the outer race for bore fit bearings.
9. For assembly work above body height, suitable working platforms or ladders should be made available.
10. Do not attempt to wash sealed bearings.

If hoists are to be completely disassembled it is recommended that the motor assembly and brake/gear housing assembly be removed as complete assemblies from the chain guide housing. This can be accomplished by removing the capscrews, nuts and washers that clamp the housings together. Carefully separate assemblies and clean mating surfaces. Assemblies are Loctited together.

The muffler is located in the top of the gear housing. To clean muffler remove retainer ring in gear housing and with the aid of small pick remove the first muffler plate. Remove 'O' ring, second muffler plate and last 'O' ring.

Load Chain Replacement

WARNING

- **NEVER splice a load chain except when installing a new load chain by the following method. Always discard the link used to connect the old chain with the new.**

Excessive chain wear cannot be detected by casual observation. The chain is case hardened and once the case hardening is worn through, wear will progress rapidly and the strength of the chain will be considerably reduced. Further, the chain will no longer fit the chain sprocket properly, greatly increasing the chance of malfunction and chain breakage.

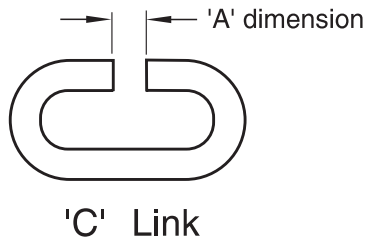
One chain sprocket will outlast several chains if the chain is replaced as recommended. The use of a worn chain will cause the chain sprocket to wear rapidly.

If the chain is visibly damaged, examine the chain sprocket and chain guide. Install a new chain sprocket if the old one is visibly worn. Install a new guide if the old one is broken or distorted.

NOTICE

- **For ease of installation, do not remove the old chain from the hoist. Use the old chain to feed the new chain through the hoist.**

1. The hoist must be hung and connected to the air supply.
2. Remove chain bucket, if used.
3. Remove chain stopper.
4. Remove the load hook.
5. Run hoist slowly in the lifting direction until the chain free end is approximately 2 ft (60 cm) from the hoist.
6. Using an abrasive wheel, cut a section from the last link as shown in Dwg. MHP0817. Use a 'C' link which is the same size as the chain. Refer to Table 9.



(Dwg. MHP0817)

Table 9

Hoist Model	Chain Size mm	'A' Dimension	
		in.	mm
LCA015S	8 x 24	0.4	10
LCA030D			
LCA030S	13 x 36	0.5	15
LCA060D			
LCA060S	16 x 45	0.7	18
LCA120D			

CAUTION

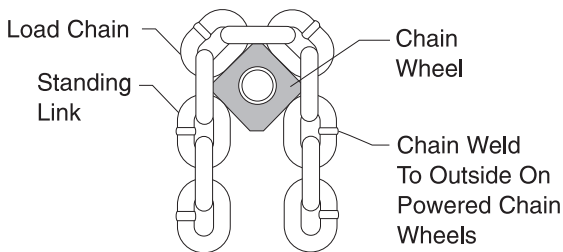
• Do not distort the link in any manner. It must be able to pass over the pocket and idler wheels without binding.

- Connect the new chain to the old chain by hooking the end of the new chain onto the 'C' link. Make certain the welds and links on the new chain match the positioning of the welds and links on the chain being replaced.

CAUTION

• Ensure that chain does NOT become twisted during reeving. All chain welds must align while chain is hanging free.

- Slowly run the hoist in the raise direction, running off the old chain and reeving the new chain over the chain wheel. *The first link of new chain over the chain wheel must be a standing link.* Refer to Dwg. MHP0472.



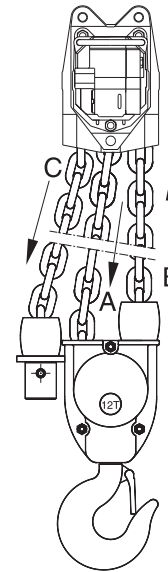
(Dwg. MHP0472)

- Reinstall the load hook and chain stopper.

WARNING

• A twisted chain can jam as it passes over the pocket wheel, possibly resulting in damage to the hoist or even breaking the chain and causing injury.

Chain Reeving



(Dwg. MHP1301)

Accessing the Brake

LCA015S and LCA030D Hoists

Refer to Dwg. MHP1462.

- It is recommended that carry handle (25) on the brake end be removed prior to brake disassembly.
- Carefully remove the four brake cover screws (27) one half turn at a time each, until spring compression is relaxed. Remove brake cover (34), brake support plate (64) and four brake springs (33).
- Check brake plate wear tolerance.
- Remove brake disc (28), friction discs (35) and steel discs (36).
- Remove retainer ring (30) from pinion (21) and pull out brake sleeve (29).
- Using low pressure air in the brake port carefully remove brake piston (37) from gear housing (23).
- Remove 'O' rings (24) and (38) from brake support plate (64) and brake piston (37).

LCA030S and LCA060D Hoists

Refer to Dwg. MHP1464.

- It is recommended that carry handle (37) on the brake end be removed prior to brake disassembly.
- Carefully remove the six brake cover screws (32) one half turn at a time each, until spring compression is relaxed. Remove brake cover (35) and eight brake springs (34).
- Using low pressure air in the brake port, carefully remove brake piston (29) from gear housing (31).
- Remove 'O' rings (30) and (33) from brake piston (29) and brake cover (35).
- Check brake plate wear tolerance.

LCA060S and LCA120D Hoists

Refer to Dwg. MHP1465.

1. It is recommended that carry handle (28) on the brake end be removed prior to brake disassembly.
2. Carefully remove the six brake cover screws (31) one half turn at a time each, until spring compression is relaxed. Remove brake cover (37) and eight brake springs (38).
3. Remove brake piston (33).
4. Remove retainer ring (36) from sun gear (41) and pull out brake sleeve (39).
5. Remove 'O' rings (8) and (32) from brake cover (37) and brake piston (33).
6. Check brake plate wear tolerance.

Motor Disassembly

2 HP without Emergency Stop or Overload

Refer to Dwg. MHP1466.

1. Remove four capscrews (21) and pull motor assembly from motor housing.
2. Remove capscrews (8) from motor flange (9) and pull motor flange assembly from motor housing (1).
3. Separate motor housing (1) from motor cover (22).
4. Immobilize the idle gear (4) and drive gear (7) with a rod between the teeth and remove locknuts (3).
5. Remove idle gear (4) and drive gear (7) from motor flange (9).
6. Remove capscrew (6) and washer (5). Tap bearings (2) from motor flange.

2 HP with Emergency Stop and Overload

Refer to Dwg. MHP1467.

Follow steps 1 through 6 immediately above for initial motor disassembly.

1. Remove the three capscrews (36) from cover (27).
2. Pry cover (27) from housing and remove spring (28) and 'O' ring (29).
3. Remove plug (50) and seal washer (49) from motor cover.
4. Remove capscrews (21, 39 and 54) and lift off cover (38).
5. Remove diaphragm (34). Remove capscrew (30) and separate valve cones (31) and (35), seal washers (33), washers (32) and spacer (37).
6. Remove diaphragm assembly (46) from housing. Unscrew valve cone (47) and nut (44). Remove washer (45) and 'O' ring (48) from valve cone.
7. Remove spring (43), spring receiver (42) and ball (52) from cover housing. Unscrew screw (40) with self locking nut (41) and seal ring (51) from same cover.
8. Check dowel pins (12) are not damaged.

4 HP Motors

Refer to 2 HP motor disassembly instructions and Dwgs. MHP1455, MHP1456 or MHP1457 in Parts Section.

Reduction Housing

LCA015S and LCA030D Hoists

Refer to Dwg. MHP1462.

1. Remove the three nuts (53), lockwashers (54) and capscrews (52) which secure the motor assembly and gear housing assembly to the chain guide housing (9).
2. Carefully pry gear housing assembly (23) from chain guide housing (9).
3. Disassemble brake parts as described in "Accessing the Brake."
4. Remove retainer ring (32) in planetary support.
5. Carefully tap on the motor end of the pinion shaft (21) until it can be removed from the brake end of the gear housing.

6. Remove pinion (11) and gear cover (48).
7. Remove ring gear (18) and planetary support assembly.
8. Remove bearings (17) and (40) from planetary support (19).
9. Slide out satellite axles (47), bearings (46), spacers (45) and planetary gears (44).
10. Remove ring gear (20).

LCA030S and LCA060D Hoists

Refer to Dwg. MHP1464.

1. Remove the three nuts (13), lockwashers (12) and capscrews (11) which secure the motor assembly and gear housing assembly to the chain guide housing (52).
2. Carefully pry gear housing assembly (31) from chain guide housing (52).
3. Using the two puller screw holes (M6 mm) provided in the gear cover (55) remove the gear cover.
4. Tap drive pinion (17) from the gear side to separate parts. Remove bearing (44), spring washer (19), ring gear (18) and gear cover (55) from drive pinion (17).
5. Remove oil seal (57) and 'O' rings (54) and (56) from gear cover (55).
6. Remove 'O' ring (16) from drive pinion (17).
7. Remove planetary assembly.
8. Refer to "Accessing the Brake" to remove brake cover.
9. Remove retainer ring (36) from sun gear (20) and pull out brake sleeve (39).
10. Pull sun gear (20) from the motor side of the housing.
11. Remove retainer ring (48) from gear housing bore. Tap on ring gear (45) hub from the brake side to remove.
12. Remove retainer ring (41) from ring gear (45) and tap out bearing (43). Remove and discard 'O' ring (47). Always replace 'O' ring (47) as it is normally damaged during disassembly.
13. Remove friction discs (27) and steel discs (28) from gear housing.
14. Slide planet axles (23) from planetary support and remove bearings (21), thrust bearings (25), spacers (22), thrust rings (26) and planetary gears (24).
15. Remove remaining bearing (44) from planetary support (46).

LCA060S and LCA120D Hoists

Refer to Dwg. MHP1465.

1. Remove the three nuts (52), lockwashers (51) and capscrews (50 and 60), nuts (61) and lockwashers (62) which secure the motor assembly and gear housing assembly to the chain guide housing (12).
2. Carefully pry gear housing assembly (30) from chain guide housing (12).
3. Remove brake assembly as described in "Accessing the Brake."
4. Using the two puller screw holes (M6 mm) provided in the gear cover (13) remove the gear cover. Remove oil seal (53) and 'O' rings (9) and (14) from gear cover (13).
5. Remove ring gear support (54).
6. Remove ring gear (16) from gear housing (30). Remove retainer ring (15) from ring gear.
7. Pull planetary support (48) assembly from gear housing.
8. To disassemble planetary assembly drive pins (25) completely through to the inside of the planetary support (48). Push planet axles (49) out of planetary support. Remove bearings (21) and (24), spacers (20), thrust rings (26) and planetary gears (22) from planetary support (48).
9. Remove capscrews (27) from ring gear support (45). Remove ring gear (47) and ring gear support from gear housing (30).
10. Remove friction discs (43) and steel discs (44).

11. Remove retainer ring (40) and bearing (5) from ring gear support (45).
12. Remove 'O' rings (46) from gear housing (30).

Chain Guide Housing

LCA015S and LCA030D Hoists

Refer to Dwg. MHP1462.

1. Remove the gear housing assembly and motor assembly as previously described.
2. Tap on the sprocket (2), on the brake side, until bearing (12) and sprocket (2) are clear of the chain guide housing (9).
3. Remove chain guide (50) and remaining bearing (12).
4. If replacement is required remove retainer ring (56) and oil seal (55) from bore of sprocket.

LCA030S and LCA060D Hoists

Refer to Dwg. MHP1464.

1. Remove gear housing assembly and motor assembly as previously described.
2. Tap on the sprocket (9), on the brake side, until bearing (10) and sprocket (9) are clear of the chain guide housing (52).
3. Remove chain guide (14) and remaining bearing (10).
4. If replacement is required remove bearing (63) and oil seal (62) from bore of sprocket.

LCA060S and LCA120D Hoists

Refer to Dwgs. MHP1465.

1. Remove gear housing assembly and motor assembly as previously described.
2. Tap on the sprocket (59), on the brake side, until bearing (55) and sprocket (59) are clear of the chain guide housing (12).
3. Remove chain guide (56) and remaining bearing (55).
4. If replacement is required remove bearing (5) and oil seal (6) from bore of sprocket.

Pendant Disassembly

Refer to Dwg. MHP1544 or MHP1558.

1. Remove the fittings (327) and the lifting eye (501).
2. Unscrew plugs (518) and remove with springs (517) and balls (516).
3. Tap out pin (502) and remove the levers (503).
4. Remove screws (515) from pendant handle (514).
5. Remove the valve assemblies (items 506 and 509) with the 'O' rings (511 and 505).
6. Remove the emergency stop valve (508) or plug (507) from the handle (514).
7. Remove retainer ring (512) and exhaust washer (513).

Cleaning, Inspection and Repair

Use the following procedures to clean, inspect and repair the components of the hoist.

Cleaning

CAUTION

• **Bushings that rotate in the frame or are loose or worn must be replaced. Failure to observe this precaution will result in additional component damage.**

Clean all hoist component parts in solvent (except for the friction discs). The use of a stiff bristle brush will facilitate the

removal of accumulated dirt and sediments on the gears and frames. If bushings have been removed, it may be necessary to carefully scrape old Loctite® from the bushing bores. Dry each part using low pressure, filtered compressed air.

Inspection

All disassembled parts should be inspected to determine their fitness for continued use. Pay particular attention to the following:

1. Inspect all gears for worn, cracked or broken teeth.
2. Inspect all bushings for wear, scoring or galling.
3. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft.
4. Inspect all threaded items and replace those with damaged threads.
5. Measure the thickness of the friction disc. Replace the friction discs if the grooves are no longer visible.

Repair

Actual repairs are limited to the removal of small burrs and other minor surface imperfections from gears and shafts. Use a fine stone or emery cloth for this work.

1. Worn or damaged parts must be replaced. Refer to the applicable Parts Listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. The cost of the part is often minor in comparison with the cost of redoing the job.
3. Smooth out all nicks, burrs or galled spots on shafts, bores, pins or bushings.
4. Examine all gear teeth carefully and remove nicks or burrs.
5. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
6. Remove all nicks and burrs caused by lockwashers.

Assembly

Brake

LCA015S and LCA030D Hoists

Refer to Dwg. MHP1462.

1. Lubricate 'O' rings (24) and (38) and install on brake cover (34) and brake piston (37).
2. Install brake sleeve (29) on pinion (21) and secure in position with retainer ring (30).
3. Install brake piston (37) in gear housing (23). Internal 'O' ring groove must be positioned nearest the gear compartment.
4. Install friction and steel discs, beginning with a friction disc (35) and alternating with a steel disc (36), until the discs are used.
5. Install brake disc (28).
6. Position springs (33) in the brake disc spring holes and install brake cover (34) and brake support plate (64) on gear housing (23). Install and tighten four cover screws (27), one half turn at a time each, until cover is secure. Keep brake cover square to gear housing during installation to avoid damaging 'O' ring.
7. Reinstall handle (25) if previously removed.

LCA030S and LCA060D Hoists

Refer to Dwg. MHP1464.

1. Lubricate and install 'O' rings (30) and (33) on brake piston (29) and brake cover (35).
2. Install brake piston (29) with 'O' rings in gear housing (31).
3. Using a small amount of grease on each spring (34) position springs in the brake cover spring holes and install brake cover (35) on gear housing (31). Install and tighten six cover screws (32), one half turn at a time each, until cover is secure. Keep brake cover square to gear housing during installation to avoid damaging 'O' ring (33).
4. Install plug (7) and copper washer (8) in brake cover (35).
5. Reinstall handle (37) if previously removed.

LCA060S and LCA120D Hoists

Refer to Dwg. MHP1465.

1. Lubricate 'O' rings (8) and (32) and install on brake cover (37) and brake piston (33).
2. Install brake sleeve (39) on sun gear (41) and secure in position with retainer ring (36).
3. Install brake piston (33).
4. Using a small amount of grease on each spring (38), position springs in the brake cover spring holes and install brake cover (37) on gear housing (30). Install and tighten six cover screws (31), one half turn at a time each, until cover is secure. Keep brake cover square to gear housing during installation to avoid damaging 'O' ring.
5. Install plug (34) and seal washer (35) in cover (37).
6. Reinstall handle (28) if previously removed.



Motor

2HP without Emergency Stop or Overload

Refer to Dwg. MHP1458.

1. Lubricate bearings (2) with Grade 2 grease then install bearings in motor flange (9). Ensure markings on bearing cage are still visible after installation.
2. Install washer (5) and capscrew (6) to retain bearings. Lightly coat capscrew threads with Loctite® 234.
3. Install idle gear (4) and drive gear (7) through bearings in motor flange (9).
4. Immobilize the idle gear (4) and drive gear (7) with a rod between the teeth. Install and tighten locknuts (3). Lightly coat locknut threads with Loctite® 234.
5. Install motor housing (1) on motor flange.
6. Lubricate and install quad rings (23) on slide valves (25). Lubricate and install quad ring (24) in bore of gear housing (1).
7. Install rear stops (10), springs (11) and slide valves (25) in gear housing.
8. Position stop (18) in recess in motor cover (22). Install needle bearings (14) in motor cover (22).
9. Lubricate and install 'O' rings (19) in gear housing. Carefully install motor cover assembly on gear housing until fully seated. Ensure pins (12) are aligned and fully engaged.
10. Lightly coat capscrew threads with Loctite® 234 then install and torque capscrews (8) to 7.5 ft-lbs (5.5 Nm). After assembly of the motor, check to ensure motor driving gear rotates freely in both directions.
11. Install motor assembly in motor housing (60). Secure in position with four capscrews (21). Torque capscrews to 7.5 ft-lbs (5.5 Nm).

2HP with Emergency Stop and Overload

Refer to Dwg. MHP1467.

Follow steps 1 through 11 immediately above, for initial motor assembly.

Assembly of Emergency Stop and Overload options:

1. Ensure dowels (12) are installed in motor cover (22).
2. Lubricate and position 'O' rings (13) and stops (18) on motor cover.
3. Assemble items (31), (32), (33) and (37) on screw (30). Install screw with parts into motor cover. Screw (32), (33) and (35) on opposite end and tighten. Use Loctite® 243 on threads.
4. Install spring (28) and 'O' ring (29) in cover (27) and assemble on motor cover. Secure with three capscrews (36). Apply Loctite® 243 to threads.
5. Install diaphragm (34) on opposite side.
6. Grease and install ball (52), spring receiver (42) and spring (43) in motor cover.
7. Assemble items (47), (44) and (45) to diaphragm (46). Ensure parts are assembled from the correct side. There is one extra hole in addition to the four capscrew holes. The extra hole must align with the port hole in the motor cover and cover (38).
8. Install cover (38) with capscrews (39) and (54) using Loctite® 243 on the threads. Torque capscrews to 7.5 ft-lbs (5.5 Nm).
9. Install seal washer (49) in cover (38) with plug (50).
10. Thread nut (41) onto screw (40) and install with seal ring (51).
11. Refer to Overload Device Adjustments in the "MAINTENANCE" section to reestablish settings.

4HP without Emergency Stop or Overload

Refer to Dwg. MHP1457.

1. Lubricate bearings (10) and (2) with Grade 2 grease then install bearings in motor housing (14). Ensure markings on bearing cage are still visible after installation.
2. Install washer (5) and screw (6) to retain bearings. Lightly coat screw threads with Loctite® 234.
3. Install 'O' ring (12) on shuttle valve stop (11). Install ball (13) and screw shuttle valve stop into motor housing (14).
4. Install idle gear (15) and drive gear (4) through bearings in motor housing (14).
5. Immobilize the idle gear (15) and drive gear (4) with a rod between the teeth. Install and tighten locknuts (3) and (9). Lightly coat locknut threads with Loctite® 234.
6. Lubricate and install quad rings (29) on slide valves (16). Lubricate and install quad ring (1) in bore of motor housing (14).
7. Install rear stops (7), springs (8) and slide valves (16) in motor housing.
8. Install bearing (23) on smaller stepped diameter of idle gear (15). Secure in position with retainer ring (24).
9. Position rear stops (28) in recess in motor cover (21). Install needle bearing (30) in motor cover (21).
10. Lubricate and install 'O' rings (27) in motor cover. Carefully install motor cover assembly on motor housing until fully seated. Ensure pins (19) are aligned and fully engaged.
11. Lightly coat capscrew threads with Loctite® 234 then install and torque capscrews (17) to 16.3 ft-lbs (12 Nm). After assembly of the motor, check to ensure motor driving gear rotates freely in both directions.
12. Install motor assembly in motor housing (60). Secure in position with six capscrews (20) and (32). Verify capscrew lengths for correct positioning.

4HP with Emergency Stop and Overload

Refer to Dwg. MHP1455.

Follow steps 1 through 12 immediately above, for initial motor assembly.

Assembly of Emergency Stop and Overload options:

1. Ensure dowels (19) are installed in motor cover (21).
2. Lubricate and position 'O' rings (27) and stops (28) on motor cover.
3. Assemble items (37), (38), (39) and (44) on screw (43). Install screw with parts into motor cover. Screw (35), (37) and (38) on opposite end and tighten. Use Loctite® 243 on threads.
4. Install spring (42) and 'O' ring (46) in cover (45) and assemble on motor cover. Secure with three capscrews (41). Apply Loctite® 243 to threads.
5. Install diaphragm (36) on opposite side.
6. Grease and install ball (50), spring receiver (51) and spring (52) in motor cover.
7. Assemble items (53), (54) and (55) to diaphragm (59). Ensure parts are assembled from the correct side. There is one extra hole in addition to the four capscrew holes. The extra hole must align with the port hole in the motor cover and cover (34).
8. Install cover (34) with capscrews (32) using Loctite® 243 on the threads. Torque capscrews to 7.5 ft-lbs (5.5 Nm).
9. Install seal washer (57) in cover (34) with plug (58).
10. Thread nut (48) onto screw (47) and install with seal ring (49).
11. Refer to Overload Device Adjustments in the "MAINTENANCE" section to reestablish settings.

Reduction Housing

LCA015S and LCA030D Hoists

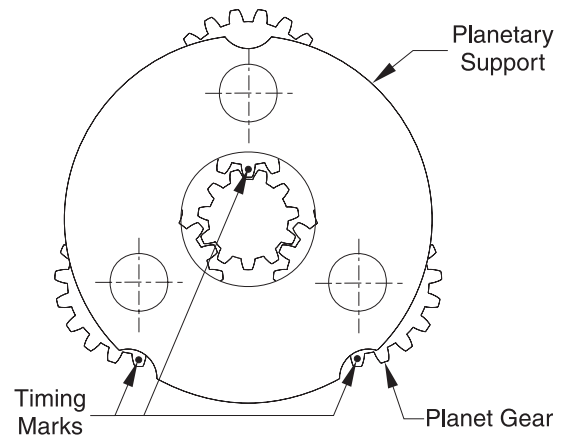
Refer to Dwg. MHP1462.

1. Install 'O' ring (43) in gear housing (23). Ensure two dowel pins (22) are in place in the gear housing and are undamaged.
2. Carefully install ring gear (20) in gear housing making sure dowel pins are aligned with the holes in the ring gear. Tap down until seated.
3. Install bearing (40) on planetary support (19).
4. Install two bearings (46) with a spacer (45) between, in each planetary gear (44).
5. Install planetary gears with bearings into planetary support (19) and locate with satellite axles (47). Ensure planet gears (44) are installed with the smaller gear head diameter nearest the side of the planetary support (19) with the timing notches.
6. Rotate satellite axles to allow installation of bearing (17).
7. Install bearing (39) and secure with retainer ring (32).
8. Time planetary gears as shown in drawing MHP1406. Use of a separate ring gear tool to maintain gear position during installation of planetary assembly is helpful. Install planetary assembly and tap down until planetary assembly is fully seated.
9. Install pinion (21). Tap into position until seated against bearing (39).
10. Install ring gear (18).
11. Lubricate and install 'O' ring (43) in gear cover (48). Install oil seal (13) with lip toward planetary support.
12. Install gear cover (48). Attempt to locate the puller holes at the top and bottom just off vertical. This may aid disassembly at some later date. Install pinion (11).
13. Refer to "Brake Assembly" for information on assembling the remaining brake parts.

LCA030S and LCA060D Hoists

Refer to Dwg. MHP1464.

1. Install 'O' ring (42) in gear housing (31). Ensure three dowel pins (40) are in place in the gear housing (31) and are undamaged.
2. Install new 'O' ring (47) on ring gear (45).
3. Install friction and steel discs. Begin with a friction disc (27) and then alternate with a steel disc (28) until discs are used. Locate friction disc tabs in slots provided in gear housing.
4. Install bearing (43) in ring gear and secure with retainer ring (41).
5. Carefully install ring gear in gear housing making sure dowel pins are aligned with the holes in the ring gear. Tap down until retainer ring groove in gear housing bore, is visible. Use a clamp to further pull ring gear into position compressing 'O' ring (42). Install retainer ring (48). Ensure retainer ring is fully seated, then release clamp.
6. Install sun gear (20) and tap into position through bearing (43) until seated.
7. Turn gear housing over and support to avoid damaging the sun gear. Align tabs on steel discs (28) and install brake sleeve (39) on sun gear spline. Secure in position with retainer ring (36).
8. Install two bearings (21) with a spacer (22) between, in each planetary gear (24).
9. Install planet gears with bearings into planetary support (46) and locate with planet axles (23). Place one bearing (25) and one thrust ring (26) on each side of the planetary gears. Bearings (25) must contact inside face of planetary support and thrust rings (26) must contact planet gears. Ensure planet gears (24) are installed with the smaller gear head diameter nearest the side of the planetary support (46) with the timing notches.
10. Rotate planet axles to allow installation of bearing (44) on the brake side. Pin punch around bearing to hold in place during assembly into gear housing (31).
11. Time gears as shown in drawing MHP1406. Using a separate ring gear tool to maintain gear position during installation of planetary assembly is helpful. Tap down until planetary assembly is fully seated.



(Dwg. MHP1406)

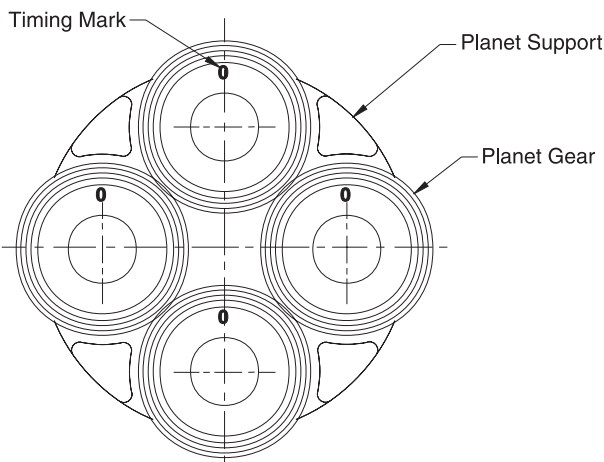
12. Install oil seal (57) and 'O' rings (54) and (56) on gear cover (55). Seal lip must be toward gear side.
13. Set drive pinion (17) on bench with the splined end up. Install gear cover on drive pinion with the threaded jacking holes toward the bench.

14. Install ring gear (18) on spline. Install spring washer (19) with concave side toward ring gear. Install bearing (44) and tap into place.
15. Install assembled parts in gear housing aligning the gear teeth with the ring gear. Position the puller holes at the top and bottom just off vertical. This may aid disassembly on another occasion.
16. Lubricate 'O' rings (30) and (33) and install on brake cover (35) and brake piston (29).
17. Install brake piston (29). Refer to "Brake Assembly" for information on assembling remaining brake parts.

LCA060S and LCA120D Hoists

Refer to Dwg. MHP1465.

1. Install 'O' rings (46) in gear housing (30). Ensure three dowel pins (42) are in place in the gear housing (30) and are undamaged.
2. Install friction and steel discs. Beginning with a friction disc (43) and then alternate with a steel disc (44) until discs are used. Locate friction disc tabs in slots provided in gear housing.
3. Install bearing (5) in ring gear support (45) and secure with retainer ring (40).
4. Carefully install ring gear support in gear housing making sure dowel pins are aligned with the holes in the ring gear support. Tap down and secure with three capscrews (27). Use Loctite® 243 on capscrew threads.
5. Install retainer ring (26) in ring gear (47) then install ring gear in gear housing.
6. Install two bearings (21) with a spacer (20) between, in each planet gear (22).
7. Install planet gears with bearings into planetary support (48) and locate with planet axle (49). Place one bearing (24) and one thrust ring (23) on each side of the planet gears. Bearings (24) must contact inside face of planetary support and thrust rings (23) must contact planet gears. Ensure planet gears (22) are installed with the smaller gear head diameter nearest the side of the planetary support (48) with the puller holes.
8. Align pin hole in planet axle with pin hole in planetary support. Install pins (25). Tap down until flush with planetary support.
9. Time gears as shown in drawing MHP1417. Using a separate ring gear tool to maintain gear position during installation of planetary assembly is helpful. Tap down until planetary assembly is fully seated.



(Dwg. MHP1417)

10. Install retainer ring (15) in ring gear (16). Install ring gear in gear housing (30).
11. Install sun gear (41) and tap into position through bearing (5) until seated.
12. Turn gear housing over and support to avoid damaging the sun gear. Align tabs on steel discs (44) and install brake sleeve (39) on sun gear spline. Secure in position with retainer ring (36).
13. Install remaining brake parts as described in "Brake Assembly."
14. Install oil seal (53) and 'O' rings (9) and (14) on gear cover (13). Seal lip must be toward gear side.
15. Install ring gear support (54).
16. Install gear cover (13) in gear housing (30).

Pendant Assembly

Refer to Dwg. MHP1558 or MHP1544.

1. Install 'O' rings (505 and 511) and protector (506) on valves (509). Install valve assemblies in handle (514).
2. Install levers (503) in pendant handle (514) with pin (502). Stake pin in pendant handle at both ends to secure.
3. Install screws (504) in levers.
4. Install screws (515) in handle.
5. Install balls (516) and springs (517) in handle (514). Secure in position with plugs (518).
6. On pendants with emergency stop, install emergency stop button (508).
7. Install exhaust washer (513) and secure in handle with retainer ring (512).
8. Adjustment:
 - a. Connect the inlet of the pendant to 100 psi (7 bar) air supply.
 - b. Connect a manometer at the outlet of the lever to be adjusted.
 - c. Apply a small amount of Loctite® 243 on the adjustment screw (504).
 - d. Tighten the adjustment setscrew to obtain a pressure of 15 psi (1 bar) without actioning the lever.
 - e. Release the adjustment setscrew by a half turn (pressure must fall to zero).
 - f. Push the lever. Check that pressure reaches 93 +/- 7 psi (6.5 +/- 0.5 bar). Check that there is no leak at the exhaust.
 - g. Release the lever, exhaust must occur and result in rapid pressure reduction.
 - h. Repeat operations f and g two or three times.
 - i. Disconnect the manometer. Check to ensure that there are no leaks when the lever is not activated.
 - j. Repeat the operations from 8b. to 8i. with each lever.

Load Test

Prior to initial use, all new, extensively repaired or altered hoists shall be load tested by or under the direction of a person trained in safety and operation of this hoist. Dynamically load test hoist to 100% of its rated capacity in accordance with ASME B30.16 standards. Testing to more than 100% is required to set overload device and may be necessary to comply with standards and regulations set forth in areas outside the USA.

SERVICE NOTES

SERVICE NOTES

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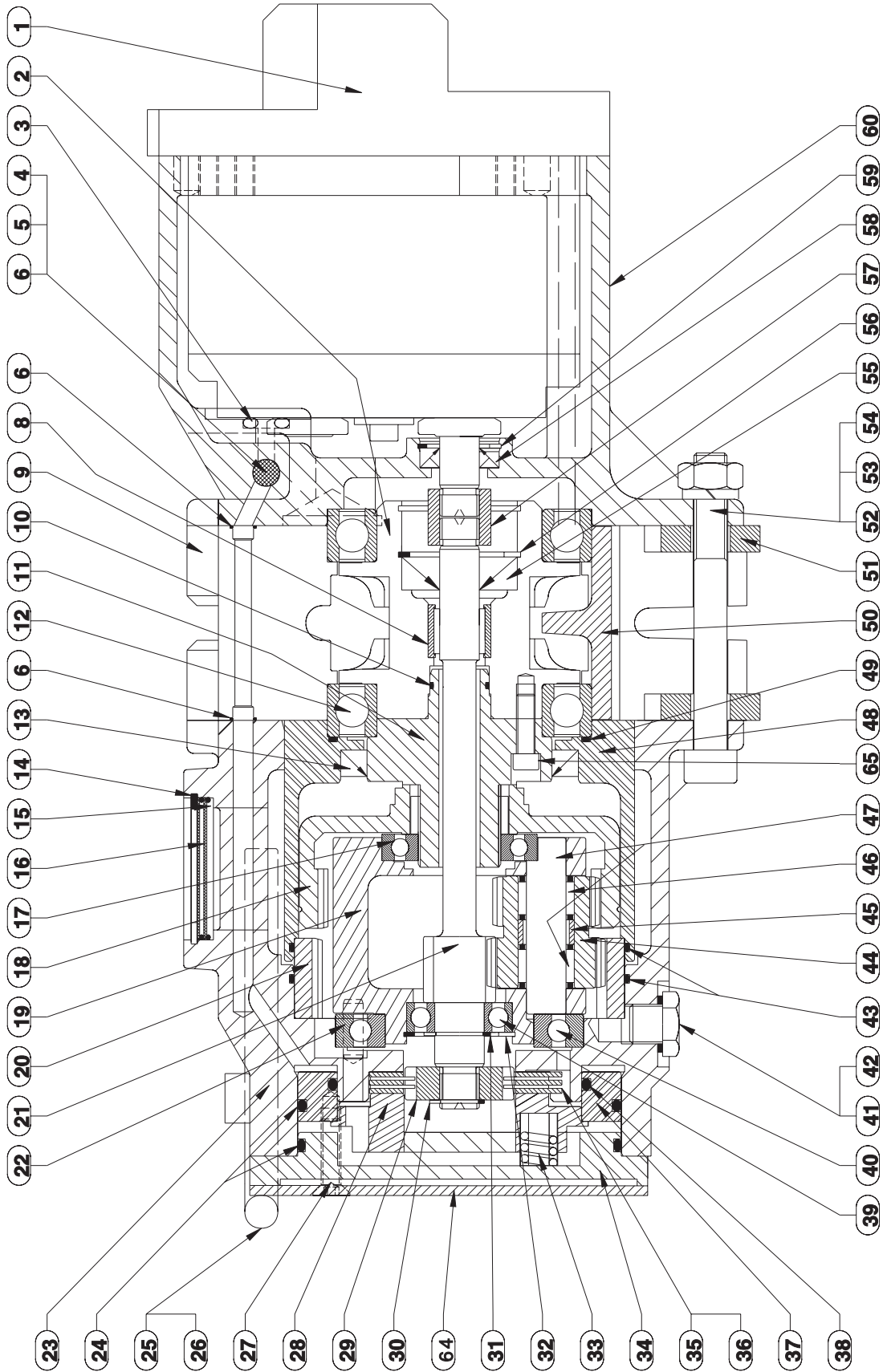
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LCA015S AND LCA030D HOIST ASSEMBLY PARTS DRAWING

1.5 and 3 ton Hoist Capacities



(Dwg. MHP1462)

LCA015S AND LCA030D HOIST ASSEMBLY PARTS LIST

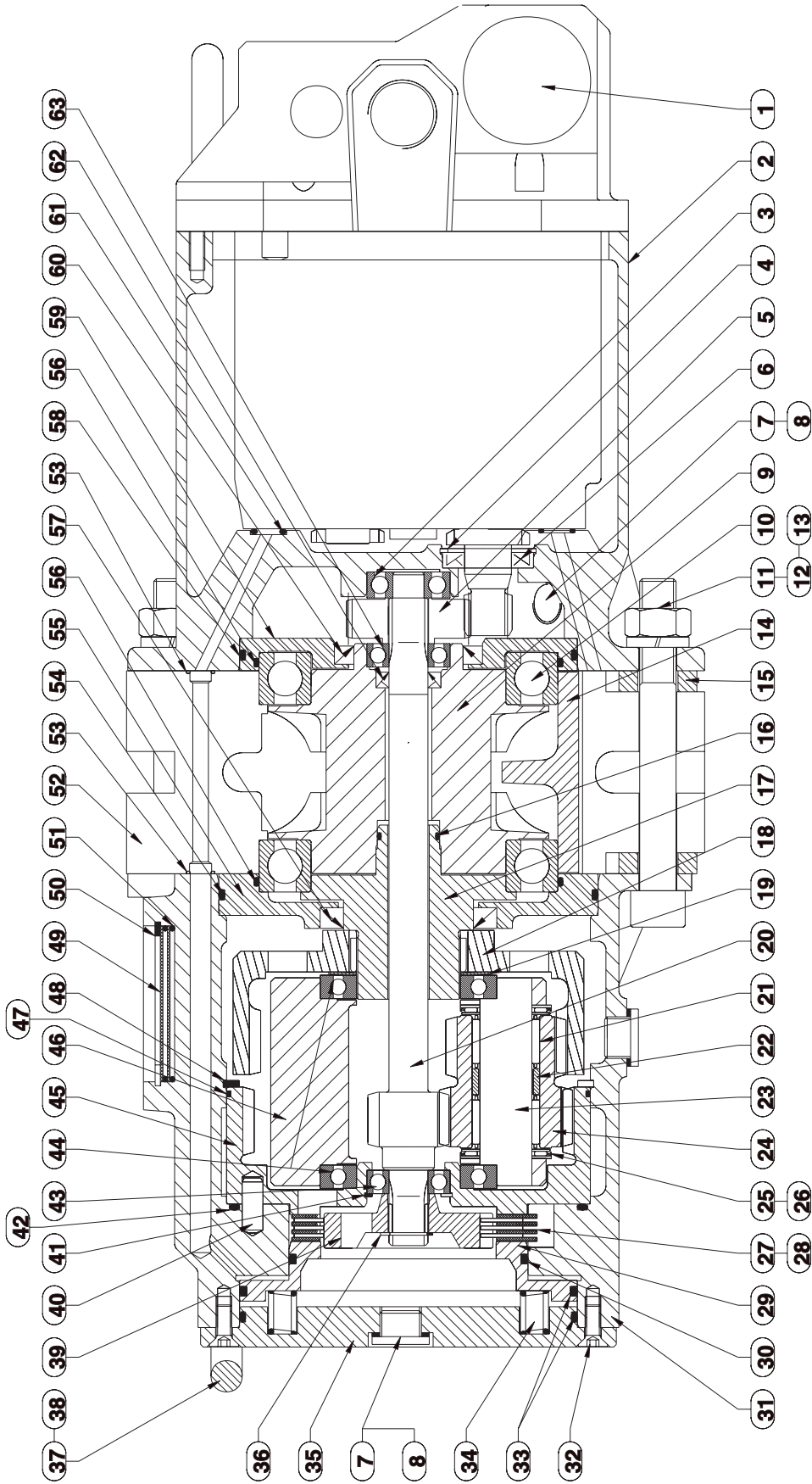
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Motor	1	Refer to Motor Section	33	Spring	4	69165532
2	Sprocket	1	94240015	34	Brake Cover	1	94240309
• 3	'O' Ring	2	58224929	35	Friction Disc	3	63028241
4	Shuttle Valve Stop	1	96090223	36	Steel Disc	2	63028341
5	Ball	1	69401625	37	Brake Piston	1	96180126
• 6	'O' Ring	5	58212229	• 38	'O' Ring	2	58235129
8	Needle Bearing	1	56471916	39	Bearing	1	50000002
9	Chain Guide Housing	1	94240157	40	Bearing	1	50800009
• 10	'O' Ring	1	58211729	41	Plug	2	65159732
11	Pinion	1	94240314	42	Seal Washer	2	58406031
12	Bearing	2	50050010	• 43	'O' Ring	2	58235829
• 13	Oil Seal	1	58006330	44	Planetary Gear	2	96180009
14	Retainer Ring	1	47703043	45	Spacer	3	96090026
• 15	'O' Ring	2	58236129	46	Bearing	6	56501713
16	Muffler	2	94240328	47	Satellite Axle	3	96090039
17	Bearing	1	50800005	48	Gear Cover	1	94240313
18	Ring Gear	1	96180008	• 49	'O' Ring	1	58235529
19	Planetary Support	1	96180041	50	Chain Guide	1	94240032
20	Ring Gear	1	96090038	51	Spacer	2	94240168
21	Pinion	1	94240315	52	Capscrew	3	41326506
22	Pin	2	46001716	53	Nut	3	43006911
23	Gear Housing	1	94240308	54	Lockwasher	3	45201010
• 24	'O' Ring	2	58235229	• 55	Oil Seal	1	58021430
25	Handle	1	94240055	56	Retainer Ring	1	47703035
26	Pin	2	46402918	57	Coupling	1	96090034
27	Screw	4	41104503	• 58	Oil Seal	1	58021530
28	Brake Disc	1	96180123	59	Retainer Ring	1	47703024
29	Brake Sleeve	1	94240316	60	Motor Housing	1	94240310
30	Retainer Ring	1	47700012	64	Brake Support Plate	1	94240309
31	Retainer Ring	1	47700015	65	Screw	4	41307206
32	Retainer Ring	1	47703032	*	Load Chain (Bulk)	Specify Length (metres)	LC824-G8ZP

• Recommended Spare

* Not Illustrated

LCA030S AND LCA060D HOIST ASSEMBLY PARTS DRAWING

3 and 6 ton Hoist Capacities



(Dwg. MHP1464)

LCA030S AND LCA060D HOIST ASSEMBLY PARTS LIST

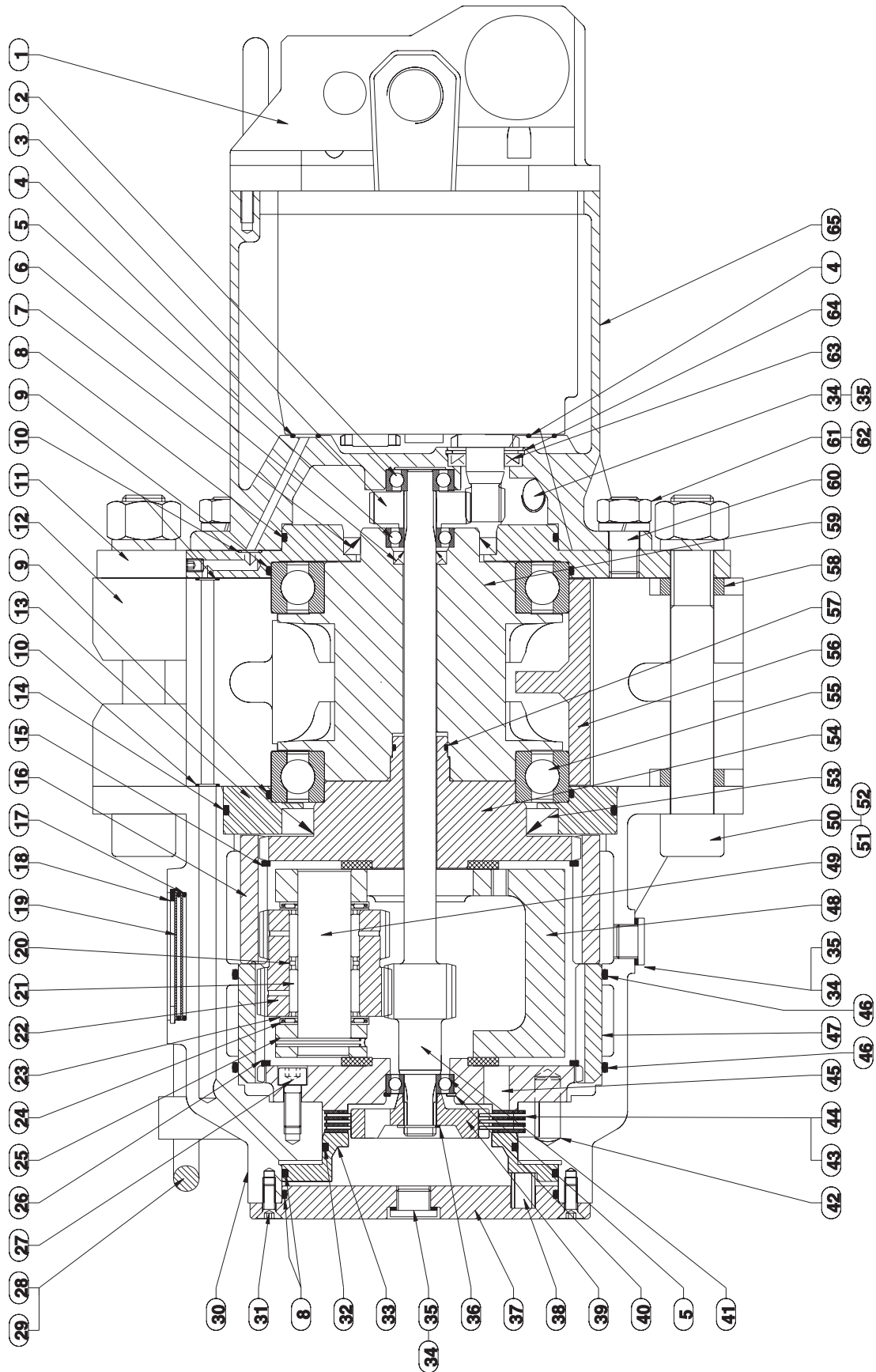
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Motor	1	Refer to Motor Section	• 33	'O' Ring	2	58212829
2	Motor Housing	1	94120405	34	Spring	8	69165532
3	Bearing	1	50100001	35	Brake Cover	1	94120406
4	Retainer Ring	1	47703035	36	Retainer Ring	1	47700015
5	Gear Wheel	1	94120410	37	Handle	1	94120080
• 6	Oil Seal	1	58020030	38	Pin	2	46503420
• 7	Plug	4	65119732	39	Brake Sleeve	1	96310120
• 8	Copper Washer	4	58403431	40	Pin	3	46000416
9	Sprocket	1	94120412	41	Retainer Ring	1	47703032
10	Bearing	2	50050015	• 42	'O' Ring	1	58221829
11	Capscrew	3	41308606	43	Bearing	1	50000002
12	Lockwasher	3	45201014	44	Bearing	1	50800008
13	Nut	3	43005811	45	Ring Gear	1	96310096
14	Chain Guide	1	94120072	46	Planetary Support	1	96200010
15	Spacer	2	94120216	• 47	'O' Ring	1	58231129
• 16	'O' Ring	1	58215829	48	Retainer Ring	1	47847832
17	Drive Pinion	1	94120408	49	Muffler	2	94120426
18	Ring Gear	1	96200031	50	Retainer Ring	1	47703060
19	Spring Washer	1	69172132	• 51	'O' Ring	2	58235729
20	Sun Gear	1	94120411	52	Chain Guide Housing	1	94127197
21	Bearing	6	56502620	• 53	'O' Ring	2	58212529
22	Spacer	3	96190024	• 54	'O' Ring	1	58234929
23	Planet Axle	3	96200060	55	Gear Cover	1	94120407
24	Planet Gear	3	96200075	• 56	'O' Ring	2	58234829
25	Bearing	6	56053520	• 57	Oil Seal	1	58012230
26	Thrust Ring	6	57319832	• 58	'O' Ring	1	58212829
27	Friction Disc	4	63059932	59	Motor Cover	1	94120409
28	Steel Disc	3	63060032	• 60	Oil Seal	1	58007230
29	Brake Piston	1	96310093	• 61	'O' Ring	3	58224929
• 30	'O' Ring	1	58230929	• 62	Oil Seal	1	58021330
31	Gear Housing	1	94120399	63	Bearing	1	50000002
32	Screw	6	41104503	*	Load Chain (Bulk)	Specify Length (metres)	LC1336-G8ZP

• Recommended Spare

* Not Illustrated

LCA060S AND LCA120D HOIST ASSEMBLY PARTS DRAWING

6 and 12 ton Hoist Capacities



(Dwg. MHP1465)

LCA060S AND LCA120D HOIST ASSEMBLY PARTS LIST

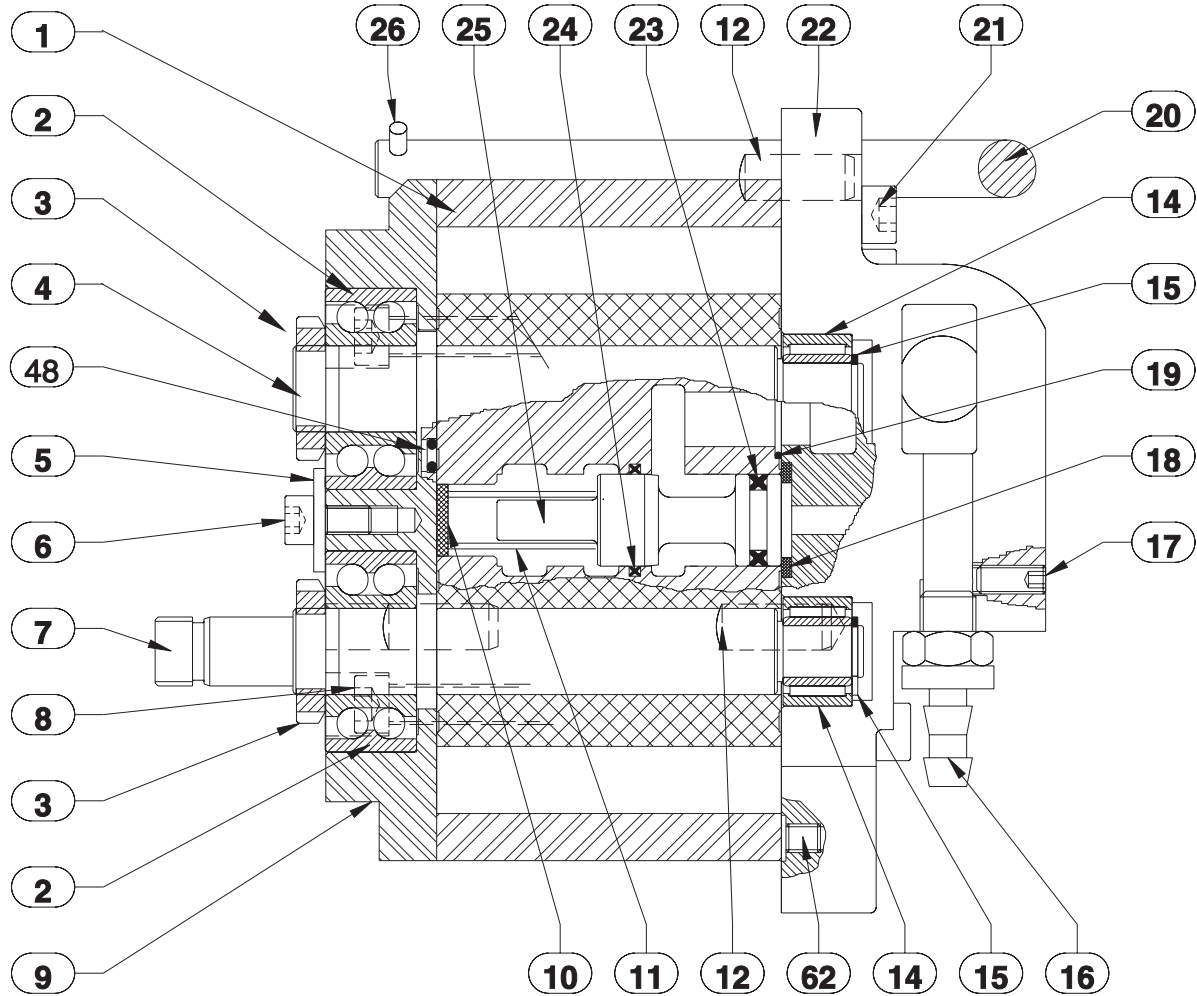
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Motor	1	Refer to Motor Section	• 34	Plug	4	65119732
2	Bearing	1	50100001	• 35	Seal/Washer	4	58403431
3	Gear Wheel	1	94120410	36	Retainer Ring	1	47700015
• 4	'O' Ring	3	58224929	37	Brake Cover	1	94120406
5	Bearing	2	50000002	38	Spring	8	69165532
• 6	Oil Seal	1	58021330	39	Brake Sleeve	1	96310120
• 7	Oil Seal	1	58006330	40	Retainer Ring	1	47703032
• 8	'O' Ring	3	58212829	41	Sun Gear	1	95260153
• 9	'O' Ring	2	58234929	42	Pin	3	46002216
• 10	'O' Ring	3	58212529	43	Friction Disc	4	63059932
11	Motor Flange	1	95260147	44	Steel Disc	3	63060032
12	Chain Guide Housing	1	95260052	45	Ring Gear Support	1	95260149
13	Gear Cover	1	95260148	• 46	'O' Ring	2	58235929
• 14	'O' Ring	1	58235029	47	Ring Gear	1	95730055
15	Retainer Ring	1	47834832	48	Planetary Support	1	96150023
16	Ring Gear	1	95260151	49	Planet Axle	4	95730019
• 17	'O' Ring	2	58235729	50	Capscrew	3	41321606
18	Retainer Ring	1	47703060	51	Lockwasher	3	45201020
19	Muffler	2	94120426	52	Nut	3	43004011
20	Spacer	4	95730021	• 53	Oil Seal	1	58008630
21	Bearing	8	56503324	54	Ring Gear Support	1	95260152
22	Planet Gear	4	95260150	55	Bearing	2	50060018
23	Thrust Ring	8	57312632	56	Chain Guide	1	95260007
24	Bearing	8	56054225	• 57	'O' Ring	1	58220129
25	Pin	4	46504220	58	Spacer	2	95260059
26	Retainer Ring	1	47836832	59	Sprocket	1	95260154
27	Capscrew	3	41301406	60	Screw	3	95260105
28	Handle	1	94120080	61	Nut	3	43005811
29	Pin	2	46503420	62	Lockwasher	3	45201014
30	Gear Housing	1	95260146	• 63	Oil Seal	1	58020030
31	Screw	6	41104503	64	Retainer Ring	1	47703035
• 32	'O' Ring	1	58230929	65	Motor Housing	1	94120405
33	Brake Piston	1	96310093	*	Load Chain (Bulk)	Specify Length (metre)	LC1645-G8ZP

• Recommended Spare

* Not Illustrated

STANDARD 2 HP MOTOR ASSEMBLY DRAWING AND PARTS LIST

Standard 2 HP Motor (without Overload or Emergency Stop) for use with Hoist Models LCA015S and LCA030D



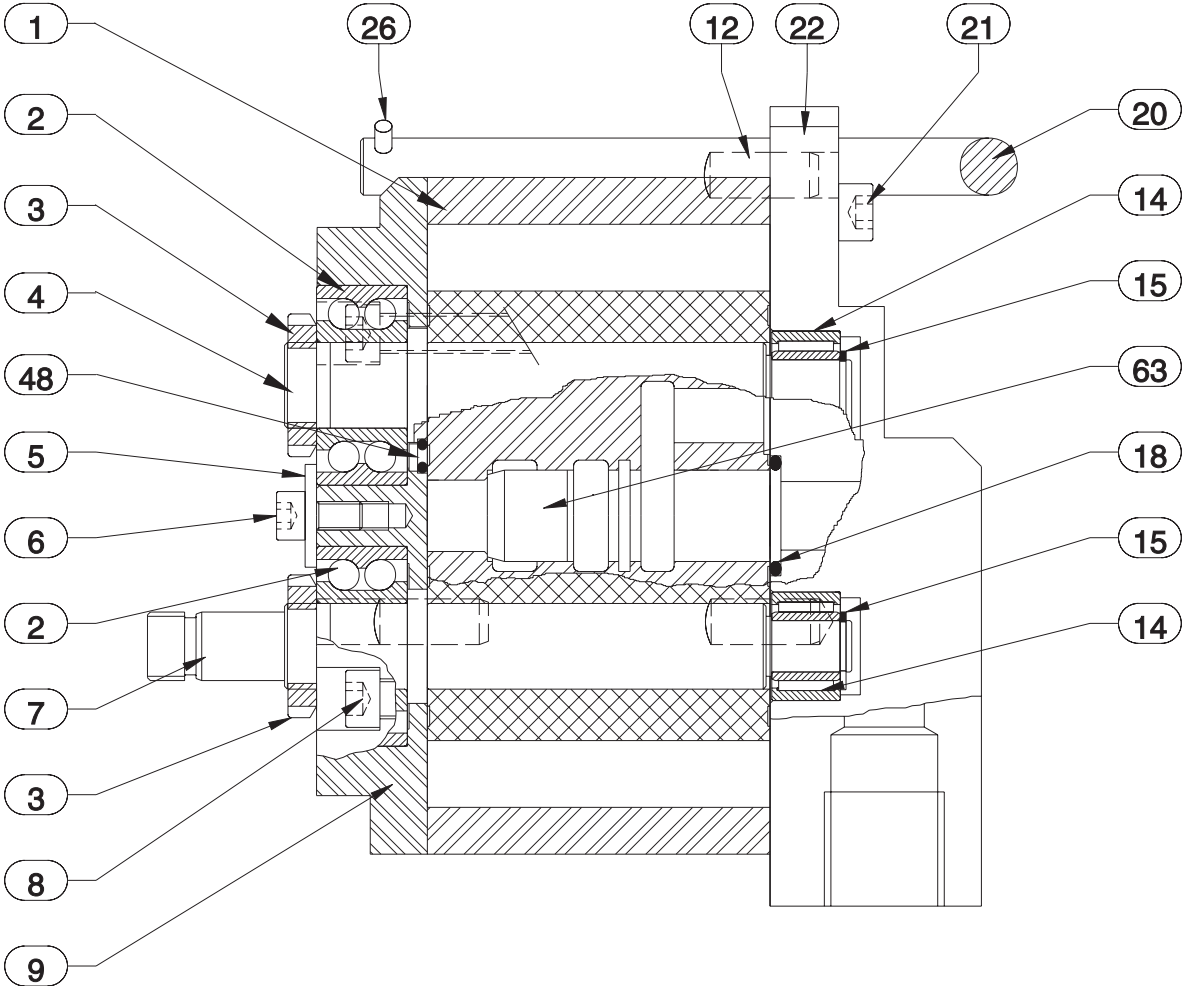
(Dwg. MHP1458)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Motor Housing	1	96090277	16	Fitting	3	61652632
2	Bearing	2	50600002	17	Screw	1	42007307
3	Locknut	2	57000002	18	Stop	2	96090042
4	Idle Gear	1	96090030	• 19	'O' Ring	2	58205029
5	Washer	1	96090032	20	Handle	1	94240055
6	Screw	1	41306706	21	Capscrew	4	41312206
7	Drive Gear	1	94240319	22	Motor Cover	1	94240318
8	Capscrew	4	41300806	• 23	Quad Ring	2	58228929
9	Motor Flange	1	96090008	• 24	Quad Ring	2	58231229
10	Rear Stop	2	94120030	25	Slide Valve	2	94240212
11	Spring	2	94240224	26	Pin	2	46402918
12	Pin	6	46000416	48	'O' Ring	1	58222329
14	Needle Bearing	2	56461912	62	Plug	2	42007407
15	Retainer Ring	2	47801339				

• Recommended Spare

REVERSIBLE 2 HP-MD MOTOR ASSEMBLY DRAWING AND PARTS LIST

Reversible 2 HP-MD Motor (without Overload or Emergency Stop) for use with Hoist Models LCA015S and LCA030D



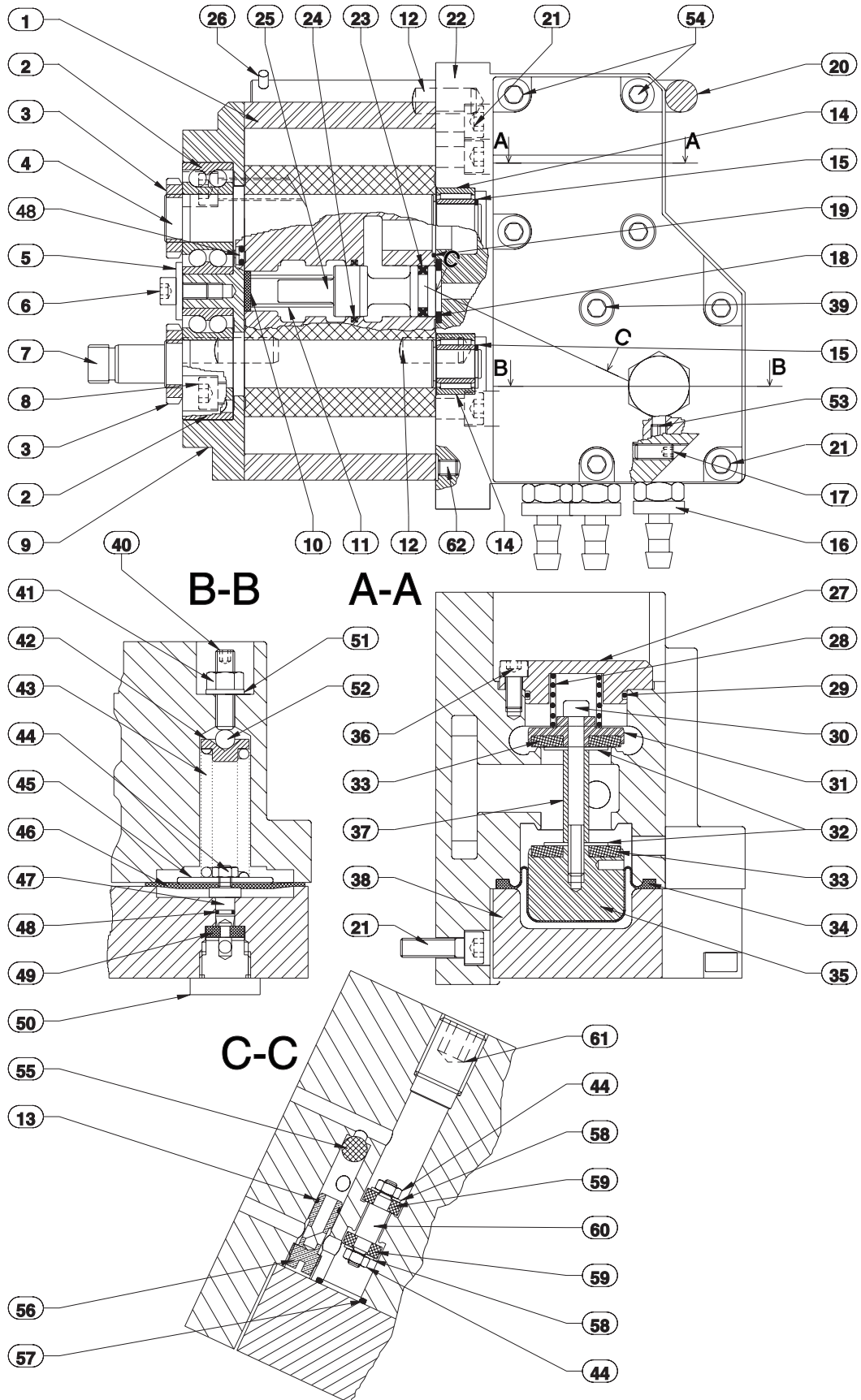
(Dwg. MHP1466)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Motor Housing	1	96090007	14	Needle Bearing	2	56461912
2	Bearing	2	50600002	15	Retainer Ring	2	47801339
3	Locknut	2	57000002	• 18	'O' Ring	2	58211829
4	Idle Gear	1	96090030	20	Handle	1	94240055
5	Washer	1	96090032	21	Capscrew	4	41322206
6	Capscrew	1	41306706	22	Motor Cover	1	94240322
7	Drive Gear	1	94240319	26	Pin	2	46402918
8	Capscrew	4	41300806	• 48	'O' Ring	2	58222329
9	Motor Flange	1	96090008	63	Plug	2	96180037
12	Pin	6	46000416				

• Recommended Spare

REVERSIBLE 2 HP-SU MOTOR ASSEMBLY PARTS DRAWING

Reversible 2 horsepower Motor with Emergency Stop and Overload for LCA015S and LCA030D Hoists



(Dwg. MHP1467)

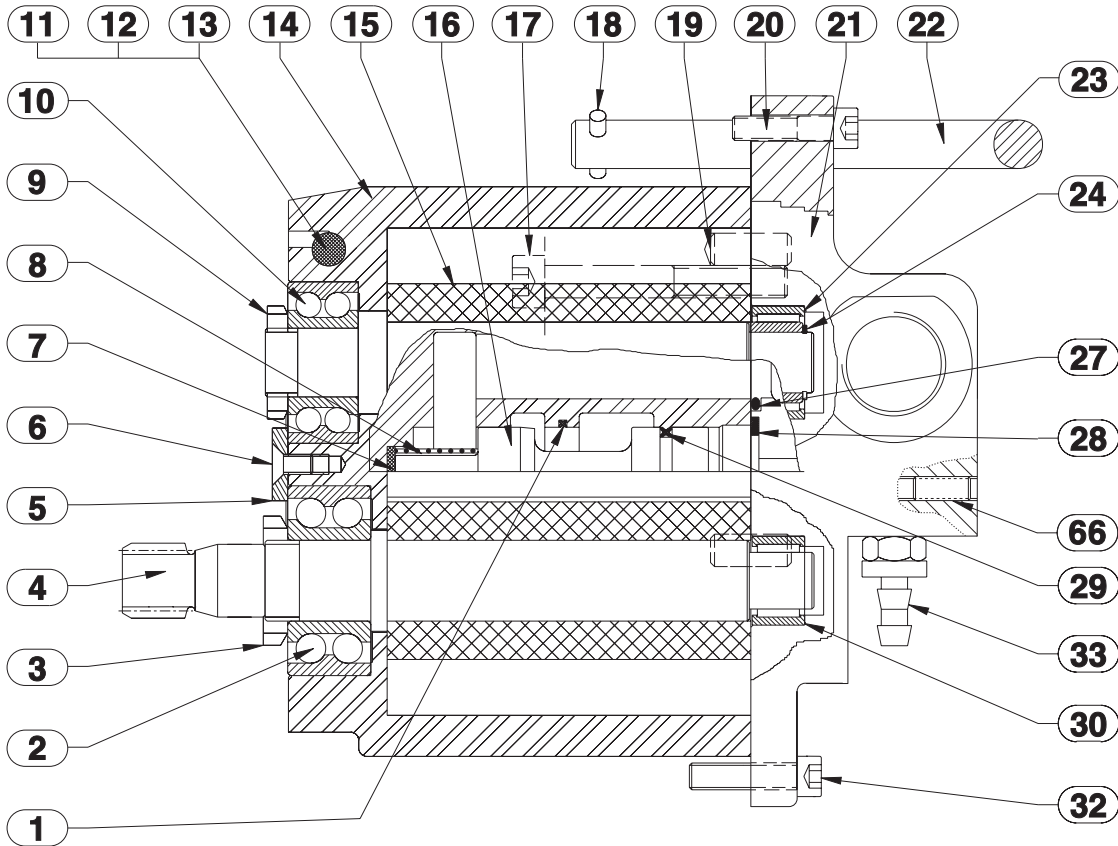
REVERSIBLE 2 HP-SU MOTOR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Motor Housing	1	96090277	32	Washer	2	45700005
2	Bearing	2	50600002	33	Seal Washer	2	96170056
3	Locknut	2	57000002	• 34	Diaphragm	1	67716341
4	Idle Gear	1	96090030	35	Valve Cone	1	96170054
5	Washer	1	96090032	36	Capscrew	3	41326306
6	Capscrew	1	41306706	37	Spacer	1	96170055
7	Drive Gear	1	94240319	38	Cover	1	94240312
8	Capscrew	4	41300806	39	Capscrew	2	41322306
9	Motor Flange	1	96090008	40	Screw	1	42007107
10	Rear Stop	2	94120030	41	Locknut	1	43707611
11	Spring	2	94240224	42	Spring Receiver	1	96360023
12	Pin	6	46000416	43	Spring	1	69159432
• 13	'O' Ring	3	58212229	44	Nut	3	43001111
14	Needle Bearing	2	56461912	45	Washer	1	96360019
15	Retainer Ring	2	47801339	• 46	Diaphragm	1	96360020
16	Fitting	5	61652632	47	Valve Cone	1	96360017
17	Screw	1	42007307	• 48	'O' Ring	3	58222329
18	Stop	2	96090042	49	Seal Washer	1	96360021
• 19	'O' Ring	2	58205029	50	Plug	1	96090269
20	Handle	1	94240317	51	Seal Ring	1	58404531
21	Capscrew	8	41322206	52	Ball	1	69400125
22	Motor Cover	1	94240311	53	Nozzle	1	96170071
• 23	Quad Ring	2	58228929	54	Capscrew	2	41324306
• 24	Quad Ring	2	58231229	55	Ball	1	69401625
25	Slide Valve	2	94240212	56	Shuttle Stop	1	96090223
26	Pin	2	46402918	• 57	'O' Ring	1	58225029
27	Cover	1	96170081	58	Washer	2	45000104
28	Spring	1	69158732	59	Seal Washer	2	94120414
• 29	'O' Ring	1	58214829	60	Valve Cone	1	94120413
30	Capscrew	1	41308206	61	Plug	1	42003107
31	Valve Cone	1	96170053	62	Plug	2	42007407

• Recommended Spare

STANDARD 4HP MOTOR ASSEMBLY DRAWING AND PARTS LIST

4 HP Motor (without Overload or Emergency Stop) for use with Hoist Models LCA030S, LCA06D, LCA060S and LCA120D



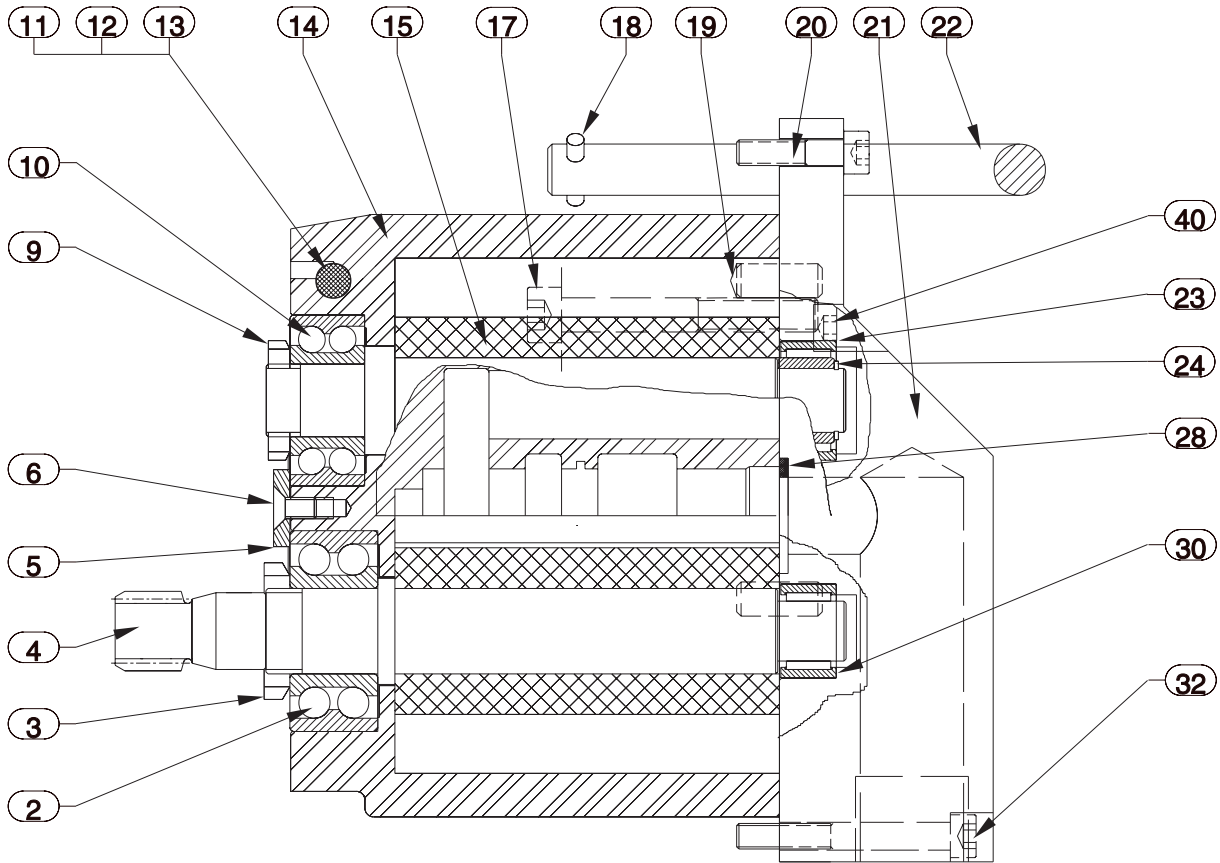
(Dwg. MHP1457)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
• 1	Quad Ring	2	58232429	17	Capscrew	4	41302206
2	Bearing	1	50600004	18	Pin	2	46503420
3	Locknut	1	57000004	19	Pin	4	46000416
4	Drive Gear	1	96200093	20	Capscrew	1	41322306
5	Washer	1	96310054	21	Motor Cover	1	94120379
6	Screw	1	41103403	22	Handle	1	94120080
7	Rear Stop	2	94120030	23	Bearing	1	56462813
8	Spring	2	94120029	24	Retainer Ring	1	47836732
9	Locknut	1	57000003	• 27	'O' Ring	2	58226029
10	Bearing	1	50600003	28	Rear Stop	2	96200069
11	Shuttle Stop	1	96090223	• 29	Quad Ring	2	58229029
• 12	'O' Ring	1	58212229	30	Bearing	1	56492213
13	Ball	1	69401625	32	Capscrew	4	41322206
14	Motor Housing	1	96200008	33	Fitting	5	61652632
15	Idle Gear	1	96200026	66	Screw	1	42007307
16	Slide Valve	2	96200006				

• Recommended Spare

REVERSIBLE 4HP - MD MOTOR ASSEMBLY DRAWING AND PARTS LIST

Reversible 4 HP Motor - MD (without Overload or Emergency Stop) for use with Hoist Models LCA030S, LCA060D, LCA060S and LCA120D



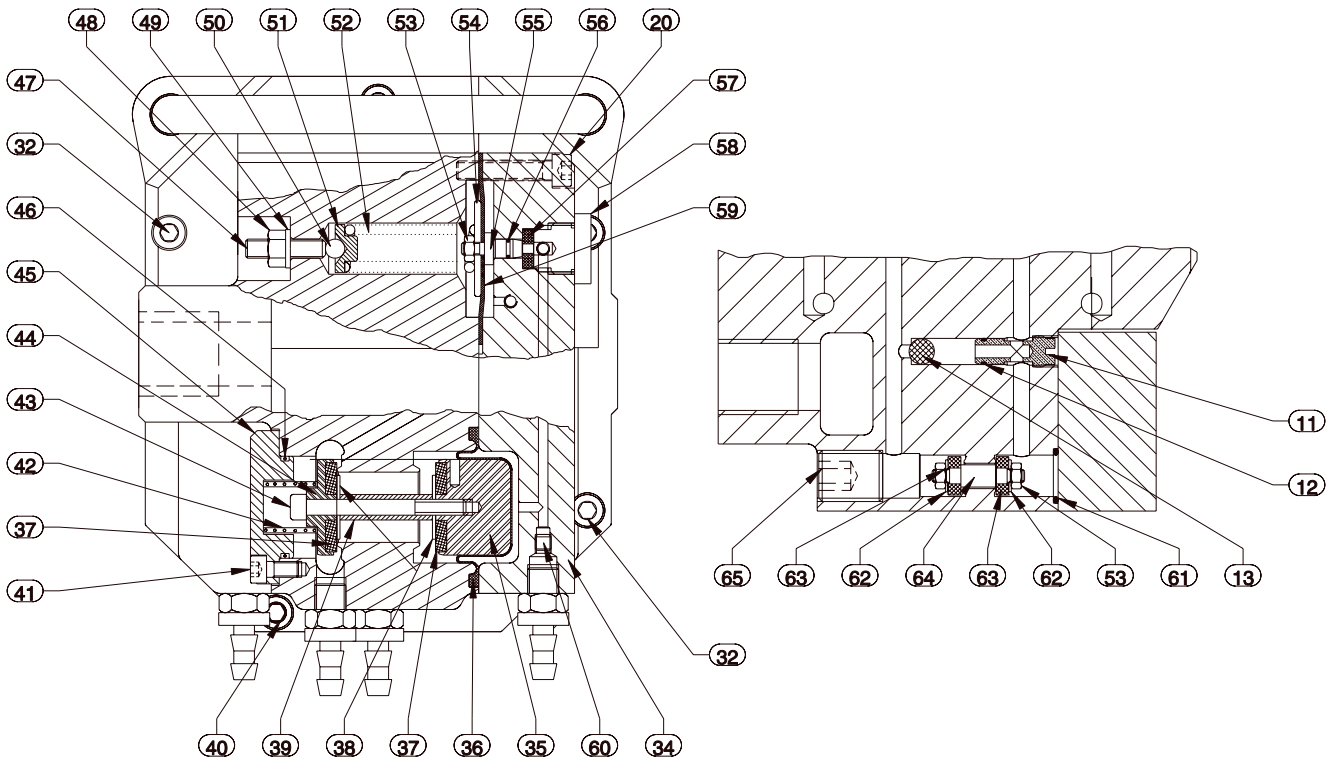
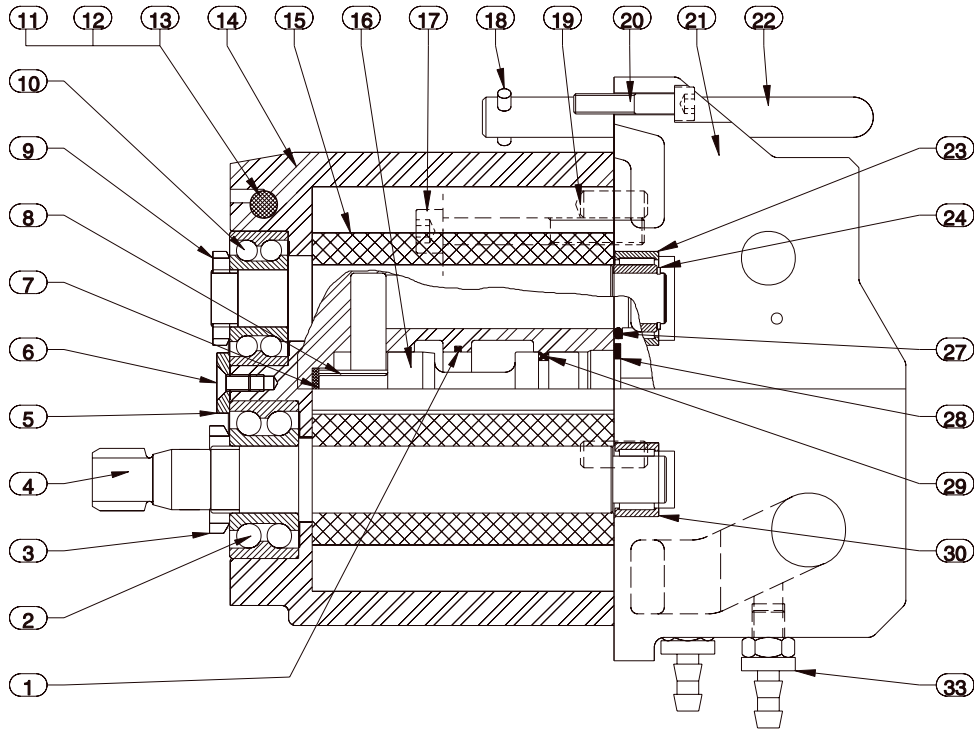
(Dwg. MHP1456)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
2	Bearing	1	50600004	17	Capscrew	4	41302206
3	Locknut	1	57000004	18	Pin	2	46503420
4	Drive Gear	1	96200093	19	Pin	4	46000416
5	Washer	1	96310054	20	Capscrew	1	41312206
6	Screw	1	41103403	21	Motor Cover	1	94120389
9	Locknut	1	57000003	22	Handle	1	94120080
10	Bearing	1	50600003	23	Bearing	1	56462813
11	Shuttle Stop	1	96090223	24	Retainer Ring	1	47836732
• 12	'O' Ring	1	58212229	28	Rear Stop	2	96200069
13	Ball	1	69401625	30	Bearing	1	56492213
14	Motor Housing	1	96200008	32	Capscrew	2	41322406
15	Idle Gear	1	96200026	40	Capscrew	1	41322206

• Recommended Spare

REVERSIBLE 4 HP - SU MOTOR ASSEMBLY PARTS DRAWING

Reversible 4 HP Model - SU (with Overload and Emergency Stop) for use with Hoist Models LCA030S, LCA060S, LCA060D and LCA120D



(Dwg. MHP1455)

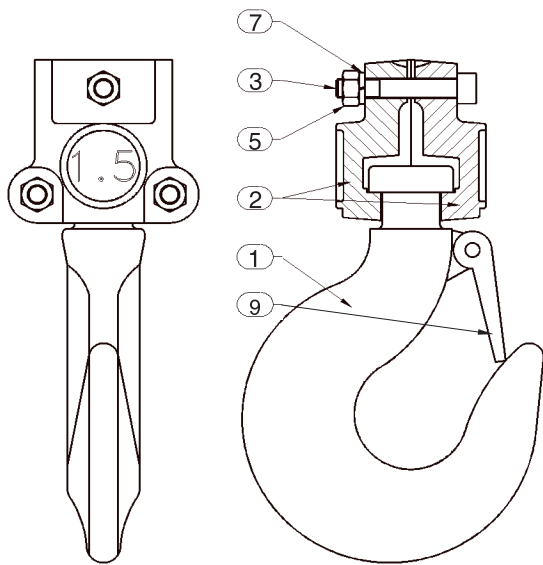
REVERSIBLE 4 HP - SU MOTOR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
• 1	Quad Ring	2	58232429	35	Valve Cone	1	96170054
2	Bearing	1	50600004	• 36	Diaphragm	1	67716341
3	Locknut	1	57000004	• 37	Seal Washer	2	96170056
4	Drive Gear	1	96200093	38	Washer	2	45700005
5	Washer	1	96310054	39	Spacer	1	96170055
6	Screw	1	41103403	40	Capscrew	1	41322606
7	Rear Stop	2	94120030	41	Capscrew	3	41326306
8	Spring	2	94120029	42	Spring	1	69158732
9	Locknut	1	57000003	43	Capscrew	1	41308206
10	Bearing	1	50600003	44	Valve Cone	1	96170053
11	Shuttle Stop	1	96090223	45	Cover	1	96170081
• 12	'O' Ring	1	58212229	• 46	'O' Ring	1	58214829
13	Ball	1	69401625	47	Screw	1	42007107
14	Motor Housing	1	96200008	48	Locknut	1	43707611
15	Idle Gear	1	96200026	49	Seal Washer	1	58404531
16	Slide Valve	2	96200006	50	Ball	1	69400125
17	Capscrew	4	41302206	51	Spring Receiver	1	96360023
18	Pin	2	46503420	52	Spring	1	69159432
19	Pin	4	46000416	53	Nut	3	43001111
20	Capscrew	9	41322306	54	Washer	1	96360019
21	Motor Cover	1	94120415	55	Valve Cone	1	96360017
22	Handle	1	94120080	• 56	'O' Ring	1	58222329
23	Bearing	1	56462813	• 57	Seal	1	96360021
24	Retainer Ring	1	47836732	58	Plug	1	96090269
• 27	'O' Ring	2	58226029	• 59	Diaphragm	1	96360020
28	Rear Stop	2	96200069	60	Nozzle	1	96170071
• 29	Quad Ring	2	58229029	• 61	'O' Ring	1	58225029
30	Bearing	1	56492213	62	Washer	2	45000104
32	Capscrew	3	41322206	• 63	Seal	2	94120414
33	Fitting	5	61652632	64	Valve Cone	1	94120413
34	Cover	1	94120351	65	Plug	1	42003107

• Recommended Spare

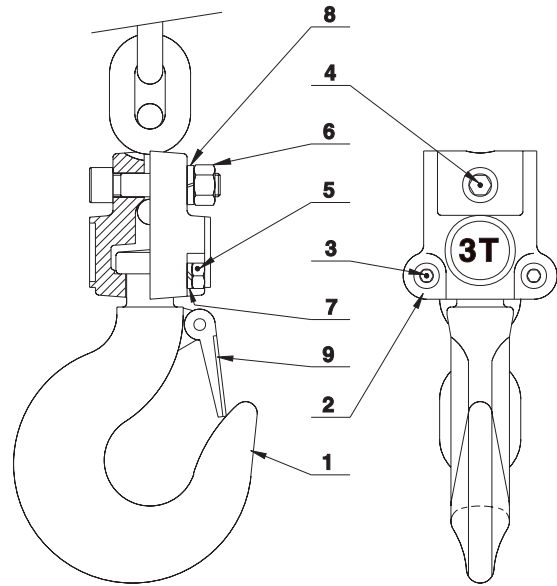
SINGLE AND DOUBLE FALL BOTTOM HOOK ASSEMBLY PARTS DRAWINGS

Single Fall 1.5 ton Hoist



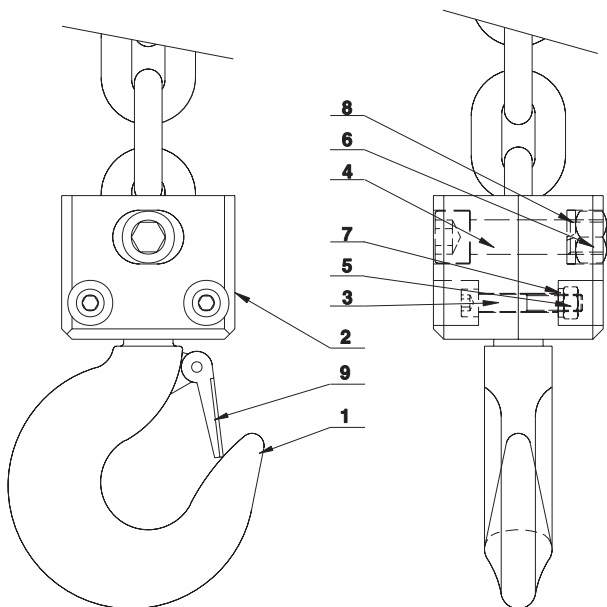
(Dwg. MHP1468)

Single Fall 3 ton Hoist



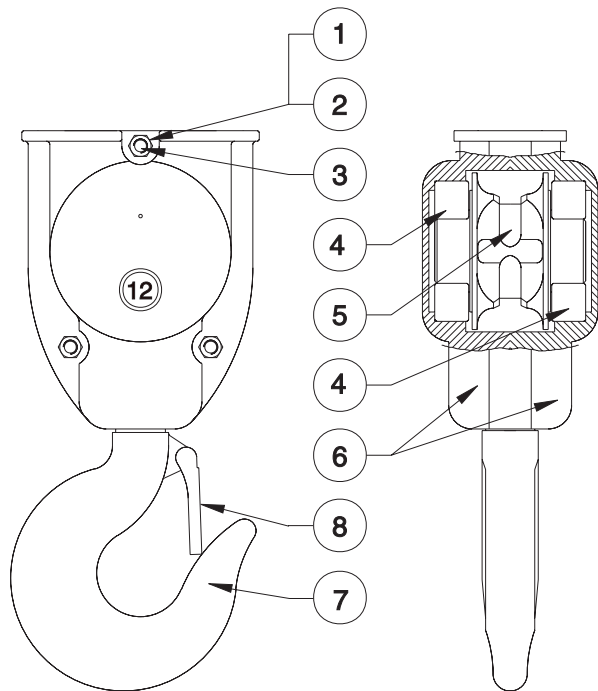
(Dwg. MHP1426)

Single Fall 6 ton Hoist



(Dwg. MHP1427)

Double Fall 3, 6 and 12 ton Hoists



(Dwg. MHP1454)

SINGLE AND DOUBLE FALL BOTTOM HOOK ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER		
			1.5 ton	3 ton	6 ton

Single Fall Hoists (1.5 - 6 ton)

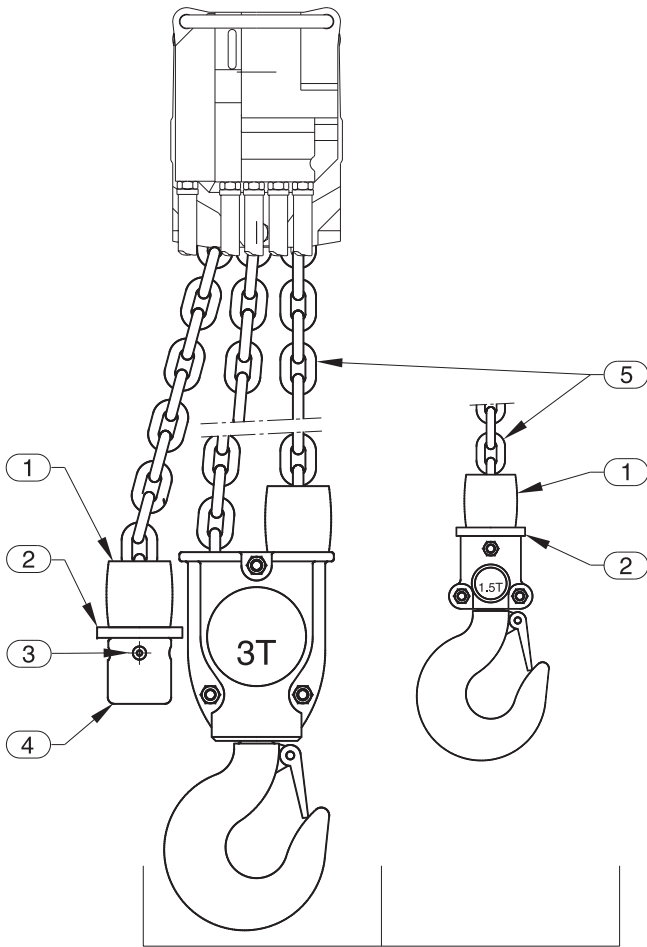
1	Hook	1	94128125	94128125	94128124
2	Hook Block	2	94120126	94120132	95260031
3	Capscrew	2(3)	41301806		41303006
4	Capscrew	1	---	41305606	95260037
5	Nut	2(3)	43000111		43000211
6	Nut	1	---	43000311	43000811
7	Lockwasher	2(3)	45200008		45200010
8	Lockwasher	1	---	45200012	45200020
9	Hook Latch Kit	1	Contact Factory		

() Quantity Required for 1.5 ton only

Double Fall Hoists (3 - 12 ton)

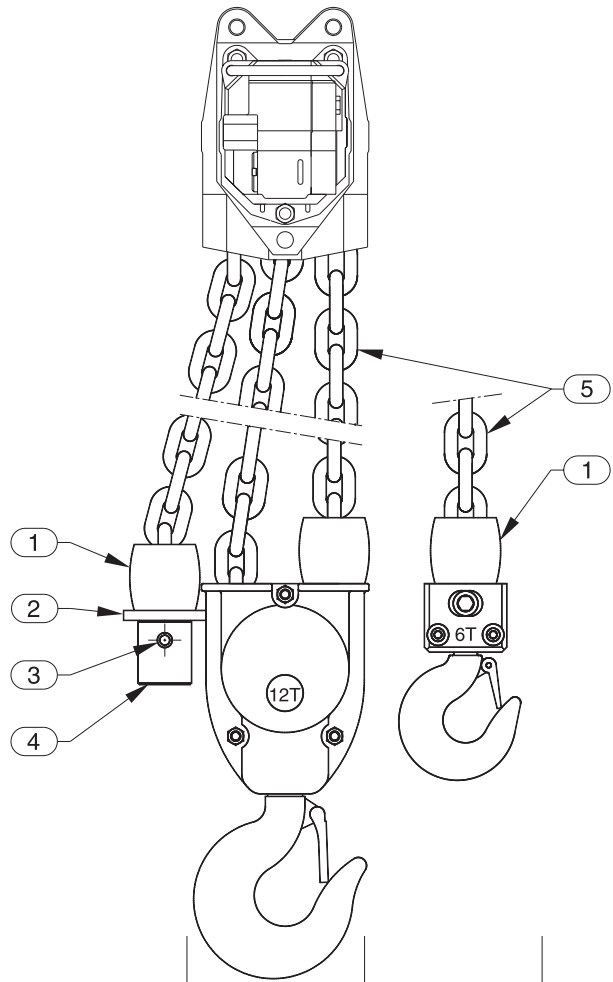
			3 ton	6 ton	12 ton
1	Nut	3	43000111	43000311	
2	Lockwasher	3	45200008	45200012	
3	Capscrew	3	41304506	41015701	41305606
4	Bearing	2	50250005	50250006	50250011
5	Sprocket Wheel	1	94240056	94120113	95268006
6	Hook Block	2	94240010	94120051	95260030
7	Hook	1	94128125	94128124	95260019
8	Hook Latch Kit	1	Contact Factory		

BOTTOM HOOK ACCESSORIES DRAWINGS AND PARTS LIST



LCA030D
3 ton Bottom Hook
Assembly

LCA015S
1.5 ton Bottom Hook
Assembly



LCA120D
12 ton Bottom Hook
Assembly

LCA060S
6 ton Bottom Hook
Assembly

(Dwg. MHP1431)

(Dwg. MHP1432)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER					
			LCA015S	LCA030D	LCA030S	LCA060D	LCA060S	LCA120D
			1.5 ton	3 ton	3 ton	6 ton	6 ton	12 ton

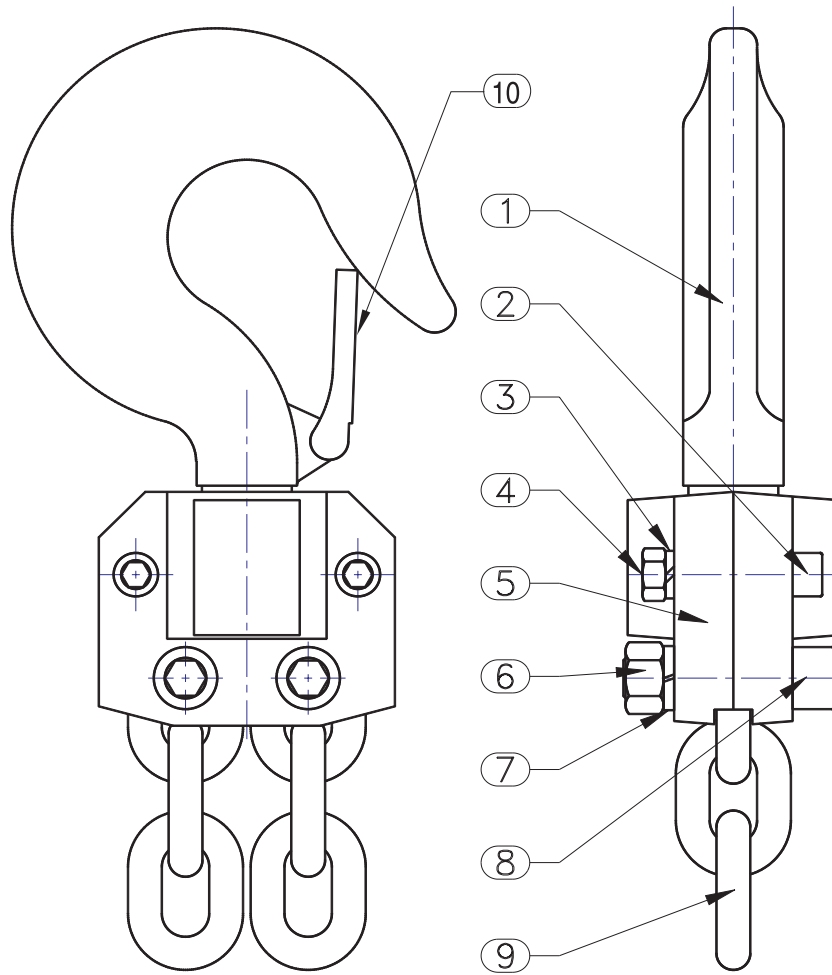
Double Fall Hoists

1	Buffer	2	---	94240070	---	94120141	---	95260039
2	Washer	1	---	94240177	---	94120118	---	95260060
3	Pin	1	---	46502820	---	46502920	---	46504020
4	Limit Stop	1	---	94240105	---	94120150	---	95260038
5	Load Chain (Bulk)	Specify Length	---	LC824-G8ZP	---	LC1336-G8ZP	---	LC1645-G8ZP

Single Fall Hoists

1	Buffer	1	94240070	---	94120141	---	94120141	---
2	Washer	1	94240177	---	94120118	---	---	---
5	Load Chain (Bulk)	Specify Length	LC824-G8ZP	---	LC1336-G8ZP	---	LC1645-G8ZP	---

TOP HOOK ASSEMBLY DRAWING AND PARTS LIST

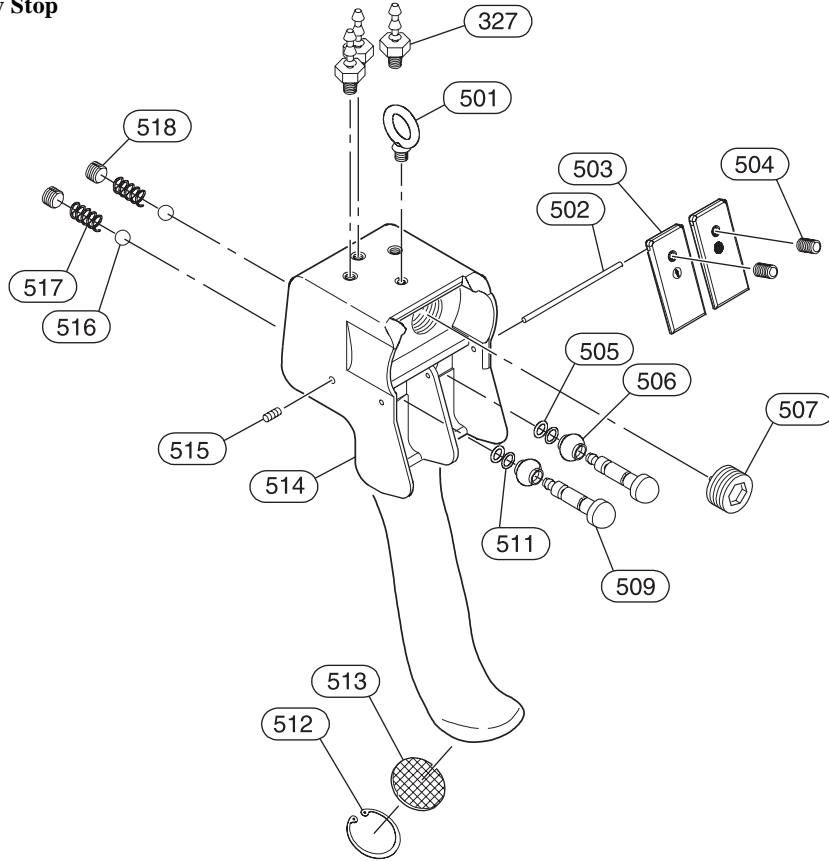


(Dwg. MHP1453)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER		
			1.5 and 3 ton	6 ton	12 ton
1	Hook	1	94248125	94128124	95260019
2	Capscrew	2	41301806	41310306	41330106
3	Lockwasher	2	45200008	45200012	45200014
4	Nut	2	43000111	43000311	43000911
5	Half Hook Catch	2	94240081	94120127	95260043
6	Nut	2	43000111	43000311	43000811
7	Lockwasher	2	45200008	45200012	45200020
8	Capscrew	2	41301806	41310306	95260037
9	Chain	2	94240221	94120278	95260077
10	Hook Latch Kit	1	Contact Factory		

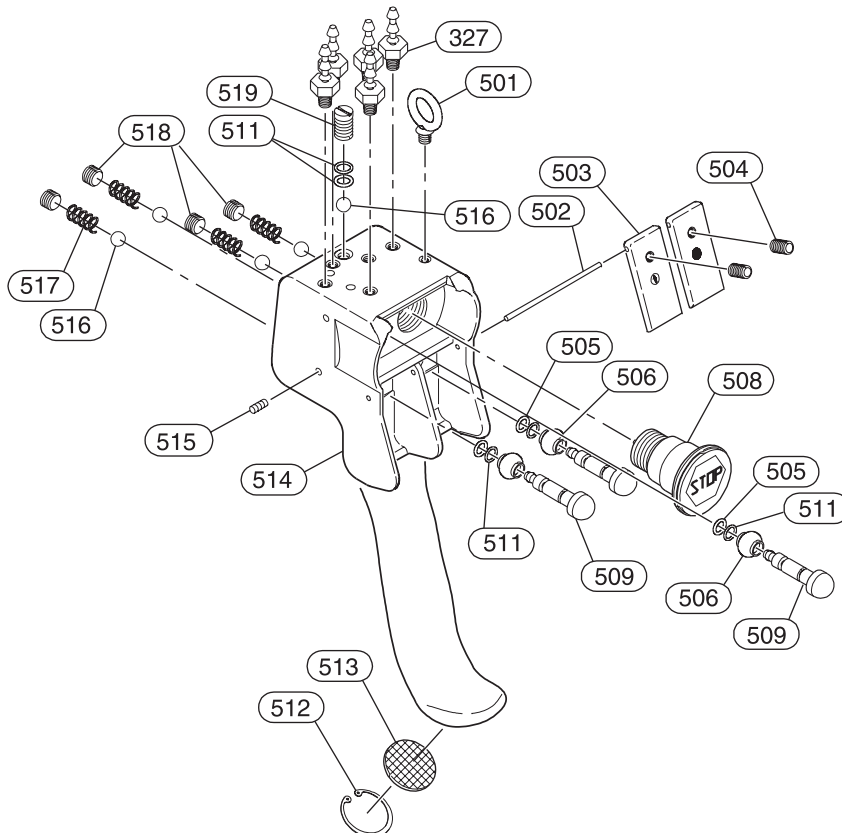
PENDANT ASSEMBLY PARTS DRAWINGS

Pendant without Emergency Stop



(Dwg. MHP1558)

Pendant with Emergency Stop



(Dwg. MHP1544)

PENDANT ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.	
			Without E-Stop	With E-Stop
500	Pendant Assembly	1	PHS2E	PHS2E-U
327	Fitting	3(5)	61652632	
501	Lifting Eye	1	64222332	
502	Pin	1	95790040	
503	Lever	2	95790122	
504	Screw	2	42006207	
• 505	'O' Ring	2(3)	58235329	
506	Protector	2(3)	95790107	
507	Plug	1	65129541	---
508	Emergency Stop Valve	1	---	95790108
509	Valve	2(3)	95790104	
• 511	'O' Ring	2(5)	58209229	
512	Retainer Ring	1	47713030	
513	Exhaust Washer	1	67600303	
514	Pendant Handle	1	95790129	995790116
515	Screw	2(3)	42008307	
• 516	Ball	2(5)	69401625	
517	Spring	2(4)	69128541	
518	Plug	2(4)	65107741	
519	Plug	1	---	95790108
521	Label Kit*	1	---	95790111
	Label: "Read the Manual"*	1	96180098	
	Label: "Do Not Use for Lifting Personnel"*	1	96180100	

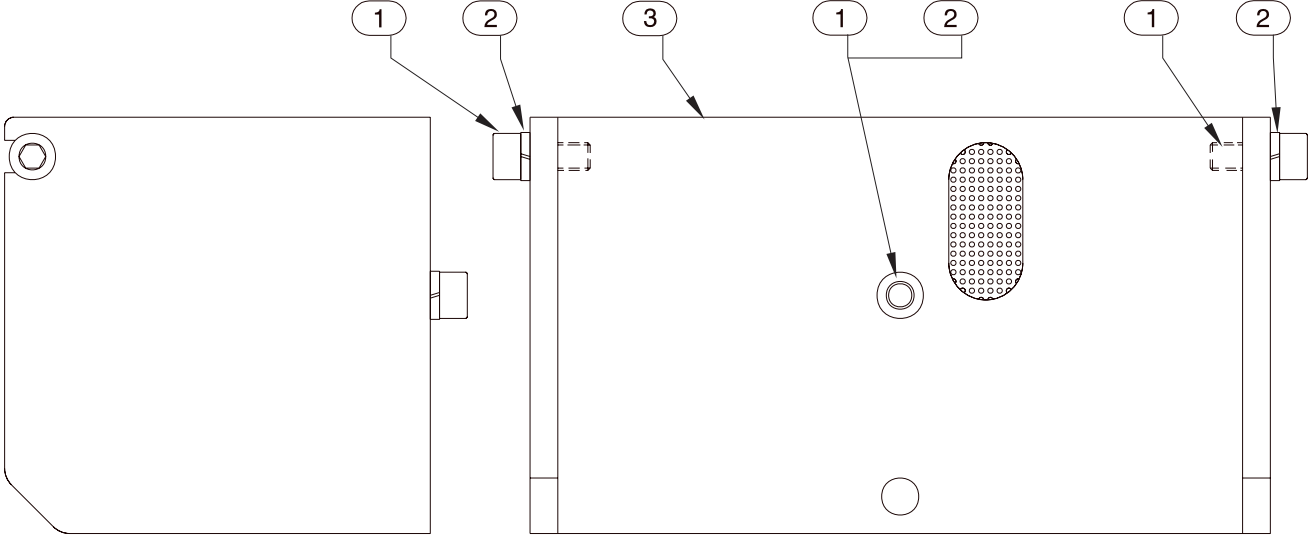
() Quantity Required for Pendants with Emergency Stop

* Not Illustrated

• Recommended Spare

CASE KIT ASSEMBLY AND PARTS LIST

For Hoist Models LCA030S and larger, equipped with Motor that includes E-Stop and Overload (SU)



(Dwg. MHP1452)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Screw	3	41322606
2	Lockwasher	3	45201006
3	Case	1	94120425

ACCESSORIES

DESCRIPTION	PART NUMBER
Lubricant	LUBRI-LINK-GREEN®
Touch-up Paint (yellow)	FAP-237Y

SERVICE NOTES

PARTS ORDERING INFORMATION

Liftchain hoists are designed and constructed to provide long, trouble-free service. In time it may become necessary to order and install new parts to replace those that have been subjected to wear.

The use of replacement parts other than **Ingersoll-Rand** Material Handling may result in decreased hoist performance, and may, at the company's option invalidate the warranty. For prompt service and genuine **Ingersoll-Rand** Material Handling parts, provide your nearest Distributor with the following:

1. Complete hoist model number as it appears on the nameplate.
2. Part number and part description as shown in this manual.
3. Quantity required.

The nameplate is located on the brake cover.

Return Goods Policy

If it becomes necessary to return the complete hoist or certain parts to the factory, contact the Distributor from whom you purchased the trolley, or the nearest **Ingersoll-Rand** Distributor in your locality. **Ingersoll-Rand** will not accept any returned goods for warranty or service work unless prior arrangements have been made and written authorization has been provided from the location where the goods were purchased.

NOTICE

• **Continuing improvement and advancement of design may produce changes to this hoist which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.**

Disposal

When the life of the hoist has expired, it is recommended that the hoist be disassembled, degreased and parts separated as to materials so that they may be recycled.

NOTICE

• **Mineral-based oils can be recycled, however, some oils such as glycols may be extremely toxic and must be identified and disposed of in accordance with local, state and national regulations.**

For additional information contact:

Ingersoll-Rand Material Handling

P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046
Phone: (206) 624-0466
Fax: (206) 624-6265

or

Ingersoll-Rand Material Handling Douai Operations

111, avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 3-27-93-08-08
Fax: (33) 3-27-93-08-00

LIMITED WARRANTY

Ingersoll-Rand Company (I-R) warrants to the original user its Hoists and Winches (Products) to be free of defects in material and workmanship for a period of one year from the date of purchase. **I-R** will repair, without cost, any Product found to be defective, including parts and labor charges, or at its option, will replace such Products or refund the purchase price less a reasonable allowance for depreciation, in exchange for the Product. Repairs or replacements are warranted for the remainder of the original warranty period.

If any Product proves defective within its original one year warranty period, it should be returned to any Authorized Hoist and Winch Service Distributor, transportation prepaid with proof of purchase or warranty card.

This warranty does not apply to Products which **I-R** has determined to have been misused or abused, improperly maintained by the user, or where the malfunction or defect can be attributed to the use of non-genuine **I-R** parts.

I-R makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above. I-R's maximum liability is limited to the purchase price of the Product and in no event shall I-R be liable for any consequential, indirect, incidental, or special damages of any nature rising from the sale or use of the Product, whether based on contract, tort, or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

IMPORTANT NOTICE

It is our policy to promote safe delivery of all orders.

This shipment has been thoroughly checked, packed and inspected before leaving our plant and receipt for it in good condition has been received from the carrier. Any loss or damage which occurs to this shipment while en route is not due to any action or conduct of the manufacturer.

VISIBLE LOSS OR DAMAGE

If any of the goods called for on the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

CONCEALED LOSS OR DAMAGE

When a shipment has been delivered to you in apparent good condition, but upon opening the crate or container, loss or damage has taken place while in transit, notify the carrier's agent immediately.

DAMAGE CLAIMS

You must file claims for damage with the carrier. It is the transportation company's responsibility to reimburse you for repair or replacement of goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the **Ingersoll-Rand** invoice, nor should payment of **Ingersoll-Rand** invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery.

You may return products damaged in shipment to us for repair, which services will be for your account and form your basis for claim against the carrier.

United States Office Locations

For Order Entry and Order Status

**Ingersoll-Rand
Distribution Center**
P.O. Box 618
510 Hester Drive
White House, TN 37188
Phone: (615) 672-0321
Fax: (615) 672-0801

For Technical Support

Ingersoll-Rand
P.O. Box 24046
2724 Sixth Ave South
Seattle, WA 98124-0046
Phone: (206) 624-0466
Fax: (206) 624-6265

Web Site:
www.ingersoll-rand.com

Regional Sales Offices

Chicago, IL
888 Industrial Drive
Elmhurst, IL 60126
Phone: (630) 530-3800
Fax: (630) 530-3891

Detroit, MI
23192 Commerce Drive
Farmington Hills, MI 48335
Phone: (248) 476-6677
Fax: (248) 476-6670

Houston, TX
450 Gears Road
Suite 210
Houston, TX 77067-4516
Phone: (281) 872-6800
Fax: (281) 872-6807

Los Angeles, CA
11909 E. Telegraph Road
Santa Fe Springs,
CA 90670-0525
Phone: (562) 948-4189
Fax: (562) 948-1828

Philadelphia, PA
P.O. Box 425
900 E. 8th Ave., Suite 103
King of Prussia, PA 19406
Phone: (610) 337-5930
Fax: (610) 337-5912

International Office Locations

Offices and distributors in principal cities throughout the world. Contact the nearest **Ingersoll-Rand** office for the name and address of the distributor in your country or write/fax to:

Ingersoll-Rand
P.O. Box 24046
2724 Sixth Ave South
Seattle, WA 98124-0046
USA
Phone: (206) 624-0466
Fax: (206) 624-6265

Canada
National Sales Office
Regional Warehouse
Toronto, Ontario
51 Worcester Road
Rexdale, Ontario
M9W 4K2
Phone: (416) 213-4500
Fax: (416) 213-4510
Order Desk
Fax: (416) 213-4506

Regional Sales Offices

Edmonton, Alberta
1430 Weber Center
5555 Calgary Trail N.W.
Edmonton, Alberta
T6H 5G8
Phone: (403) 438-5039
Fax: (403) 437-3145

Montreal, Quebec
3501 St. Charles Blvd.
Kirkland, Quebec
H9H 4S3
Phone: (514) 695-9040
Fax: (514) 695-0963

British Columbia
1200 Cliveden Avenue
Delta, BC.
V3M 6G4
Phone: (604) 523-0803
Fax: (604) 523-0801

Latin America Operations
Ingersoll-Rand
Production Equipment Group
730 N.W. 107 Avenue, Suite
300 Miami, FL 33172-3107
USA
Phone: (305) 559-0500
Fax: (305) 222-0864

Europe, Middle East and Africa
Ingersoll-Rand Company
111, avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 3-27-93-08-08
Fax: (33) 3-27-93-08-00

Asia Pacific Operations
Ingersoll-Rand (Japan) Ltd.
Shin-Yokohama Square Bldg.
(5th Floor)
2-3-12 Shin-Yokohama,
Kouhoku-Ku,
Yokohama-shi, Kanagawa
Pref. 222 Japan
Phone: 81-45-476-7800
Fax: 81-45-476-7806

Russia
Ingersoll-Rand Company
Kuznetsky Most, 21/5
Moscow, 103895
Russia.
Phone: 7-501-921-53-21
7-501-923-91-34
Fax: 7-501-924-46-25