

PARTS, OPERATION AND MAINTENANCE MANUAL

for

PALAIR PREMIUM "FOOD GRADE" AIR CHAIN HOIST MODELS

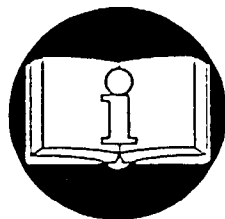
PAL250K and KV
(0.25 metric ton)

PAL500K and KV
(0.5 metric ton)

PAL1000K and KV
(1 metric ton)

PAL315K and KV
(0.315 metric ton)

PAL630K and KV
(0.63 metric ton)



(1 metric ton = 2200 lbs)

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, 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.

TABLE OF CONTENTS

DESCRIPTION	PAGE
Safety Information	
Danger, Warning, Caution and Notice	3
Safe Operating Instructions	4
Warning Tag	4
Description	
Model Code Explanation	5
Specifications	6
Installation	
Mounting	7
Air Supply	7
Motor	7
Initial Operating Checks	8
Hoist storage	8
Operation	
Description of operation	8
Inspection	
Records and Reports	9
Frequent Inspection	9
Periodic Inspection	10
Hoists not in Regular Use	10
Lubrication	
Load Chain	11
Motor	11
Gear Case	11
Hook and Hook Latch	11
Troubleshooting	
Troubleshooting Chart	12
Maintenance	
Maintenance Intervals	13
Brake Disc Replacement	13
Chain Replacement	13
General Disassembly	14
Cleaning, Inspection and Repair	15
Hoist Assembly	16- 17
Parts Information	
Hoist Assembly Drawings and Parts Information	18 to 25
Return Goods Policy	26
Warranty	27

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 *minor* 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 hoist and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.

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 cranes 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 line of force 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, connected with the final installation. It is the owner's responsibility 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. See ASME B30.9 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

NOTICE

- Using other than genuine INGERSOLL-RAND Material Handling parts may void the warranty.

SAFE OPERATING INSTRUCTIONS

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

These recommendations apply to hoists used for material handling of freely suspended unguided loads.

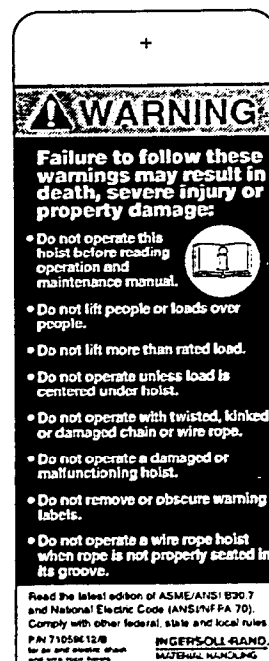
INGERSOLL-RAND recognizes that most companies who use hoists have a safety program in force in their plants. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

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 to operate the hoist.
2. Only operate a hoist if you are physically fit to do so.
3. Only allow personnel trained in safety, maintenance and troubleshooting to perform service on hoists.
4. When a "DO NOT OPERATE" sign is placed on the hoist controls, do not operate the hoist until the sign has been removed by designated personnel.
5. Never use a hoist which inspection indicates is damaged.
6. Do not use hoist if hook latch on a hook has been sprung or broken.
7. Check that the hook latches are engaged before using.
8. Never splice a hoist chain by inserting a bolt between links.
9. Only lift loads less than or equal to the rated capacity of the hoist. See warning labels attached to the hoist.
10. When using two hoists to suspend one load, select two hoists each having a rated capacity equal to or more than the load. This provides adequate safety in the event of a sudden load shift.
11. Never place your hand inside the throat area of a hook.
12. Never use the hoist chain as a sling.
13. Only operate a hoist when the load chain is centered over the hook. Do not "side pull" or "yard".
14. Never operate a hoist with twisted, kinked, "capsized" or damaged load chain.
15. Do not force a chain or hook into place by hammering.
16. Never insert the point of the hook into a chain link.
17. Be certain the load is properly seated in the saddle of the hook.
18. Do not support the load on the tip of the hook.
19. Never run the load chain over a sharp edge. Use a sheave.
20. Pay attention to the load at all times when operating the hoist.
21. Make sure all people are clear of the load path. Do not lift a load over people.
22. Never use the hoist for lifting or lowering people, and never allow anyone to stand on a suspended load.
23. Ease the slack out of the chain and sling when starting a lift. Do not jerk the load.
24. Do not swing a suspended load.
25. Do not leave a load suspended when the hoist is not in use.
26. Never leave a suspended load unattended.
27. Never weld or cut a load suspended by the hoist.
28. Never use the hoist chain as a welding electrode.
29. Do not operate hoist if chain jumping, excessive noise, jamming, overloading, or binding occurs.
30. Keep the load from hitting the load chain.
31. Do not use the up and down emergency stop limit protection as a normal means of stopping the hoist.
32. Avoid unnecessary jogging of hoist and/or trolley controls.
33. Always rig the hoist properly and carefully.
34. Shut off air supply before performing any maintenance.
35. Avoid collision or bumping of hoist.

WARNING TAG

Each hoist is supplied from the factory with the warning tag shown. If the tag is not attached to your unit, order a new tag and install it. See the parts list for the part number. Read and obey all warnings and other safety information attached to this hoist. Tag may not be shown actual size.



SPECIFICATIONS

Model Code Explanation

Model Code Example: **PAL250K - 2C10 - 6F1**

Series	PAL	Type	Precision spotting
F1	Hoist Capacity	Standard speed	
	550 lb (250 kg)	250K	250KV
	1100 lb (500 kg)	500K	500KV
	2200 lb (1000 kg)	1000K	1000KV
F2	690 lb (315 kg)	315K	315KV
	1380 lb (630 kg)	630K	630KV
F3	690 lb (315 kg)	315KV
	1380 lb (630 kg)	630KV

Control

2 = One Motor Pendant (PHS2)

Suspension

A = Fixed Lug Mount
C = Swivel Top Hook

Length of Lift

10 = 10 ft. (3 m) (Standard)
XX = Specify Length in feet

Pendant Drop

6 = 6 ft. (2 m) (Standard)
XX = Specify Length in feet

Level of Corrosion Resistance

F1
F2 = * See chart below for description of corrosion resistance
F3

Description of Corrosion Resistance

Level of Corrosion Resistance	Corrosion Resistance Material					Max Hoist Capacity	
	Body	Pendant	Top Hook	bottom Hook Assy	Chain	Single fall kg (lb)	Double fall kg (lb)
F1	EN	EN	EN	EN	ND	500 (1100)	1000 (2200)
F2	EN	EN	EN	SS	ND	315 (690)	630 (1380)
F3	EN	EN	EN	SS	SS	315 (690)	630 (1380)

ND= Nickel Diffused, SS= Stainless Steel, EN= Electroless Nickel.

General

The Palair Plus "Food Grade" Hoist is a lube-free* air powered hoist designed to meet the requirements of the United States Department of Agriculture (USDA) for corrosion resistance materials, internal lubrication and chain lubrication.

* Lube-free means that no lubrication to the supply air is required, and therefore no oil mist is exhausted to the atmosphere.

The Palair Plus hoist hook mounts to the suspension shaft of a trolley or a permanent mounting structure. The air supply line can be strung to the hoist using either cable hangers or cable trolleys.

Performance

Model No.	PAL250K	PAL315K	PAL500K	PAL630K	PAL1000K	
Load capacity: lbs (kg)	550 (250)	690 (315)	1100 (500)	1380 (630)	2200 (1000)	
Falls of load chain	1	1	1	2	2	
Standard height of lift: ft (m)	10 (3)	10 (3)	10 (3)	10 (3)	10 (3)	
Standard length of pendant: ft (m)	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)	
Weight of hoist with chain and pendant: lbs (kg)	33 (15)	33 (15)	33 (15)	39.5 (18)	39.5 (18)	
Weight of chain - 1 ft of lift: lbs (kg)	.36 (.16)	.36 (.16)	.36 (.16)	.73 (.33)	.73 (.33)	
Performance with air pressure of 90 psig (6.3 bar)						
Working pressure: psig (bar)	80 - 100 (5.5 - 7)					
Max. speed* rated load	Hoisting: ft/min (m/min)	66 (20)	59 (18)	44 (13.5)	30 (9)	22 (6.75)
	Lowering: ft/min (m/min)	75 (23)	79 (24)	88 (27)	40 (12)	44 (13.5)
Max. speed* no load	Hoisting: ft/min (m/min)	98 (30)	98 (30)	98 (30)	49 (15)	49 (15)
	Lowering: ft/min (m/min)	52 (16)	52 (16)	52 (16)	26 (8)	26 (8)
Max. air consumption: scfm (m3/min)	78 (2.2)	78 (2.2)	78 (2.2)	78 (2.2)	78 (2.2)	
Air consumption for 1 ft of lift : cu.ft. (m3)	1.2 (0.03)	1.3 (0.04)	1.8 (0.05)	2.6 (0.07)	3.6 (0.10)	

* variable speed according to pressure applied on PHS pendant.

Performance

Model No.	PAL250KV	PAL315KV	PAL500KV	PAL630KV	PAL1000KV	
Load capacity: lbs (kg)	550 (250)	690 (315)	1100 (500)	1380 (630)	2200 (1000)	
Falls of load chain	1	1	1	2	2	
Standard height of lift: ft (m)	10 (3)	10 (3)	10 (3)	10 (3)	10 (3)	
Standard length of pendant: ft (m)	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)	
Weight of hoist with chain and pendant: lbs (kg)	33 (15)	33 (15)	33 (15)	39.5 (18)	39.5 (18)	
Weight of chain - 1 ft of lift: lbs (kg)	.36 (.16)	.36 (.16)	.36 (.16)	.73 (.33)	.73 (.33)	
Performance with air pressure of 90 psig (6.3 bar)						
Working pressure: psig (bar)	80 - 100 (5.5 - 7)					
Max. speed* rated load	Hoisting: ft/min (m/min)	33 (10)	30 (9)	26 (8)	15 (4.5)	13 (4)
	Lowering: ft/min (m/min)	43 (13)	44 (13.5)	45 (13.6)	22 (6.7)	22 (6.8)
Max. speed* no load	Hoisting: ft/min (m/min)	46 (14)	46 (14)	46 (14)	23 (7)	23 (7)
	Lowering: ft/min (m/min)	39 (12)	39 (12)	39 (12)	20 (6)	20 (6)
Max. air consumption: scfm (m3/min)	53 (1.5)	53 (1.5)	53 (1.5)	53 (1.5)	53 (1.5)	

* variable speed according to pressure applied on PHS pendant.

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

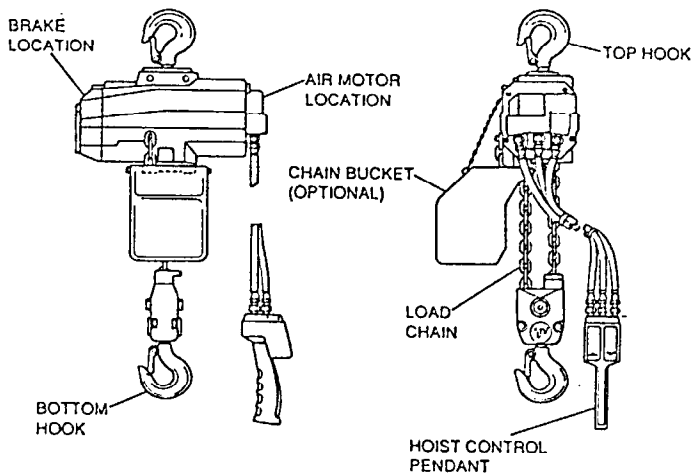
• Owners and users are advised to examine specific, local or other regulations, including American National Standards Institute and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting hoist to use.

⚠ WARNING

• A falling load can cause injury or death. Before installing, read "SAFETY INFORMATION".

Hook Mounted Hoist Installation

Place top hook over mounting structure. Make sure top hook latch is engaged as shown below.



(Dwg. D6090013)

Air Supply

The air supply must be clean and free from moisture.

Air Lines

The inside diameter of the hoist air supply lines must not be smaller than 1/2 in. (13 mm) and 7/16 in. (11 mm) for hose fittings. Before making final connections, all air supply lines should be purged before connecting to system inlct. 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 (optional)

The use of an air line lubricator is not required for the Palair Plus lube-free hoists. If lubricated supply air is used on the Palair Plus lube-free models it will cause no harm to the hoist.

⚠ CAUTION

• Shut off air supply before filling air line lubricator.

Air Line Filter

When a hoist is to be used in corrosive or moist atmospheres it is recommended that an air line strainer/filter be installed within 3 feet (1 meter) of the motor to prevent dirt from entering the motor. The strainer/filter should provide 20 micron filtration and include a moisture trap. Clean strainer/filter periodically to maintain 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 to eliminate moisture and 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 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.

Chain Container

⚠ CAUTION

• Do not pile chain carelessly in the chain container. Piling the chain carelessly into the container by hand may lead to kinking or twisting that will jam the hoist.

To attach the chain container: run lower block to lowest point, attach chain container to hoist and run hoist in up direction to feed the chain back into the container.

1. Check the chain container size to make sure the length of load chain is within the capacity of the chain container. Replace with a larger chain bucket, if required.
2. Attach stop buffer 2 to 6 in. (5 to 15 cm) from the end of the chain.
3. Attach the chain container to the hoist.

NOTICE

- When putting chain into the chain container by hand begin with the stop buffer end of the chain so that it piles naturally.

Attaching Free End of Load Chain

NOTICE

• Stop buffer must be correctly positioned on the chain to ensure contact with the stop button.

1. Install stop buffer (115) on the end of the load chain.
2. Attach stop buffer to the ninth link from the end of the load chain.
3. Attach the free end of the load chain to the hoist.

Hoist Pendant

Check all hose connections are tight and that hoses are not twisted or crimped.

WARNING

- Disconnect air supply before performing any maintenance.

Check strain relief wire (172) is firmly secured in the hoist motor cover (5) with screw (2). The opposite end of strain relief wire attaches to eyebolt (161) on pendant body.

CAUTION

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

Initial Operating Checks

1. After installation, make sure the load chain is not twisted or kinked. Fix before using. On Palair Series 1 metric ton hoists for a capsized bottom hook, pass the hook between the two chain falls until the chain is untwisted.
2. If a trolley is used, check that the hoist is centered below the trolley. Raise a load equal to the rated capacity of the hoist a few inches off the floor and operate the trolley along the entire length of the beam.
3. Run hoist slowly in both directions with no load.

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 hoist.
2. Only allow personnel trained in safety and operation of this product to operate the hoist.
3. Subject each hoist to a regular inspection and maintenance procedure.
4. Be aware of the hoist capacity and weight of load at all times.

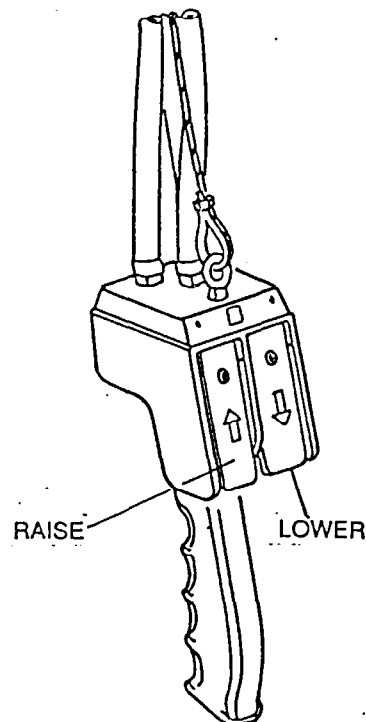
CAUTION

- Only allow personnel trained in safety and operation to operate a hoist.

Hoist Movement

(Refer to Dwg. D6090014)

Lifting and lowering a load is controlled by the pendant control levers. Careful movement of the pendant levers will allow infinitely variable up and down speeds.



(Dwg. D6090014)

INSPECTION

There are two types of inspection, the frequent inspection performed by the operator and periodic inspections performed by personnel trained in the operation and repair of this hoist.

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.

Any deficiency revealed through inspection must be reported to an appointed person. A determination must be made as to whether a deficiency constitutes a safety hazard before resuming operation of the hoist.

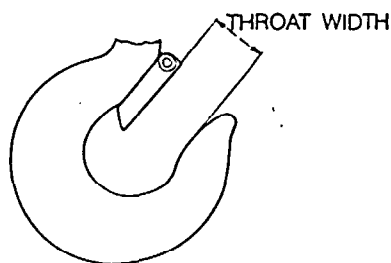
Records and Reports

Some form of inspection record should be maintained for each hoist, listing all points requiring periodic inspection. A written report should be made monthly on the condition of the critical parts of each hoist. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available to authorized personnel.

Frequent Inspection

On hoists in continuous service, frequent inspection should be made 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 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 problem persists, replace the chain. Do not operate the hoist until all problems have been corrected.
2. **UPPER AND LOWER LIMIT DEVICE.** Test operation with no load. Upward travel must stop when the bottom block or stop buffer on chain hits hoist stop button.
3. **HOOKS.** Check for wear or damage, increased throat width, bent shank or twisting of hook. Replace hooks with 15% increase in throat width (see Dwg. D6090005) or exceed a 10° twist (see Dwg. D6090006).

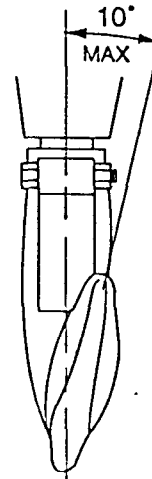


(Dwg. D6090005)

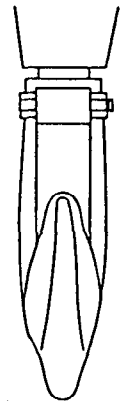
	Throat Width*		Discard Width	
	in.	mm	in.	mm
EN Models	1.06	27	1.22	31
SS Models	1.14	29	1.32	33.4

* Dimensions are based on the throat width opening with a hook latch in place

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/ANSI B30.10 "HOOKS" for additional information.

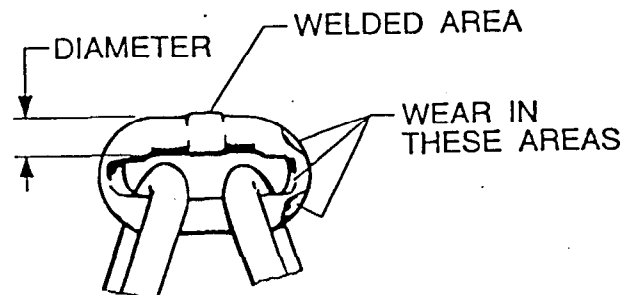


**TWISTED
DO NOT USE**
(Dwg. D6090006)



**NORMAL
CAN BE USED**

4. **HOOK LATCH.** Make sure the hook latch is present and operating. Replace if necessary.
5. **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. Replace a chain that fails any of the inspections. Check chain lubrication and lubricate if necessary. See "Load Chain" under "LUBRICATION".



(Dwg. D6090007)

NOTICE

• Excessive wear or stretching may not be apparent from visual observation. Also, inspect chain by measuring eleven links in accordance with instructions under "Periodic Inspection". A worn load chain may cause the load sheave to wear rapidly. Inspect the load sheave and replace if damaged or worn.

- 6. 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.

Periodic Inspection

According to ASME B30.16, frequency of periodic inspection depends on the severity of usage: NORMAL, yearly; HEAVY, semi-annually; SEVERE, 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:

- 1. FASTENERS. Check rivets, split pins, capscrews and nuts on hook, chain bucket and hoist body. Replace if missing or tighten if loose.
- 2. ALL COMPONENTS. Inspect for wear, damage, distortion, deformation 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.
- 3. HOOKS. Inspect hooks carefully for cracks using magnetic particle or other suitable non-destructive method. Inspect hook retaining parts. Tighten or repair, if necessary.
- 4. CHAIN SHEAVES. Check for damage or excessive wear. Replace if necessary.
- 5. MOTOR. If performance is poor, disassemble the motor and check for worn gearing, bearings and shafts. The parts should be cleaned, lubricated and reassembled. Replace worn or damaged parts.

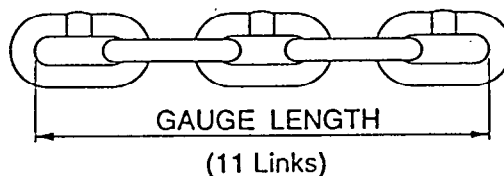
WARNING

• A falling load can cause injury or death. To keep the brake from slipping, do not get lubricant on the brake lining.

- 6. BRAKE. Raise a load equal to the rated capacity of the hoist a few inches off the floor and check ability of hoist to hold the load without drift. If drift occurs, disassemble. Check brake disc lining thickness per "Hoist Brake Lining Measurement" under "MAINTENANCE". Ensure brake disc is dry and free of oil or grease.

- 7. SUPPORTING STRUCTURE. Check for distortion, wear and continued ability to support load.
- 8. TROLLEY. (If equipped) check that the trolley wheels track the beam properly and clearance between wheels and beam is correct, 3/32 to 5/32 in. (2 to 4 mm). Check side plates for spreading due to bending.
- 9. LABELS AND TAGS. Check for presence and legibility. Replace if necessary.
- 10. LOAD CHAIN END ANCHORS. Ensure both ends of load chain are securely attached. Secure if loose, repair if damaged, replace if missing. Check stop buffers are correctly installed and functional.
- 11. LOAD CHAIN. Measure the chain for stretching by measuring across eleven link sections all along the chain paying particular attention to the most frequently reeved links. When any eleven links in the working length reaches or exceeds the discard length, replace the entire chain (see Dwg. D6090008). Always use genuine INGERSOLL-RAND Material Handling replacement load chain.

Size (mm)	Normal Length		Discard Length	
	in.	(mm)	in.	(mm)
5.0	6.50	165	6.57	167



(Dwg. D6090008)

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

Hoists Not in Regular Use

A hoist which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming with the requirements of "Frequent Inspection" before being placed into service.

A hoist which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection".

Standby hoists shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". If abnormal operating conditions apply hoists may require a more frequent inspection.

LUBRICATION

Lubrication Schedule

The time intervals listed below are for service in a normal environment. Units operating in a harsh environment (excessively hot or cold, marine, hazardous gases or abrasive dust) may require more frequent lubrication.

Usage:

Heavy	Continual daily usage.
Normal	Subject to daily use, but not continually.
Occasional	Average use of once a week or less.

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

Load Chain



WARNING

• Failure to maintain clean and well lubricated load chain will affect the life of the chain resulting in premature wear and can result in chain failure.

1. Clean chain to remove abrasive dust build-up. After cleaning, lubricate the chain using U.S.D.A. accepted Ingersoll-Rand food grade chain lubricant "Lubri-Link-Green"
2. Coat entire link surfaces, including bearing surfaces between links.
3. Lubricate each link of the chain and apply new lubricant over existing layer. Ensure that all links in the top and bottom chain sheaves are moved to allow lubrication of links in those areas.



CAUTION

• Amount of grease in gear case must not exceed 2 ounces (60 g).

Hook and Hook Latch

Lubricate the hook and hook latch pivot points. Hook should swivel freely. Hook latch should pivot freely. Use Ingersoll-Rand U.S.D.A. accepted food grade lubricant "Lubri-Link-Green"

Gear Case

The gear case is packed with grease on assembly. Whenever hoist is serviced remove old grease and replace with new. Use a good quality U.S.D.A. H-1 type Grease NLGI Grade 0.

TROUBLESHOOTING

This section provides the information necessary for troubleshooting this hoist. The troubleshooting guide provides a general outline of problems which could be experienced with normal use of this hoist. It lists the symptom, the possible cause, and the possible remedy for the trouble being experienced.

SYMPTOM	CAUSE	POSSIBLE REMEDY
Hoist will not operate.	<p>No air supply to hoist, or too little CFM or air pressure.</p> <p>Hoist is overloaded.</p> <p>Motor is damaged.</p> <p>Brake is not releasing.</p>	<p>Check air supply connections and air supply line. Check air supply hose size.</p> <p>Reduce load to within rated capacity.</p> <p>Repair or replace. See "MAINTENANCE" section.</p> <p>Remove end cover and inspect brake. Check brake release circuit.</p>
Load continues to move when hoist is stopped.	<p>Brake is slipping.</p> <p>Hoist is overloaded.</p>	<p>Check brake spring and brake disc lining. See "MAINTENANCE" section.</p> <p>Reduce load to within rated capacity.</p>
Hoist will not lift load.	<p>Hoist is overloaded.</p> <p>Motor is damaged.</p> <p>Brake is not releasing.</p> <p>No air supply to hoist, or too little CFM or air pressure.</p>	<p>Reduce load to within rated capacity.</p> <p>Check for worn motor bearings.</p> <p>Remove end cover and inspect brake. Check brake release circuit.</p> <p>Check power supply and connections, in power supply line.</p>
Hook lowers, but will not raise.	<p>Hoist is overloaded.</p> <p>Low air pressure.</p>	<p>Reduce load to within rated capacity.</p> <p>Check at hoist power supply connection with hoist under load. Raise pressure to rated capacity.</p>
Load chain jumps on sheave or is making a snapping sound.	<p>Worn or rusted chain.</p> <p>Incorrect chain.</p> <p>Worn sheave or chain guide.</p> <p>No oil on load chain.</p>	<p>See "INSPECTION" to determine wear limit. Replace if necessary.</p> <p>Replace with correct chain.</p> <p>Replace worn parts.</p> <p>Lubricate load chain.</p>

MAINTENANCE

⚠ 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 service and repair on this hoist to perform maintenance.
- After performing any maintenance on the hoist, test hoist to 125% of its rated capacity before returning to service.
- Turn off air system and depressurize air lines before performing any maintenance.

INTERVAL	MAINTENANCE CHECKS
Start of each shift	Make a thorough visual inspection of the hoist for damage. Do not operate the hoist if damage is found. Check the operation of the brake.
6 Months	Inspect the disc brake friction linings. Clean or replace parts as required. Lubricate brake spring washers.
Annually	Inspect the gearing, shafts, and bearings for damage or wear. Check all of the supporting members, including the trolley if used.

Disc Brake

Adjustment

No brake adjustment is required.

NOTICE

- When any part of the brake disc thickness measures 0.098 in. (2.5 mm) or less, brake disc must be replaced.

Brake Disc Replacement

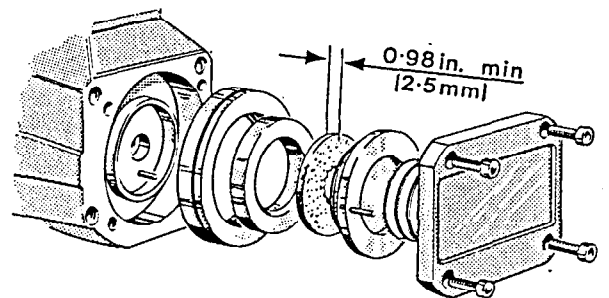
To check or replace the brake friction disc (88) use the following procedure.

1. Loosen capscrews (36) one turn at a time progressively round the cover (97) until brake spring load is relaxed. Remove capscrews (36) holding cover to the brake cover (90).
2. Remove cover (97), spring washers (96) and brake disc (95).
3. Pull brake friction disc (88) from pinion (75).
4. Replace brake friction disc (88) so spline locates on pinion (75).

5. Install brake disc (95). Place spring washers (96) on brake disc starting with a dished surface toward the brake disc. Alternate spring washers (96) (dished up/dished down).
6. Align pin (89) in brake disc (95) with hole in cover (97) then install cover (97) and pull down evenly with capscrews (36).

⚠ CAUTION

- The brake will not operate properly if there is oil or grease on the brake disc.

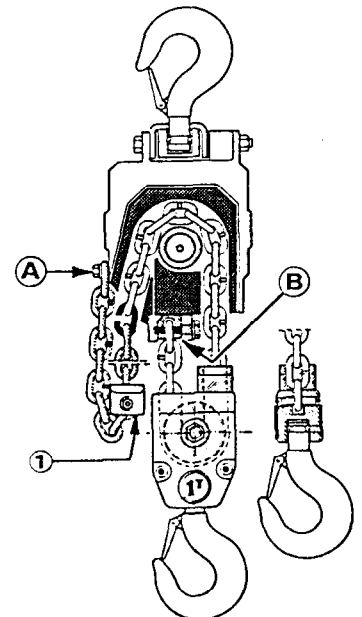


(Dwg. D6090011)

Chain Replacement

(Ref. Dwg. D6090009)

1. The hoist must be hung and connected to the air supply. Reduce air pressure to 60 psi (4 bar).
2. Remove chain bucket, if used.
3. Remove free end of chain from hoist body "A", if attached. Remove chain stop buffer (115).
4. Run hoist slowly in the lifting direction until the chain free end is approximately 2 ft (60 cm) from the hoist.



(Dwg. D6090009)

5. Using a 'C' link which is the same size as the chain join the new chain to the old taking care that the weld on the "standing" links on the new chain are facing away from the hoist load sheave.
6. Run the hoist slowly until the new chain has passed 24 to 36 in. (60 to 90 cm) through the hoist.
7. Install buffer (115) with the buffer ring (116) on the hook fall of the load chain. The offset shoulder of the buffer (115) must be toward the hose connection end of the hoist. The buffer actuates the top limit switch.

Single chain fall

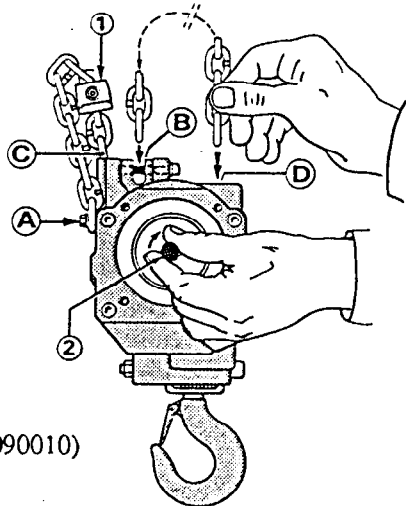
8. Nickel Diffused version: (F1 models)
Remove retainer wire (112), hook ring (121) and hook anchor pin (120). Position the last link of the chain in the hook slot. Replace hook anchor pin (120), hook ring (121) and retainer wire (112).
Stainless Steel version: (F2 and F3 models)
Remove nut (127), lock washer (126) and capscrew (128). Position the last link of the chain in the hook slot. Replace the capscrew (128), lock washer (126) and nut (127).
9. Install buffer (115) with the buffer ring (116) on opposite chain end so offset shoulder of buffer is facing the bottom of the hoist motor. Place buffer 6 in. (15 cm) from the chain end. This buffer activates the bottom limit switch.
10. Secure buffer (115) in position with capscrew (118) and nut (117).
11. Attach the last chain link to the hoist with capscrew (36) and washer (45).

CAUTION

- Check that the chain is not twisted.

Double chain fall hoists

12. Feed the chain end with a nylon string into the hook block (124) for Nickel Diffused Version and (137) for Stainless Steel Version. Take care that the "standing" links on the new chain are facing away from the hook block sheave.
13. Secure the last link on the chain to the hoist body with capscrew (59).



(Dwg. D6090010)

14. Secure the opposite end of the chain as previously described for the single chain fall hoists.
In the event that the chain has been completely removed from the hoist it will be necessary to remove the hoist brake. Refer to the instructions for "Brake Disc Replacement" (Ref. Dwg. D6090010).
Insert the first link in "D" so link is parallel to pinion (75). Ensure welded side of second chain link faces away from sprocket (63).
Rotate pinion (75) by hand to install chain until it appears at "C".

CAUTION

- Do not attempt to install the chain by powering the hoist.

Attach the chain at "A" after installing buffer (115) with the buffer ring (116). Reinstall the brake and complete chain installation as previously described.

General Disassembly

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the hoist. Parts drawings of the hoist assembly are provided in the Parts Section.

If a hoist is being completely disassembled for any reason, follow the order of the topics as they are presented.

It is recommended that all maintenance work on the hoist 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 as clean as practical, to prevent dirt and other foreign matter from getting into bearings or 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-covered 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 that part is necessary for repairs or replacement.

Disassembly Instructions

(Ref. Dwg. D6090001)

1. Disconnect all hoses from hoist motor. Position hoist vertically so brake end is down. Remove capscrews (4) and pry motor assembly from gear casing (39). Set motor assembly to one side for later disassembly. Pull coupling (60) from pinion (75).
2. Remove capscrews (29), pull out tubes (32) and screen (33) from gear casing (39). Reposition hoist in a vertical position so motor end is down.
3. Progressively loosen capscrews (36) in cover (97) one turn at a time each, until the brake spring load is relaxed.
4. Remove spring washers (96). Lift off brake friction disc (88) and brake disc (95).
5. Remove capscrews (98) and pry brake cover (90) and gasket (77) from gear casing (39). Lift off spring washer (83).
6. Pull piston (86) with 'O' rings (87) and (93) from brake cover (90).
7. Pry bearing (78) from planet carrier (67).
8. Set hoist in a horizontal position and from the motor end of the gear casing (39) carefully tap on the end of pinion (75) to remove planet assembly.
9. Remove retainer ring (82) and tap out pinion (75).
10. If planet assembly requires disassembly slide out planet pins (73) and separate planet gears (69), spacers (72) and bearings (68).
11. Remove ring gear (76) from gear casing.

NOTICE

• Check that load chain has been removed before attempting to remove sprocket (63).

12. Remove retainer ring (40) from the motor side and tap on sprocket from the brake end of gear casing (39) to drive out sprocket (63) and bearing (43).
13. Lift out ring gear (65) and bearing (66).
14. Remove retainer ring (40) from gear casing (39) bore and tap out bearing (43) from brake side.
15. Loosen capscrews (52) in chain holder (54). Tap out pins (46) and remove chain holder (54) with chain guide stop (53).
16. Remove shafts (34) from gear casing (39) and slide out chain guide (50).

Air Gear Motor Disassembly

(Ref. Dwg. D6090001)

Refer to disassembly instructions to remove motor assembly from gear casing.

1. Remove capscrews (31)
2. Remove the motor cover (5). If necessary, remove bearings (8), "O" ring (17) and pins (10).
3. Remove the motor housing (19), spring (18), slide valve (16), stop (9), side valve (22) and "O" ring (25).
4. Immobilize the motor rotors with a rod between the teeth and remove nuts (28).

5. Remove the motor rotors (23, 24), retainer rings (20).
6. Remove the screw (29) and the washer (30).
7. Remove bearing (27).

Pendant Control Disassembly

(Ref. Dwg. D6090016)

1. Remove the fittings (13) and the eyebolt (161).
2. Remove the retainer rings (160).
3. Pull out rear covers (154) with the "O" ring (164).
4. Remove the springs (169).
5. Remove the slide valve (159) with the quad ring (165).
6. Remove the spring (168).
7. Remove the valve cone ass'y (158)
8. Remove the setscrew (166).
9. Tap out pin (152) to remove the levers (156).

Cleaning, Inspection and Repair

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

Cleaning



- Bearings that are loose, worn or rotate in the frame must be replaced. Failure to observe this precaution will result in additional component damage.
- Do not use trichloroethylene to clean parts.

Clean all hoist component parts in solvent (except for the brake disc). 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 bearing 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 having damaged threads.
5. Inspect the brake disc for oil and wipe clean as required. If the brake disc is glazed, sand it lightly using fine emery cloth.
6. Measure the thickness of the brake disc. If the brake disc is less than 0.098 in. (2.5 mm) replace the brake disc (88).
7. Check screen (33) and silencer (37) for damage or excessive dirt.

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. Worm 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 instructions

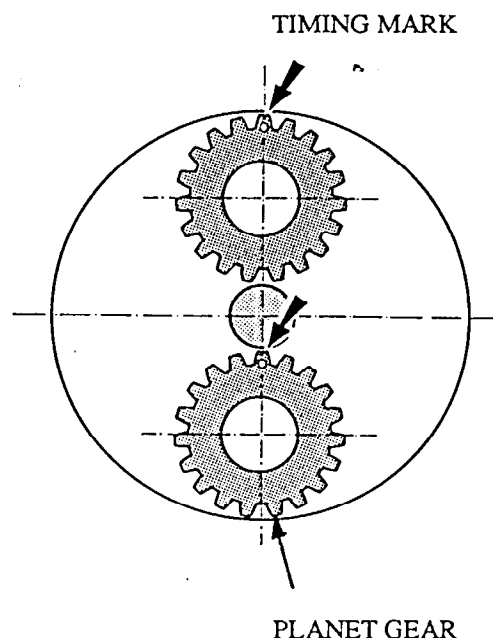
(Ref. Dwg. D6090001)

1. Install ring (42) in gear casing (39) so it is positioned just below the retainer ring groove on the brake side. Install retainer ring (40). Tap bearing (43) into ring (42) from the motor side of gear casing (39). Extreme care is required during this operation to ensure bearing (43) remains square and ring (42) is not damaged.
2. Install second ring (42) and bearing (43) on sprocket (63). Slide chain guide (50) into gear casing (39). Tap or press assembled sprocket (63) into gear casing (39) from the motor side.
3. Install retainer ring (40) at motor side.
4. Install shafts (34) in gear casing (39). Jiggle chain guide (50) to aid installation.
5. Position hoist vertically with the motor end down. Lubricate and install 'O' ring (64) in the groove on the outside of ring gear (65). Install ring gear (65) on spline of sprocket (63). Install bearing (66) on sprocket (63).
6. Install load chain. Refer to chain installation procedures in the "MAINTENANCE" section.
7. Assemble chain guide stop (53) to chain holder (54) with capscrews (58) and washers (56). Install assembled chain holder in the bottom of gear casing (39) with pins (46). Tighten capscrews (52) to secure pins (46).
8. Install pinion (75), bearing (80) and retainer rings (70) and (82) in planet carrier (67).

NOTICE

• Maintenance of the planet gear assembly should be limited to general cleaning and greasing of the planet gears (69) and bearings (68). If the planet gear assembly was removed during hoist disassembly it will be necessary to line up the timing marks on the planet gears correctly.

9. Assemble planet assembly so planet gears (69) mesh with pinion (75). Position planet gears (69) so the "O" marks engraved on the planet gears are in line. Ref. Dwg. D6090012.
10. Install assembled planet assembly with pinion (75) in gear casing (39).
11. Install ring gear (76) with notches outward.



(Dwg. D6090012)

12. Install bearing (78) on planet carrier (67).
13. Install gasket (77) on brake cover (90). Place spring washer (83) on bearing (78) so dished side is toward the bearing (78). Lubricate gear casing. See "LUBRICATION" section.
14. Lubricate 'O' rings (79) and 'U' cup seal (84) and install in brake cover (90). The lip of 'U' cup seal (84) must be toward the planet assembly. Add Silicone seal to gear casing surface and install brake cover (90) so pins (55) line up. Exercise caution during this operation to ensure 'O' rings (79) remain in position. Secure brake cover (90) in position with capscrews (98).
15. Lubricate and install 'O' rings (87) and (93) on piston (86). Install piston (86) in brake cover (90).
16. Install brake disc (94) and brake friction disc (88).
17. Place brake disc (95) on brake friction disc (88). Install springs (96) on brake disc (95) starting with a dished surface toward the brake disc. Alternate springs (96) (dished up/dished down).
18. Align pin (89) in brake disc (95) with hole in cover (97) then install cover (97) and pull down evenly with capscrews (36).

19. Position hoist vertically with the brake end down. Set screen (33) in motor side of gear casing (39) and loosely secure with capscrews (29). Install tubes (32) through screen (33) until they are fully seated. Tighten capscrews (29). Install coupling (60) on pinion (75).
20. Install motor assembly and secure with capscrews (4).
21. Install silencer (37) in gear casing (39) with capscrew (36).

Motor

If the motor assembly has been removed for disassembly, inspection or repair it is necessary that it be reassembled into casing (39) using a good quality silicone seal between the casing (39) and motor mounting flange. The silicone seal must be allowed to cure for 3 hours before attempting to pressurize the motor.

Air Gear Motor Assembly

(Ref. Dwg. D6090001)

1. Lubricate bearings (27) with grade 2 grease then install bearings in motor flange (26). Ensure markings on bearing cage are still visible after installation.
2. Install screw (29) and washer (30).
3. Install motor rotors (23-24) and retainer ring (20) with the part of the bearing (8).
4. Immobilize the motor rotors with a rod between the teeth and install nuts (28). Lightly coat nut threads with Loctite ® 234.
5. Install motor housing (19) with "O" ring (25) on motor flange (26).
6. Install side valve (22), springs (18), slide valve (16) with "O" rings (15) (17) and quad rings (11) in motor housing (19).
7. Install bearing (8) and stop (9) in motor cover (5). Install motor cover on motor housing (19). Ensure pins (10) are fully aligned and engaged. Secure with capscrews (31). Lightly coat capscrew threads with Loctite ® 234.

Pendant Control Assembly

(Ref. Dwg. D6090016)

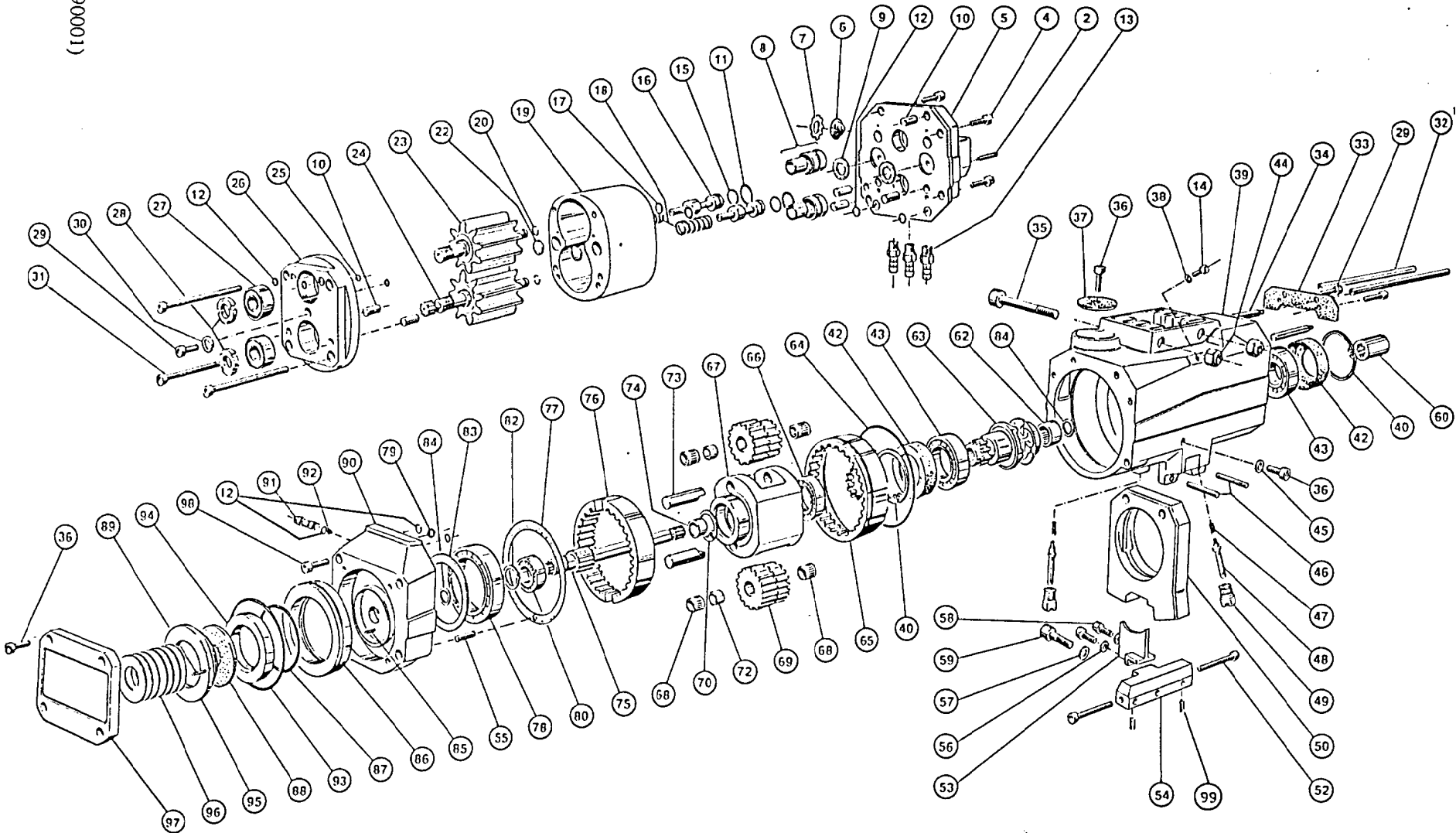
1. Install Levers (156) in pendant handle (153) with pin (152). Stake pin in pendant handle at both ends to secure.
2. Install setscrews (166).
3. Check that "O" ring is undamaged and securely crimped in valve cone. Install valve cone assemblies (158).
4. Install springs (169).
5. Check that "O" ring is undamaged and securely crimped in slide valves. Install quad ring (165) and slide valve ass'y (159).
6. Install springs (169).
7. Lubricate and install "O" ring (164) on rear cover (154). Install rear cover in pendant handle.
8. Install retainer ring (160)
9. Adjustment :
 - 9.1 Connect the inlet of the pendant to 100 psi (7 bar) air supply.

- 9.2 Connect a manometer at the outlet of the lever to be adjusted.
- 9.3 Apply a small amount of Loctite ® 243 on the adjustment setscrew (314).
- 9.4 Tighten the adjustment setscrew to obtain a pressure of 15 psi (1 bar) without actioning the lever.
- 9.5 Release the adjustment setscrew by a half turn (pressure must fall to zero).
- 9.6 Push the lever. Check that pressure reaches 93 +/- 7 psi (6.5 +/- 0.5 bar). Check that there is no leak at the exhaust.
- 9.7 Release the lever, exhaust must occur and result in rapid pressure reduction.
- 9.8 Repeat operations "9.6 and 9.7" from 2 to 3 times.
- 9.9 Disconnect the manometer. Check to ensure that there are no leaks when the lever is not activated.
- 9.10 Repeat the operations from 9.2 to 9.9 with each lever.

Hook Assemblies

If the hook assemblies have been disassembled for inspection or repair attention is required on reassembly to ensure that all ten balls (113) are installed and retained with washer (114) and hook ring (121) (Nickel Diffused version only).

HOIST ASSEMBLY DRAWING



(Dwg. D6090001)

HOIST ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.
2	Screw	1	4200-7707
4	Capscrew	4	4131-2206
5	Motor Cover	1	9609-0189
6	Filter	1	6190-9028
7	Stop Ring	1	4770-3018
8	Bearing	2	5646-1912
9	Stop	2	9609-0042
10	Pin	6	4600-0416
• 11	Quad-Ring	2	5823-1229
• 12	'O' Ring	7	5821-2229
13	Fitting	3	6161-6041
14	Capscrew	1	4132-6306
• 15	'O' Ring	2	5822-8929
16	Slide Valve (Standard)	2	9424-0212
	Slide Valve (High Precision)	2	9609-0084
• 17	'O' Ring	2	5820-5029
18	Spring	2	9424-0224
19	Motor Housing	1	9609-0007
20	Retainer Ring	2	4780-1339
22	Side Valve	2	9412-0030
23	Idle Gear	1 set	3609-0128
24	Driving Gear		
• 25	'O' Ring	2	5822-2329
26	Motor Flange	1	9609-0008
27	Bearing	2	5060-0002
28	Nut	2	5700-0002
29	Capscrew	3	4130-6706
30	Washer	1	9609-0032
31	Capscrew	4	4130-0806
32	Tube	2	9609-0055
• 33	Screen	1	9609-0057
34	Shaft	2	9609-0040
35	Capscrew	2	4132-7206
36	Capscrew	6	4132-2606
• 37	Silencer	1	9609-0056
38	Washer	1	4500-1105
39	Casing	1	9609-0190
40	Retainer Ring	2	4770-3067
42	Ring	2	9609-0076
43	Bearing	2	5005-0007
44	Nut	2	4370-7011
45	Washer	1	4500-1106
46	Pin	2	9609-0163
47	Spring	2	6916-0332
48	Limit Switch	2	9609-0051
49	Limit Switch Body	2	9609-0050
50	Chain Guide	1	9609-0019
52	Capscrew	2	4132-2306
53	Chain Guide Stop	1	9609-0020

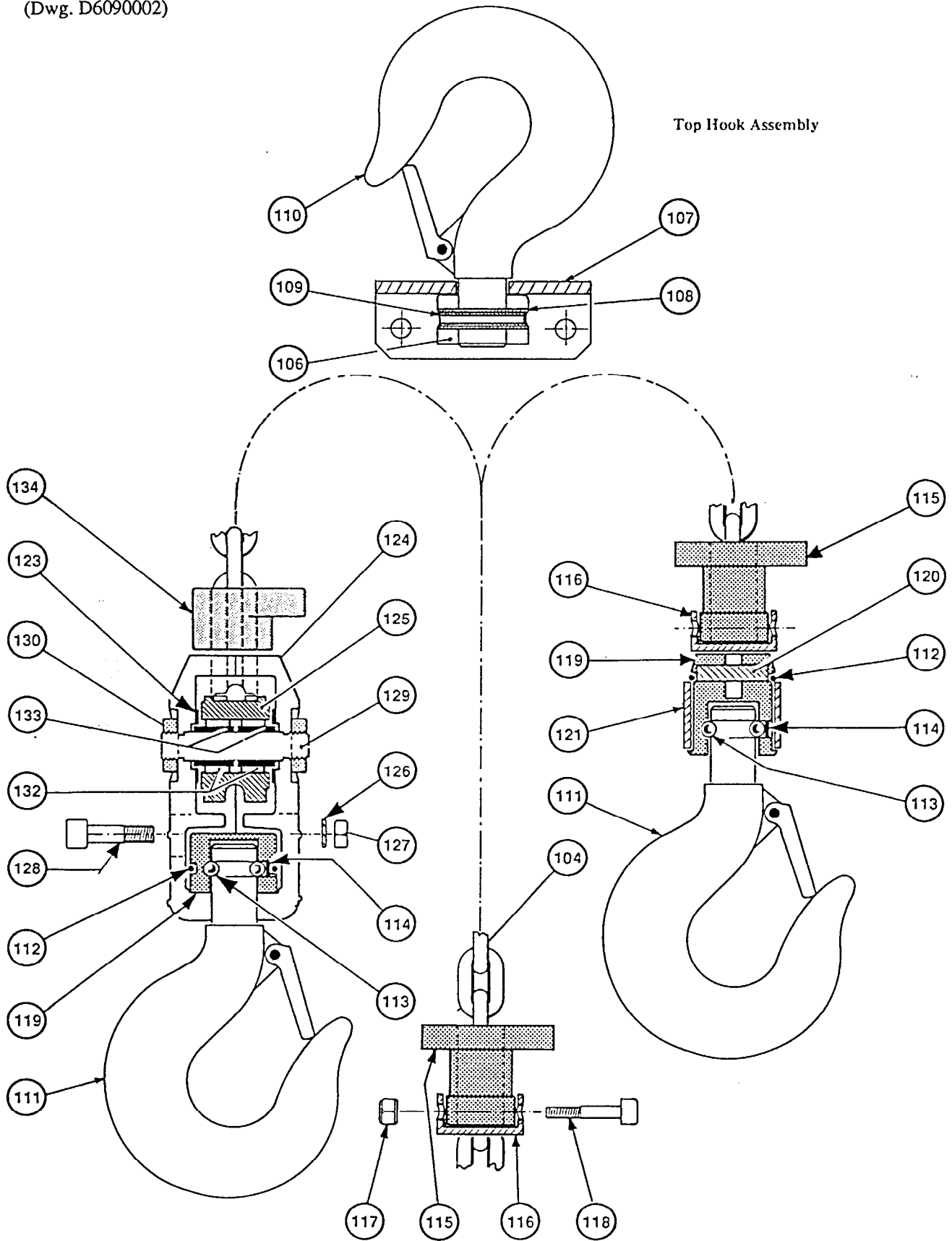
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.
54	Chain Holder	1	9609-0162
55	Pin	1	4600-1716
56	Washer	2	4520-1004
57	Washer	1	4520-1008
58	Capscrew	2	4131-6506
59	Capscrew	1	9609-0138
60	Coupling	1	9609-0034
62	Bearing	1	5632-1512
63	Sprocket	1	9609-0195
• 64	'O' Ring	1	5821-6129
65	Ring Gear (Standard "K")	1	9609-0094
	Ring Gear (High Precision "KV")	1	9609-0037
66	Bearing	1	5080-0005
67	Planet Carrier	1	9609-0014
68	Bearing (Standard "K")	4	5650-1513
	Bearing (High Precision "KV")	4	5650-1613
69	Planet Gear (Standard "K")	1 set	3609-0129
	Planet Gear (High Precision "KV")		3609-0130
70	Retainer Ring	1	4770-3032
72	Spacer (Standard "K")	2	9609-0095
	Spacer (High Precision "KV")	2	9609-0026
73	Planet Pin	2	9609-0039
74	Bearing	1	5636-2432
75	Pinion	1	9609-0035
76	Ring Gear	1	9609-0038
77	Gasket	1	9609-0041
78	Bearing	1	5080-0009
• 79	'O' Ring	1	5822-1729
80	Bearing	1	5000-0002
82	Retainer Ring	1	4770-0015
83	Spring Washer	1	6916-0432
• 84	'U' Cup Seal	2	5801-9830
85	Pin	1	4640-4618
86	Piston	1	9609-0113
• 87	'O' Ring	1	5823-2229
• 88	Brake Friction Disc	1	9609-0049
89	Pin	1	4640-6118
90	Brake Cover	1	9609-0187
91	Shuttle Valve Stop	1	9609-0223
92	Ball	1	6900-1625
• 93	'O' Ring	1	5823-2329
• 94	Brake Disc	1	9609-0047
• 95	Brake Disc	1	9609-0046
96	Spring Washer	7	6916-0532
97	Cover	1	9609-0188
98	Capscrew	4	4132-7406
* 99	Screw	2	4200-8007
* 100	Nameplate	1	71070031-R

• Recommended Spare

*Not Shown on drawing

LEVEL "F1" - TOP AND BOTTOM HOOK ASSEMBLY DRAWING

(Dwg. D6090002)



Top Hook Assembly

1 Ton Bottom Hook Assembly

0.25 and 0.5 Ton Bottom Hook Assembly

LEVEL "F1" - TOP AND BOTTOM HOOK ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.		
			0.25 T	0.50 T	1 T
104	Nickel Diffused Chain	1	LCES 003ND		
105	Top Hook Assembly (incl's items 106 through 110)	1	3609-0225		
106	Hook Ring	1	9609-0199		
107	Support Plate	1	9609-0160		
108	Roll Pin	1	9609-0200		
109	Roll Pin	1	9609-0201		
110	Top Hook with Latch Assembly	1	9609-0198		
111	Bottom Hook with Latch Assembly	1	9609-0149		
112	Retainer Wire	1	9609-0154		
113	Ball	10	6940-1125		
114	Washer	1	9609-0152	9609-0159	
115	Buffer	()	9609-0121 (2)	9609-0121 (1)	
116	Buffer Ring	()	9609-0221 (2)	9609-0221 (1)	
117	Nut	1	4370-7211		
118	Screw	1	4132-6006		
119	Hook support	1	9609-0150	9609-0158	
120	Pin	1	9609-0153	---	
121	Hook Ring	1	9609-0151	---	
122	Bottom Hook Assembly (*)	1	3609-0279	3609-0278	
123	Spacer	2	---	9609-0206	
124	Block Flange	2	---	9609-0194	
125	Block Wheel	1	---	9609-0157	
126	Washer	2	---	4520-1006	
127	Nut	2	---	4300-6211	
128	Screw	2	---	4101-9701	
129	Axis	1	---	9609-0125	
130	Nut	2	---	4320-2212	
• 132	Bearing	2	---	5632-2115	
• 133	Bearing Ring	2	---	5636-2432	
134	Buffer	1	---	9609-0018	



Recommended Spare

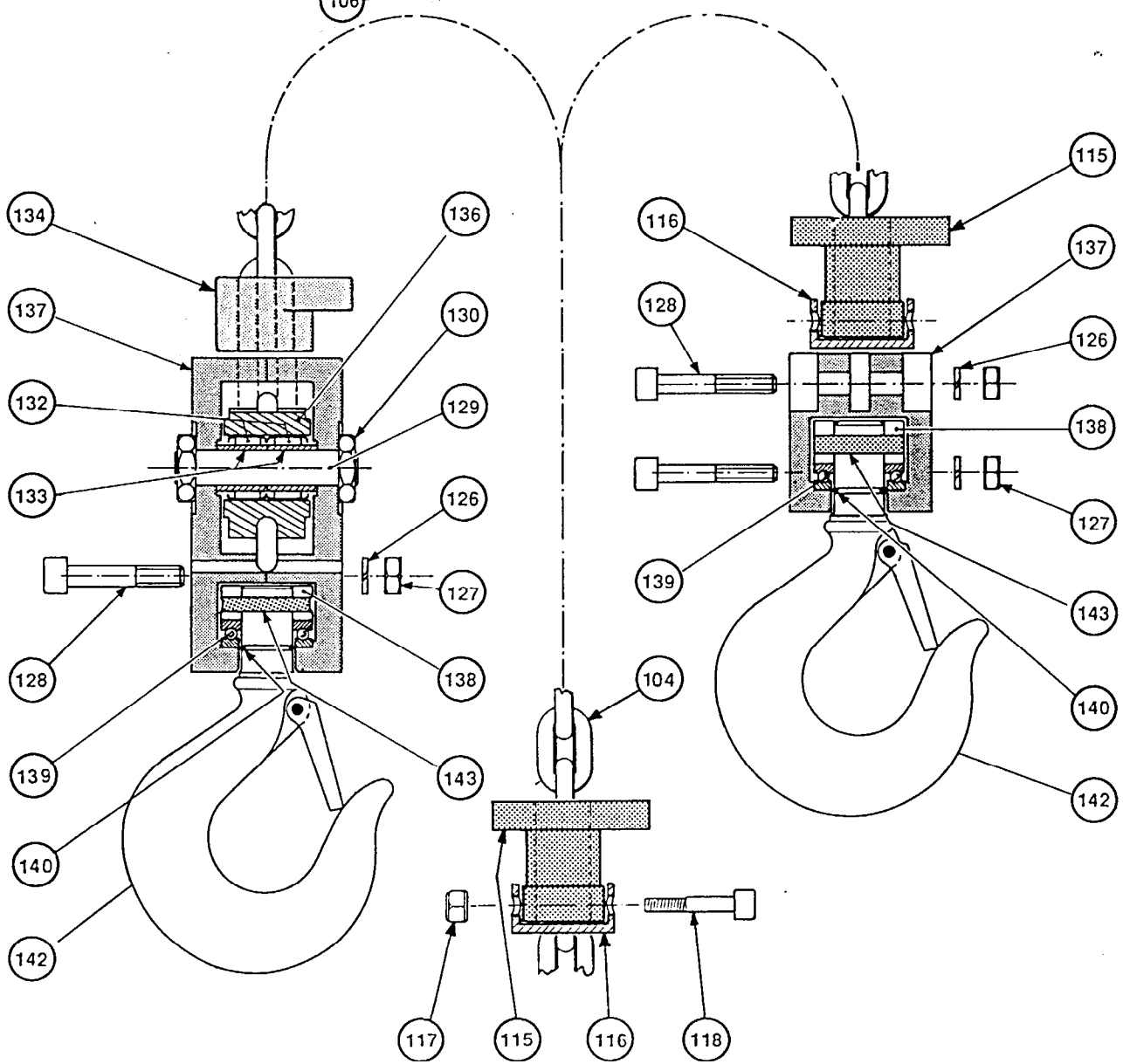
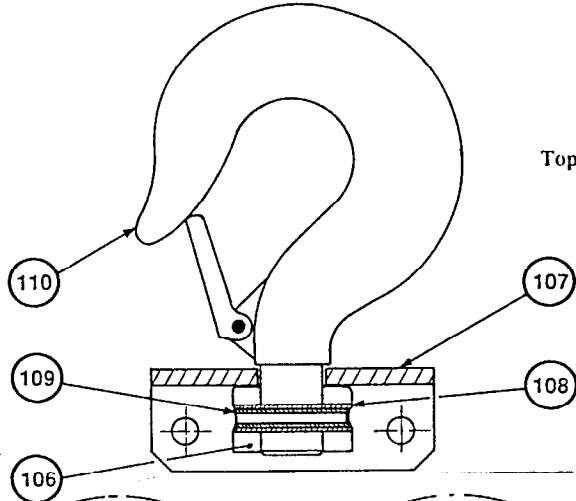
(*)

- Bottom Hook Assembly for 0.25 to 0.5 Ton hoists (incl's items 111 through 121)
- Bottom Hook Assembly for 1 Ton hoists (incl's items 111 through 119 and 123 through 134)

LEVEL "F2 & F3" - TOP AND BOTTOM HOOK ASSEMBLY DRAWING

(Dwg. D6090003)

Top Hook Assembly



1 Ton Bottom Hook Assembly

0.25 and 0.5 Ton Bottom Hook Assembly

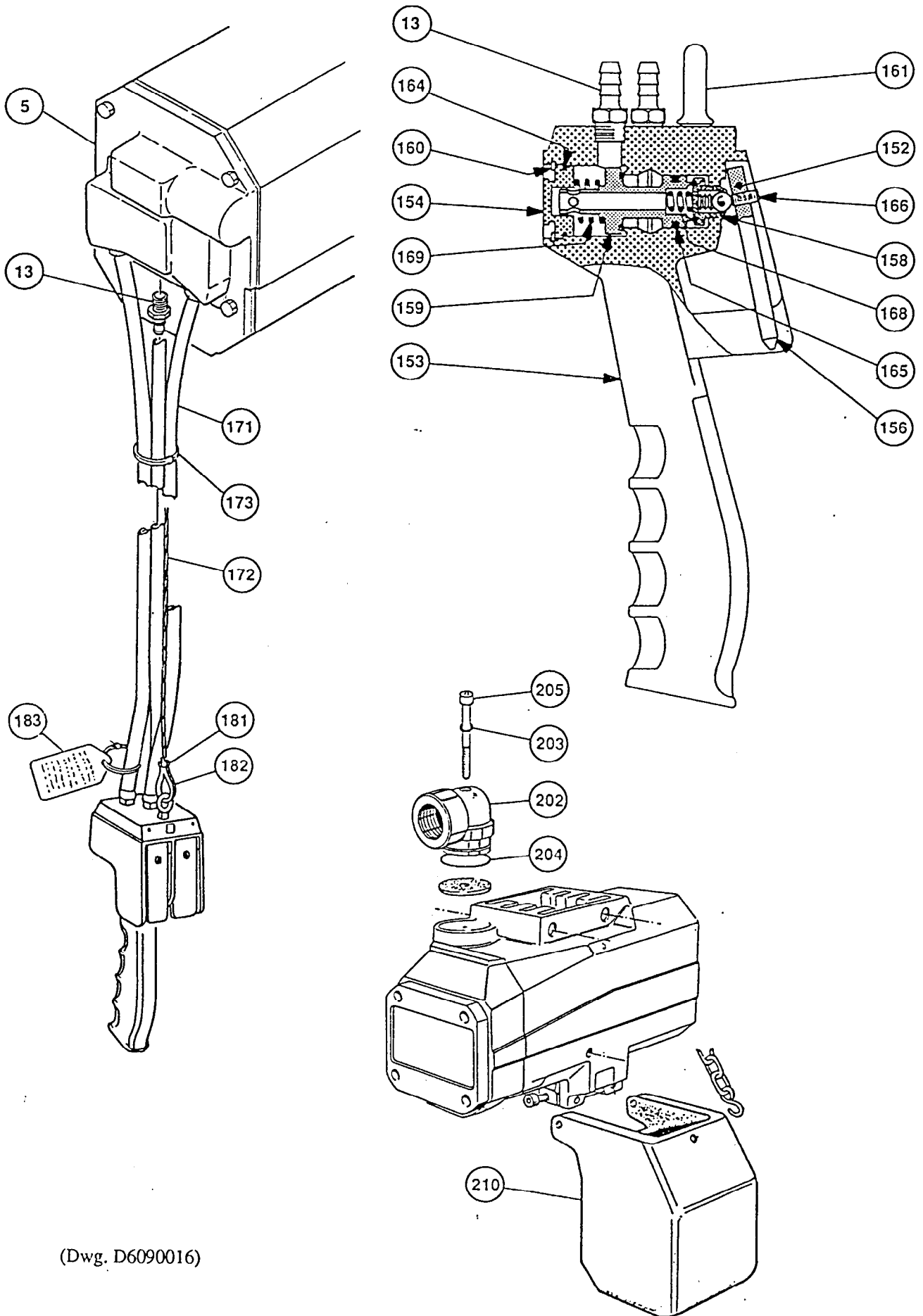
LEVEL "F2 & F3" - TOP AND BOTTOM HOOK ASSEMBLY DRAWING

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.	
			0.315 T	0.630 T
104	Nickel Diffused Chain (F2)	1	LCES 003ND	
	Stainless Steel Chain (F3)		LC515-G4I	
105	Top Hook Assembly (incl's items 106 through 110)	1	3609-0225	
106	Hook Ring	1	9609-0199	
107	Support Plate	1	9609-0160	
108	Roll Pin	1	9609-0200	
109	Roll Pin	1	9609-0201	
110	Top Hook With Latch Assy	1	9609-0198	
115	Buffer	()	9609-0121 (2)	9609-0121 (1)
116	Buffer Ring	()	9609-0221 (2)	9609-0221 (1)
117	Nut	1	4370-7211	
118	Screw	1	4132-6006	
126	Lock Washer	()	4520-1006 (3)	4520-1006 (2)
127	Nut	()	4300-6211 (3)	4300-6211 (2)
128	Screw	2	4101-9801	4101-9701
129	Axis	1	---	9609-0125
130	Nut	2	---	4320-2212
• 132	Bearing	2	---	5632-2115
• 133	Bearing Ring	2	---	5636-2432
134	Buffer	1	---	9609-0018
135	Bottom Hook Assembly (*)	1	3609-0219	3609-0220
136	Block Wheel	1	---	9609-0124
137	Hook Flange	2	9609-0134	9609-0123
138	Hook Ring	1	9609-0128	
139	Thrust Ball Bearing	1	5400-0003	
• 140	'O' Ring	1	5823-2829	
142	Hook with Latch Assembly	1	9609-0127	
143	Axis	1	9609-0130	

• Recommended Spare

- (*)
- Bottom Hook Assembly for 0.315 Ton hoists (incl's items 115 through 128, 134, 137 through 143)
 - Bottom Hook Assembly for 0.630 Ton hoists (incl's items 115 through 134 and 136 through 143)

PENDANT ASSEMBLY DRAWING



(Dwg. D6090016)

PENDANT ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.
150	Control Assy (1 motor) includ's item 13 to 169	1	3579-0070	164	Seal	2	5820-3729
13	Fitting	3	6161-6041	•165	Seal	2	5823-0229
152	Axle	1	9579-0040	166	Setscrew	2	4200-7407
153	Body	1	9579-0034	168	Spring	2	6915-8632
154	Cover	2	9579-0037	169	Spring	2	6915-8732
156	Lever	2	9579-0038	171	Hose	3	71153837
158	Valve Cone Ass'y	2	9579-0036	172	Wire	1	71073506
159	Slide Valve Ass'y	2	9579-0035	173	Tie Wrap	2	54235
160	Retainer Ring	2	4770-3028	181	Clamping Collar	2	6112-5032
161	Eye Bolt	1	6422-2332	182	Thimble	1	6932-533
				183	Warning Label	1	71059612

• Recommended Spare

Accessories

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
200	Piped Exhaust Assembly (incl's items 202 through 205)	1	3609-0282
202	Elbow	1	9609-0196
203	'O' Ring	1	5821-2229
204	'O' Ring	1	5821-5129
205	Screw	1	4132-2506
210	Chain Container Assembly max. 20 ft. (6 m)	1	3609-0280
	Chain Container Assembly max. 40 ft. (12 m)		3609-0281
---	Food Grade Lubricant	As Required	Lubri-Link-Green
---	Label Kit	1	9609-0249

PARTS ORDERING INFORMATION

The use of replacement parts other than INGERSOLL-RAND Material Handling may invalidate the Company's warranty. For prompt service and genuine INGERSOLL-RAND Material Handling parts, provide your nearest Distributor with the following:

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

The model and serial number label is located on the brake end housing.

For your convenience and future reference it is recommended that the following information be recorded.

Hoist Model Number

Hoist Serial Number

Date Purchased

Return Goods Policy

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. Hoists returned with opened, bent or twisted hooks, or without chain and hooks, may not be repaired or replaced under warranty.

NOTICE

. Continuing improvement and advancement of design may cause 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.

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.

For additional information contact:
Ingersoll-Rand Material Handling
2724 Sixth Avenue South
Seattle, Wa. 98124 USA
Phone: (206) 624-0466
Fax: (206) 624-6265

or
Ingersoll-Rand Equipements de production S.A
111, avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 27-93-08-08
Fax: (33) 27-93-08-00

Ingersoll-Rand Palair Plus "Food Grade" Hoists include parts that are designed and manufactured to comply with USDA Specifications. These parts differ in material and or surface treatment and therefore must not be substituted with dissimilar parts which may make the hoist non-compliant with the requirements for "Food Grade" applications.

HOIST AND WINCH 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 enroute 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
Material Handling**
P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046
Phone: (206) 624-0466
Fax: (206) 624-6265

Regional Sales Offices

Atlanta, GA
111 Ingersoll-Rand Drive
Chamblee, GA 30341
Phone: (404) 936-6230
Fax: (404) 936-6204

Detroit, MI
23192 Commerce Drive
Farmington Hills, MI 48335
Phone: (810) 476-6677
Fax: (810) 476-6670

Houston, TX
Suite 150
2500 East T.C. Jester
Houston, TX 77008
Phone: (713) 864-3700
Fax: (713) 864-2244

Los Angeles, CA
11909 E. Telegraph Road
P.O. Box 2525
Santa Fe Springs,
CA 900670
Phone: (310) 948-4189
Fax: (310) 948-1828

Milwaukee, WI
12311 W. Silver Spring Dr.
Milwaukee, WI 53225
Phone: (414) 461-0973

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

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
Material Handling**
P.O. Box 24046
2724 Sixth Avenue 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) 675-5611
Fax: (416) 675-6920
Order Desk
Fax: (416) 674-6549

Regional Sales Offices

Calgary, Alberta
44 Harley Road S.E.
Calgary, Alberta
T2V3K3
Phone: (403) 252-4180
Fax: (403) 252-4462

Edmonton, Alberta
1340 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
201-6351 Westminster Hwy
Richmond, B.C.
V7C 5C7
Phone: (604) 278-0459
Fax: (604) 278-1254

**Latin America Operations
Ingersoll-Rand
Production Equipment
Group**
730 N.W. 107 Avenue
Suite 300, Miami, FL
33172-3107
Phone: (305) 559-0500
Telex: 441617TLS UI
Fax: (305) 559-7505

**Europe, Middle East and
Africa
Ingersoll-Rand Equipements
de production S.A**
111, avenue Roger Salengro
59450 Sin le Noble, France
Phone: (33) 27.93.08.08
Fax: (33) 27.93.08.00

**Asia - Pacific Operations
Ingersoll-Rand (Japan) Ltd.**
Kowa Bldg. No. 17
2-7 Nishi-Azabu 1-chome
Minato-ku, Tokyo 106,
Japan
Phone: (03) 3403-0641/7
Fax: 81 3 3401-2049

**Russia
Ingersoll-Rand Company
World Trade Center
Office 1101**
Krasnopresnenskaya Nab.12
Moscow, Russia 123610