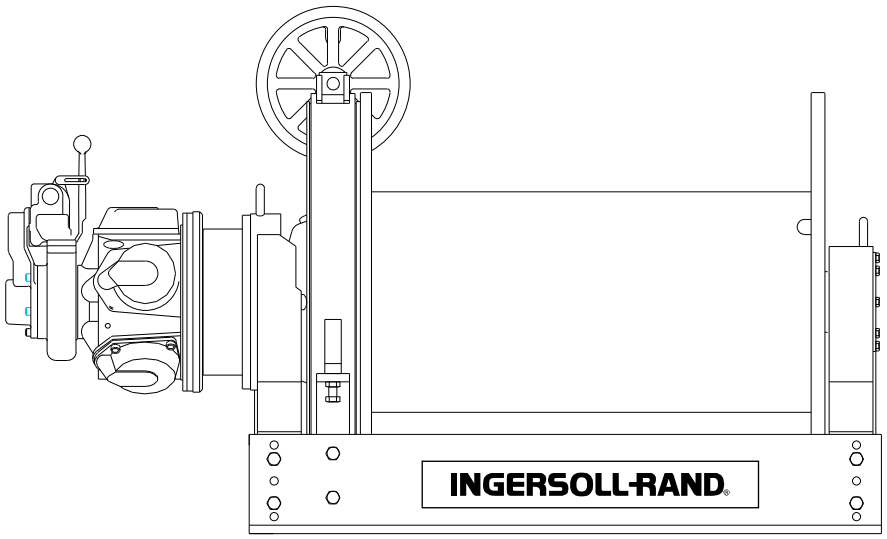
force 5™ AIR WINCHES

PARTS, OPERATION AND MAINTENANCE MANUAL

MODEL FA10



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 winch for lifting, supporting, or transporting people or lifting or supporting loads over people.

Always operate, inspect and maintain this winch in accordance with American National Standards Institute Safety Code (ASME B30.7) 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 winch.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in an injury. 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 winch 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 winch must provide an adequate safety factor to handle the rated load, plus the weight of the winch 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 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 line of force of any load.

Ingersoll-Rand Material Handling winches are manufactured in accordance with the latest ASME B30.7 standards.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the owner/employer, 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. See 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 can not know of, nor 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 B30.7 and are intended to avoid unsafe operating practices which might lead to injury or property damage.

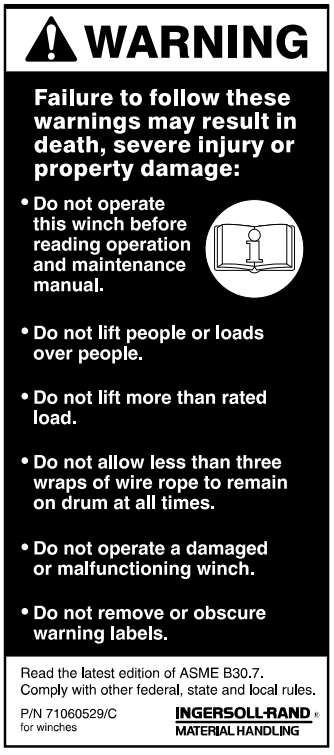
Ingersoll-Rand recognizes that most companies who use winches have a safety program in force at their facility. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

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 winch to operate and maintain this product.
2. Only operate a winch if you are physically fit to do so.
3. When a **"DO NOT OPERATE"** sign is placed on the winch, or controls, do not operate the winch until the sign has been removed by designated personnel.
4. Before each shift, check the winch for wear and damage. Never use a winch that inspection indicates is worn or damaged.
5. Never lift a load greater than the rated capacity of the winch. 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 or near wire rope spooling onto or off of the winch drum.
8. Always rig loads properly and carefully.
9. Be certain the load is properly seated in the saddle of the hook. Do not tipload the hook as this leads to spreading and eventual failure of the hook.
10. Do not "side pull" or "yard".
11. Make sure everyone is clear of the load path. Do not lift a load over people.
12. Never use the winch for lifting or lowering people, and never allow anyone to stand on a suspended load.
13. Ease the slack out of the wire rope when starting a lift or pull. Do not jerk the load.
14. Do not swing a suspended load.
15. Never suspend a load for an extended period of time.
16. Do not leave a load suspended when the winch is unattended or not in use.
17. Pay attention to the load at all times when operating the winch.
18. After use, or when in a non-operational mode, the winch should be secured against unauthorized and unwarranted use.
19. The operator must maintain an unobstructed view of the load at all times.
20. Never use the winch wire rope as a sling.

WARNING LABELS

Each unit is shipped from the factory with the warning labels shown. If the labels are not attached to your unit, order new labels and install them. See the parts list for the part number. Labels are not shown actual size.



SPECIFICATIONS

Model Code Explanation

Example: FA10-24XK1P — **FA10 - 24 X K 1 P**

Series (Capacity):

Model FA10 (10 metric tons / 22,000 lbs)

Drum Flange Height:

- = **Standard flange: 38 inch (965 mm) diameter**

Drum Length (Distance between drum flanges):

24 = **24 inch (610 mm) [Standard]**

30 = 30 inch (760 mm)

36 = 36 inch (915 mm)

40 = 40 inch (1014 mm)

Drum Brake:

M = Manual Drum Brake

X = **None**

Disc Brake:

K = **Automatic Disc Brake**

X = None

Control:

1 = **Winch mounted lever throttle (Standard)**

2XX = Remote full flow lever throttle [XX = Specify hose length (feet). Max 20 ft. (6 metres)] **

3XX = Remote pilot pendant throttle [XX = Specify hose length (feet). Max 50 ft. (15 metres)]**

4XX = Remote pilot lever throttle [XX = Specify hose length (feet). Max 50 ft. (15 metres)] **

Options: ***

7 = Drum Grooving (Number = wire rope size in sixteenths, e.g. 7 = 7/16 inch)

D = Drum Divider Flange (includes additional wire rope anchor)

G = Drum Guard

L = Drum Locking Pin

P = **Marine 812 top coat**

S = Rotary Limit Switch ****

T = Tensioning Manifold (Feature not covered in this manual, contact factory for additional information)

Z = Sand blast and Carbozinc primer only

Notes:

** Remote throttles are provided with 10 feet (3 metres) of hose. Specify hose lengths greater than 10 feet. For lengths greater than 20 ft. (6 metres) with the Remote Full Flow Throttle, or 50 ft. (15 metres) with the Remote Pilot Lever and Remote Pilot Pendant Throttles contact Technical Sales for control acceptability. Metric lengths are provided for reference only, order lengths in feet.

*** Documentation, witness testing and material traceability available; must be requested at time of order. Specify options or contact the factory or your nearest Ingersoll-Rand distributor for information.

**** Includes mandatory remote full flow lever or remote pilot pendant throttle with 10 feet (3 metres) of hose. Contact Ingersoll-Rand for application suitability.

General Specifications

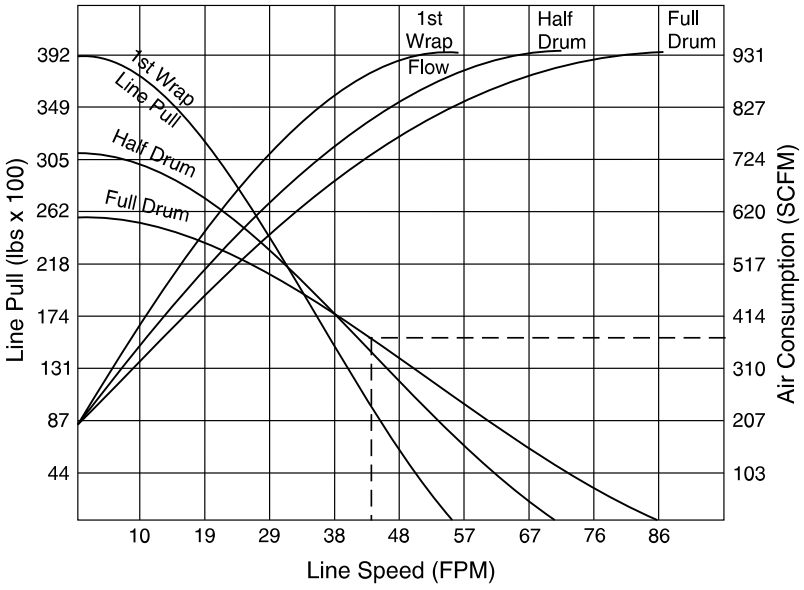
Utility Rating 5:1 design factor	Full drum line pull based on 90 psig (6.3 bar/630 kPa) air inlet pressure	22,000 lb	10,000 kg
	Mid drum line speed (fpm)	30 fpm	9.1 m/m
Drum barrel diameter		20 inches	508 mm
Drum flange diameter		38 inches	965 mm
Air Inlet pressure		90 psig	6.3 bar
hp		31	304 kw
Air flow at rated load		800 scfm	22 Nm^3/min
Maximum Stall Pull 1st layer at 90 psig (6.3 bar/630 kPa)		38,000 lbs	17,250 kg
Pipe inlet size		1-1/4 inches	
Hose size		1-1/2 inches	
Shipping weight (24 in. long drum without wire rope)		3550 lb	1610 kg

FA10 Drum Wire Rope Storage Capacities ft. (m)

Drum Length		Rope Diameter							
inches	**mm**	**3/4 inch**	**20 mm**	**7/8 inch**	**22 mm**	**1 inch**	**26 mm**	**1-1/8 inch**	**28 mm**
24	610	2488	731	1962	592	1332	398	1026	377
30	762	3130	921	2470	746	1679	503	1295	476
36	914	3772	1110	2980	900	2026	606	1564	574
40	1016	4200	1236	3319	1002	2258	676	1744	640

Storage capacities are based on ASME B30.7 Standards which requires 1/2 inch (13mm) minimum clear flange above last layer. Storage capacities shown may vary from those shown elsewhere.

Performance Graph



Example: 370 scfm = 43 fpm on full drum

INSTALLATION

Prior to installing the winch, carefully inspect it for possible shipping damage.
Winches are supplied fully lubricated from the factory. Before operation check oil levels and adjust as necessary. Use the proper type of oil as recommended in the "LUBRICATION" section.

⚠ 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 winch to use.

Mounting

Refer to Dwg. MHP0920 and Table 1
Care must be taken when moving, positioning or mounting the winch. In most cases, lifting lugs have been provided to assist in handling the winch. If the lug locations are improper for your specific installation, great care should be taken to ensure that the winch, when lifted, will be properly balanced. Determine the weight of your winch by referring to the "SPECIFICATIONS" section. Lift the winch 3 to 4 inches (75 to 100 mm) off the ground. Verify winch is balanced and secure before continuing lift.
Mount the winch so the axis of the drum is horizontal and that the motor vent cap is not more than 15° off top vertical center. If the winch is to be mounted in an inverted position, the motor case must be rotated to position the vent cap at the top.

1. The winch mounting surface must be flat and of sufficient strength to handle the rated load plus the weight of the winch and attached equipment. An inadequate foundation may cause distortion or twisting of the winch uprights and side rails resulting in winch damage.
2. Make sure the mounting surface is flat to within 0.005 inch (0.127 mm) per inch of drum length. Shim if necessary.
3. Mounting bolts must be 7/8 inch (22 mm) Grade 8 or better. Use self-locking nuts or nuts with lockwashers.

Winch Bolt Hole Mounting Dimensions

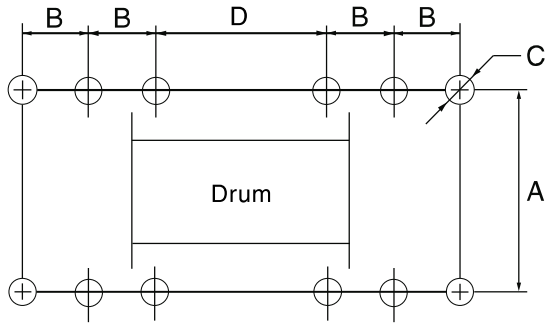


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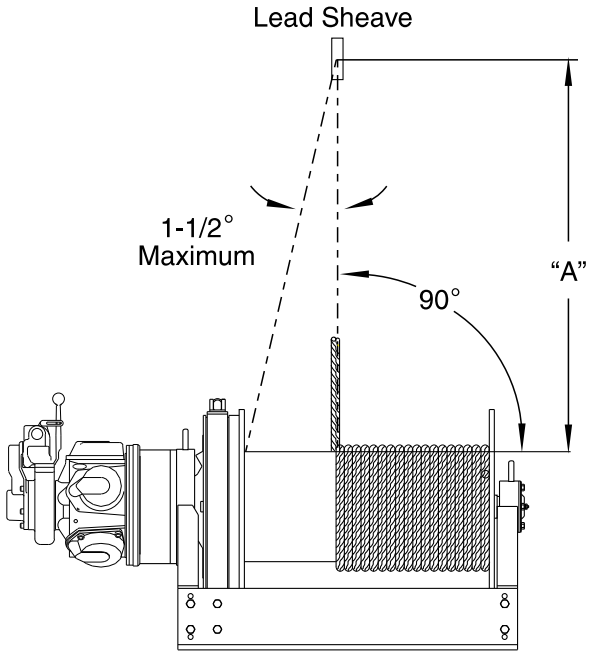
Table 1 – Winch Bolt Hole Mounting Dimensions

Dimension		Drum Length (inches)			
		24	30	36	40
'A'	in	42.25			
	mm	1073			
'B'	in	6.00	8.00		
	mm	152	203		
'C'	in	15/16			
	mm	24			
'D' (with drum brake)	in	14	12	16	22
	mm	356	305	406	559
'D' (without drum brake)	in	10	8	12	18
	mm	254	203	305	457

4. Tighten 7/8 inch (22 mm) mounting bolts evenly and torque to 600 ft. lbs. (813 Nm) for dry thread fasteners. If the fasteners are plated, lubricated or a thread locking compound is used, torque to 460 ft. lbs. (624 Nm).
5. Maintain a fleet angle between the sheave and winch of no more than 1-1/2°. The lead sheave must be on a center line with the drum and, for every inch (25 mm) of drum length, be at least 1.6 feet (0.5 metre) from the drum. The diameter of the lead sheave must be at least 18 times the diameter of the wire rope. Refer to Dwg. MHP0487.



(Dwg. MHP0487)

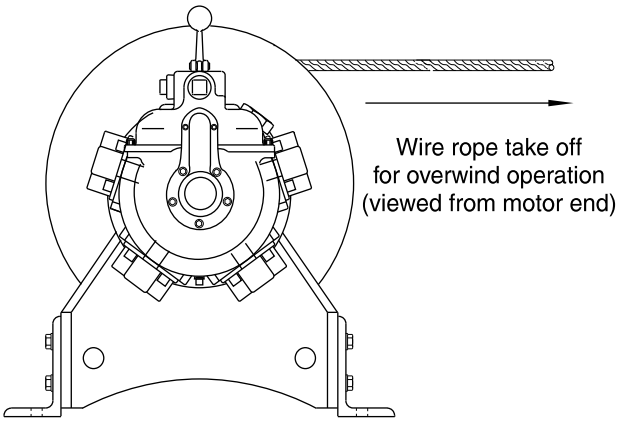
'A'= 1.6 feet (.05 metre) per inch of drum length:
'A'= 38.4 feet (11.7 metres) for 24 inch long drum.
'A'= 48.0 feet (14.6 metres) for 30 inch long drum.
'A'= 57.6 feet (17.5 metres) for 36 inch long drum.
'A'= 64.0 feet (19.5 metres) for 40 inch long drum.

6. Do not weld to any part of the winch.

Wire Rope

⚠ CAUTION

• Maintain at least 3 tight wraps of wire rope on the drum at all times.
• Install the wire rope to come off the drum for overwind operation. Refer to Dwg. MHP0564.



(Dwg. MHP0564)

NOTICE

• Some applications may require underwind operation. Consult the factory prior to use.

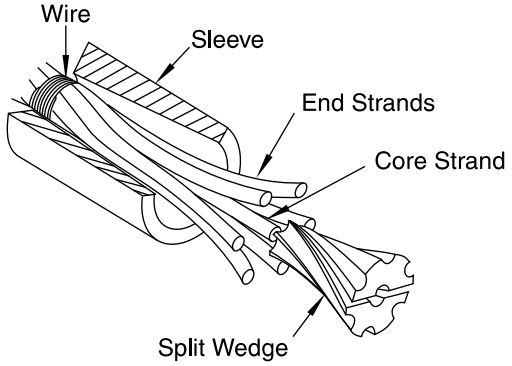
Wire Rope Selection
Consult a reputable wire rope manufacturer or distributor for assistance in selecting the appropriate type and size of wire rope and, where necessary, a protective coating. Use a wire rope which provides an adequate safety factor to handle the actual working load and that meets all applicable industry, trade association, federal, state and local regulations.

When considering wire rope requirements the actual working load must include not only the static or dead load but also loads resulting from acceleration, retardation and shock load. Consideration must also be given to the size of the winch wire rope drum, sheaves and method of reeving. Wire rope construction should be 6 X 19 or 6 X 37 IWRC right lay to permit correct installation of wire rope anchor. Refer to Table 2 for minimum and maximum recommended wire rope diameters.

Table 2 – Minimum and Maximum Wire Rope Size

Model	Minimum		Maximum	
	inch	mm	inch	mm
FA10	3/4	20	1-1/8	28

Installing Wire Rope
Refer to Dwg. MHP0166
1. Cut wire rope to length in accordance with the wire rope manufacturer's instructions.
2. Feed the end of the wire rope into the anchor hole in the drum and pull through approximately one foot (305 mm) of wire rope.



(Dwg. MHP0166)

3. Wrap the wire rope with wire a distance from the end equal to the wedge length plus one inch (25 mm).
4. Slide the sleeve over the end of the wire rope so the larger diameter of the taper bore is nearest the end of the wire rope.
5. Spread the end strands of the wire rope and insert the split wedge until it is below the end of the wire rope.
6. Pull the sleeve over the wire rope end until tight. Check that the wire rope strands stay in the slots located on the split wedge.
7. Pull the wire rope anchor into position in the drum anchor pocket.

⚠ CAUTION

• Make sure the first wrap of wire rope is tight and lays flush against the drum flange.

Safe Wire Rope Handling Procedures
1. Always use gloves when handling wire rope.
2. Never use wire rope which is frayed or kinked.
3. Never use wire rope as a sling.
4. Always ensure wire rope is correctly spooled and the first layer is tight against the drum.

Wire Rope Spooling
To compensate for uneven spooling and the decrease in line pull capacity as the drum fills up, use as short a wire rope as practical. When rewinding apply tension to the end of the wire rope to eliminate line slack. This helps achieve level winding and tight spooling.

Rigging
Make sure all wire rope blocks, tackle and fasteners have a sufficient safety margin to handle the required load under all conditions. Do not allow wire rope to contact sharp edges or make sharp bends which will cause damage to wire rope, **use a sheave**. Refer to the wire rope manufacturer's handbook for proper sizing, use and care of wire rope.

Safe Installation Procedures
1. Do not use wire rope as a ground (earth) for welding.
2. Do not attach a welding electrode to winch or wire rope.
3. Never run the wire rope over a sharp edge. Use a correctly sized sheave.
4. Always maintain at least three full, tight wraps of wire rope on the drum.

Air Supply

The air supply must be clean and free from moisture. The air consumption is 800 scfm (22 Nm^3/min) at rated operating pressure of 90 psig (6.3 bar/630 kPa) at the motor inlet.

Air Lines

The inside diameter of the winch air supply lines must not be less than the sizes shown in Table 3. Before making final connections, all air supply lines should be purged with clean, moisture free air or nitrogen before connecting to winch 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.

Table 3 – Minimum Allowable Air Supply Line Sizes

Model	inch	mm
FA10	1-1/2	38

Air Line Lubricator

Refer to Dwg. MHP0191

Always use an air line lubricator with these motors. The lubricator must have an inlet and outlet at least as large as the inlet on the motor. Install the air line lubricator as close to the air inlet on the motor as possible.

⚠ CAUTION

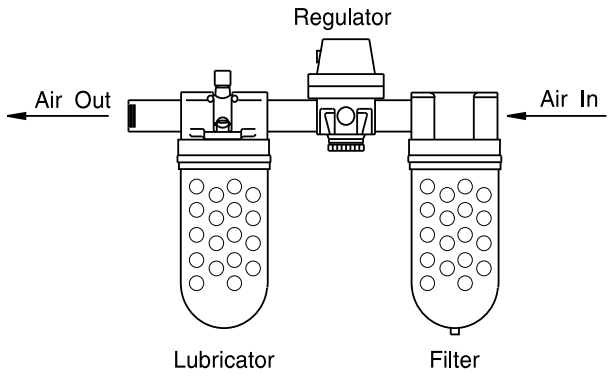
• Lubricator must be located no more than 10 ft. (3 m) from the motor inlet.

The air line lubricator should be replenished daily and set to provide 6 to 9 drops per minute of SAE 10W oil. A fine mist will be exhausted from the throttle control valve when the air line lubricator is functioning properly.

Air Line Filter

Refer to Dwg. MHP0191

It is recommended that an air line strainer/filter be installed as close as practical to the motor air inlet port, but before the lubricator, to prevent dirt from entering the valve and motor. The strainer/filter should provide 20 micron filtration and include a moisture trap. Clean the strainer/filter periodically to maintain its operating efficiency.



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Moisture in Air Lines

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

Motor

For optimum performance and maximum durability of parts, provide an air supply of 90 psig at 800 scfm (6.3 bar/630 kPa at 22 Nm^3/min) as measured at the motor inlet. The air motor should be installed as near as possible to the compressor or air receiver. Recommended pressures and volumes are measured at the point of entry to the air motor.

Initial Operating Checks

Winches are tested for proper operation prior to leaving the factory. Before the winch is placed into service the following initial operating checks should be performed.

1. When first running the motor inject some light oil into the inlet connection to provide initial lubrication.
2. When first operating the winch it is recommended that the motor be driven slowly in both directions for a few minutes.

For winches that have been in storage for a period of more than one month the following start-up procedure is required.

1. Give the winch an inspection conforming to the requirements of “Winches Not in Regular Use” in the “INSPECTION” section.
2. Pour a small amount of 10W oil in the motor inlet port.
3. Operate the motor for 10 seconds in both directions to flush out any impurities.
4. The winch is now ready for normal use.

OPERATION

The four most important aspects of winch operation are:
1. Follow all safety instructions when operating the winch.
2. Allow only people trained in safety and operation of this winch to operate this equipment.
3. Subject each winch to a regular inspection and maintenance procedure.
4. Be aware of the winch capacity and weight of load at all times.

⚠WARNING

• The winch is not designed or suitable for lifting, lowering or moving people. Never lift loads over people.

⚠ CAUTION

• To avoid damage to the rigging, the structure supporting the rigging and the winch, do not "two-block" the end of the wire rope.

Two blocking occurs when the winch wire rope is multi reeved using two seperate blocks which are allowed to come in contact with each other during winch operation. When this occurs extreme forces are exerted on the wire rope and sheave blocks which may result in equipment and or rigging failure.

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 winch operator must be carefully instructed in his duties and must understand the operation of the winch, 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 winch under unsafe conditions.

Winch Controls

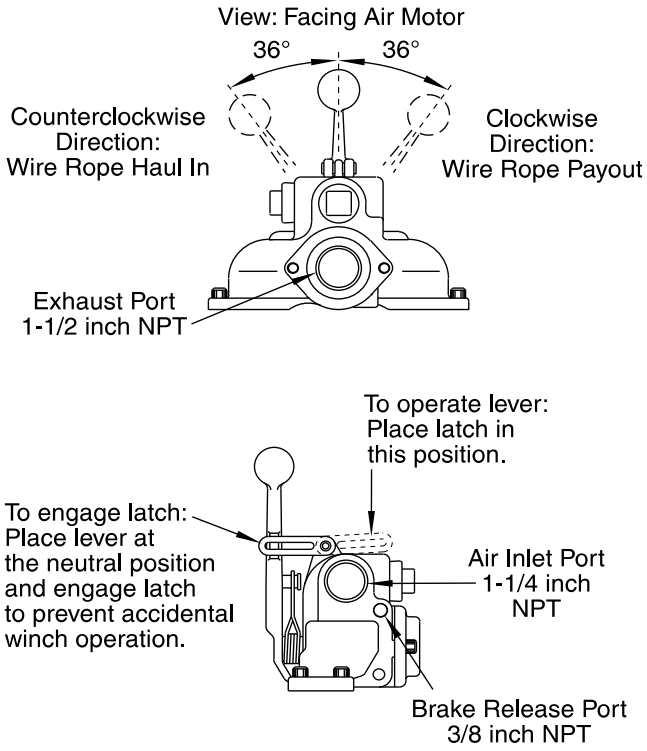
The spring loaded, motor mounted, live air manual throttle control valve is standard to, and normally supplied with, this winch. Optional motor throttle controls are available. Reference the model code on the winch nameplate and compare it to the "SPECIFICATIONS" section of this manual to determine your configuration. The throttle controls provide operator control of the motor speed and direction of drum rotation.

Winch Mounted Live Air Throttle (standard feature)
Refer to Dwgs. MHP0566 and MHP0165
The spring loaded, live air, manual control throttle valve (260) mounts directly to the air motor.
As viewed from the air motor end, move the control throttle handle to the right (clockwise) to pay out wire rope and to the left (counterclockwise) to haul in wire rope. Avoid sudden movements of the control valve to ensure smooth operation of the winch.

Remote Live Air Throttle (optional feature)
Refer to Dwg. MHP0161
Provides for the remote mounting of the winch control at a fixed location at up to 20 feet (6 metres) away from the winch motor. Air hoses connect the throttle to the winch motor to provide winch operation.

When viewed from the air motor end move the control throttle handle to the right (clockwise) to pay out wire rope and to the left (counterclockwise) to haul in wire rope. Avoid sudden movements of the control valve to ensure smooth operation of the winch.

Live Air Throttle Control Valves



(Dwg. MHP0566)

Remote Pilot Pendant Throttle (optional feature)
Refer to Dwg. MHP0167
Provides for remote winch control at distances of up to 50* feet (15 metres) away from the winch. The pendant pilot control throttle is a two lever movable control station for winch operation. Pilot pressure from the pendant pilot control throttle activates the winch control valve. The winch control valve, located on the winch motor, controls the motor speed and direction of drum rotation. Direction of rotation is determined by the pendant lever depressed.

* For distances greater than 50 feet (15 metres) contact **Ingersoll-Rand** Technical Support for control suitability.

Remote Pilot Lever Throttle (optional feature)
Refer to Dwg. MHP0167, item 358
Provides for remote winch control at distances of up to 50* feet (15 metres) away from the winch. The lever pilot control throttle is a fixed mount lever control station for winch operation. Pilot pressure from the lever pilot control throttle activates the winch control valve. The winch control valve, located on the winch motor, controls the motor speed and direction of drum rotation. Direction of rotation is determined by the direction in which the lever is shifted.

***** For distances greater than 50 feet (15 metres) contact **Ingersoll-Rand** Technical Support for control suitability.

Winch Brakes

Manual Drum Brake
Refer to Dwg. MHP0627
The manual drum brake may be applied by turning the handwheel (104) in a clockwise direction and released by turning handwheel counterclockwise. The brake must be kept properly adjusted to hold the required load. Refer to the "MAINTENANCE" section for adjustment instructions.

Automatic Disc Brake
Refer to Dwg. MHP0873
The automatic disc brake is a spring applied, air released brake. Using an air actuated, spring loaded brake piston (10), the brake automatically disengages when the motor is operated. Air pressure ported through the brake housing (21) shifts the brake piston (10) which overcomes spring pressure, disengages the friction plates (16) and releases the brake. When the control valve is placed in the neutral position, the air is vented and the springs (9) shift the brake piston to engage the brake and prevent drum rotation.

Emergency Lowering Procedure

⚠ CAUTION

• The following procedure describes the use of the winch to lower loads when the supply of air to the winch has been interrupted. The procedure must only be used on winches with a band brake and after all other established methods have been exhausted.

The lowering speed of the load using this procedure is dependent upon the weight of the load, amount of wire rope on the drum, and position of the load in the lifting system.
To use the winch to lower the load when the air supply has been interrupted conduct the following:
1. Engage the manual band brake.
2. Remove brake line between disc brake and motor. Connect a functioning air line to the disc brake port and pressurize to 50 psi (3.4 bar).
3. Slowly disengage manual band brake using the brake handwheel (104). Regulate speed of load using manual band brake.

Drum Locking Pin (optional feature)
Refer to Dwg. MHP0874
The drum locking pin is mounted to the winch on the outboard upright, (opposite end to the motor). It should be engaged if a load is temporarily suspended. The drum locking pin is operated by rotating a pin between two slots, one shallow and the other deep.
To engage:
1. Rotate the drum flange (80) to align one of the twelve holes with the lock pin (136). Pull out, straight away from the outboard upright, pull rod (140) and rotate 90°. Align pin (135) with the deep groove in gland and allow the spring loaded lock pin (136) to insert into the drum flange hole.

To disengage:
1. Pull out, straight away from the outboard upright, pull rod (140) and rotate 90°. Align pin (135) with the shallow groove in gland. Ensure locking pin (136) is clear of the drum (80) flange.

⚠ WARNING

• Ensure that all braking mechanisms are engaged and all personnel are clear of the winch load and rigging before disengaging the locking pin.
• Extremely difficult locking pin release is an indication that the load is held by the locking pin and the braking mechanisms are not functioning properly. Do not release the locking pin until load control is established.

LUBRICATION

To ensure continued satisfactory operation of the winch, all points requiring lubrication must be serviced with the correct lubricant at the proper time interval as indicated for each assembly.

The lubrication intervals recommended in this manual are based on intermittent operation of the winch eight hours each day, five days per week. If the winch is operated almost continuously or more than the eight hours each day, more frequent lubrication will be required. Also, the 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 the performance of the winch. Approval for the use of other lubricants must be obtained from your **Ingersoll-Rand** distributor. Failure to observe this precaution may result in damage to the winch and/or its associated components.

INTERVAL	LUBRICATION CHECKS
Start of each shift	Check flow and level of air line lubricator (approximately 6 to 9 drops per minute required at maximum motor speed).
	Check winch motor oil level.
Monthly	Lubricate components supplied by grease fittings.
	Inspect and clean or replace air line filter.
	Check reduction gear oil level.
Yearly	Drain and refill winch reduction gear oil.
	Drain and refill winch motor oil.

Note: Intervals are based on winch operation in a normal environment as described in the "INSPECTION" section. In 'Heavy' or 'Severe' operating conditions adjust lubrication intervals accordingly.

Recommended Lubricants

Oil

Temperature	Type Oil
Below 32° F (0° C)	SAE 10W
32° to 80° F (0° to 27° C)	SAE 20W
Above 80° F (27° C)	SAE 30W

Grease

Temperature	Type Grease
-20° to 50° F (-30° to 10° C)	EP 1 multipurpose lithium-based grease
30° to 120° F (-1° to 49° C)	EP 2 multipurpose lithium-based grease

Component Lubrication

General Lubrication

Correct lubrication is one of the most important factors in maintaining efficient winch operation.

1. 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 internal components. Refer to the "Recommended Lubricants" section.
2. Drain and replace oil in the motor, disc brake and reduction gear after the first 50 hours of initial winch operation. Thereafter, drain and replace oil according to the operating environment as defined by the "Periodic Inspection" interval table in the "INSPECTION" section, or more frequently if desired.
3. Always inspect removed oil for evidence of internal damage or contamination (metal shavings, dirt, water, etc.). If indications of damage are noted, investigate and correct before returning winch to service.
4. After winch operation, allow oil to settle before topping off.
5. Always drain oil into a suitable container and dispose of in an environmentally safe manner.

Motor

Refer to Dwg. MHP1007

The motor is splash lubricated by the oil in the motor housing and has no other means of lubrication. It is therefore important to use only quality, non-detergent motor oil to ensure maximum performance and minimum downtime for repairs. Refer to "Recommended Lubricants" in this section.

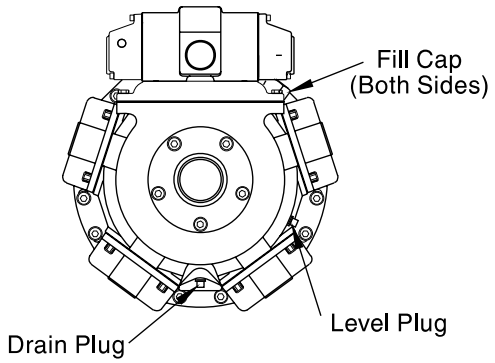
Oil capacity for the K5B-550 motor is 3 quarts (2.8 litres). Add oil through the filler opening until oil flows from the level plug hole. Baffles are installed in the motor at each motor fill port. Add oil slowly to prevent spilling.

The motor should be level checked daily, or at the start of each shift after any accumulated water has been drained off. When motors are operated in temperatures below freezing, wait long enough at end of shift for water to separate from oil but not long enough for it to freeze. Drain the water then refill to the level plug. If desired, all the oil may be drained at the end of the shift and the motor refilled with new oil.

Oil Capacities

COMPONENT	QUANTITY
K5B Motor	3 qts (2.8 litres)
Reduction Gear Assembly	5 qts (4.8 litres)
Disc Brake	Receives oil from Reduction Gear Assembly

Motor Lubrication Locations



(Dwg. MHP0565)

Reduction Gear Assembly
Refer to Dwg. MHP0567
The reduction gear assembly is filled and shipped with oil from the factory. Check oil level before initial winch operation.

To ensure correct performance, highest efficiency and long life, it is essential that the lubricating oil be maintained at the correct level. Rotate the drum until the fill plug is located at top dead center then add oil up to the level plug hole. Oil capacity for the reduction gear assembly is 5 quarts (4.8 litres).

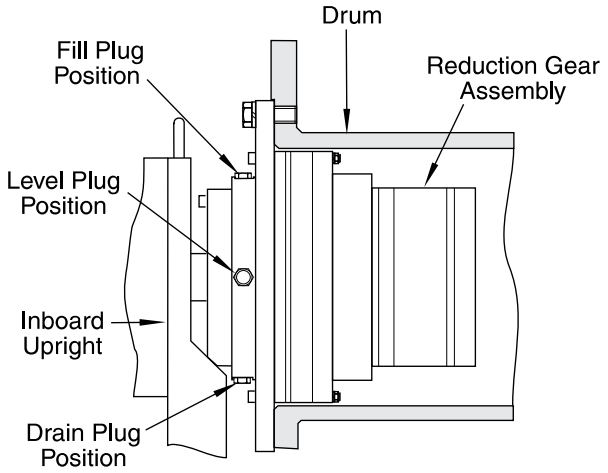
⚠ CAUTION

• Do not over fill. Excess oil will reduce operating efficiency and increase oil temperature.

To check oil level, position fill plug at the top. Remove fill plug, then slowly operate winch to rotate the fill plug hole to the 3 or 9 o'clock position. Check if oil runs out. Slowly reverse the procedure until fill plug hole is returned to the top position. Install fill plug.

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. Refer to "Recommended Lubricants" in this section.
Use only high quality lubricants in the reduction gear assembly such as motor oil, high grade EP type hydraulic oil or their equivalents.

Reduction Gear Lubrication Plug Locations



(Dwg. MHP0567)

Disc Brake
Oil from the reduction gear assembly also provides lubrication for the disc brake. After an oil change or winch overhaul remove the breather plug (22) and pour a small amount of oil (6 to 8 fluid ounces [0.2 litres.]) through the breather hole in the brake housing to initially lubricate the brake discs. Refer to "Recommended Lubricants" in this section. Reinstall the breather plug before operation of winch or brakes.

Seals and Bearings
If winch or components are disassembled, clean all parts thoroughly and coat bearings and seals with clean grease. Refer to "Recommended Lubricants" in this section. Use sufficient grease to provide a good protective coat. Lubricate grease fittings monthly with 2 or 3 pumps of a grease gun.

Drum Locking Pin (optional feature)
Refer to Dwg. MHP0874
Lubricate at least once every year, depending on the environment and duty cycle. Clean all parts thoroughly and coat with clean grease. Pack the gland cavity with grease. Refer to "Recommended Lubricants" in this section. Use sufficient grease to provide a good protective coat.
Lubrication will help to prevent rust and allow easier locking pin operation.

Wire Rope
Follow the wire rope manufacturer's instructions. At a minimum, observe the following guidelines.
1. Clean with a brush or steam to remove dirt, rock dust or other foreign material on the surface of the wire rope.

⚠ CAUTION

• Do not use an acid-based solvent. Only use cleaning fluids and lubricants specified by the wire rope manufacturer.

2. Apply a wire rope lubricant, **LUBRI-LINK-GREEN**® or SAE 30W oil.
3. Brush, drip or spray lubricant weekly, or more frequently, depending on severity of service.

INSPECTION

Inspection information is based in part on American National Standards Institute Safety Codes (ASME B30.7).

⚠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 winch 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 equipment operation. Periodic inspections are thorough inspections conducted by personnel trained in safety, operation and maintenance of this equipment. ASME B30.7 states inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage. 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 decided, 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.

Wire Rope Reports

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

Frequent Inspection

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

1. WINCH. Prior to operation, visually inspect winch housings, controls, brakes, side rails and drum for indications of damage. Do not operate the winch unless the wire rope feeds onto the drum smoothly, and any discrepancies noted have been reviewed and inspected further by personnel instructed in the operation, safety and maintenance of this winch.
2. WIRE ROPE. Visually inspect all wire rope which can be expected to be in use during the day's operations. Inspect for damage indicated by distortion of wire rope such as kinking, "birdcaging," core protrusion, main strand displacement, corrosion, broken or cut strands. If damage is evident, do not operate winch until the discrepancies have been reviewed and inspected further by personnel instructed in the operation, safety and maintenance of this winch.

NOTICE

• The full extent of wire rope wear cannot be determined by visual inspection. At any indication of wear inspect the wire rope in accordance with instructions in "Periodic Inspection."

3. AIR SYSTEM. Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any leaks or damaged components found.
4. CONTROLS. During operation of winch, verify response to control is quick and smooth. If winch responds slowly or movement is unsatisfactory, do not operate winch until all problems have been corrected.
5. BRAKES. During winch operation test brakes. Brakes must hold load without slipping. Automatic brakes must release when winch motor throttle is operated. If brakes do not hold load, or do not release properly, the brakes must be adjusted or repaired.

Periodic Inspection

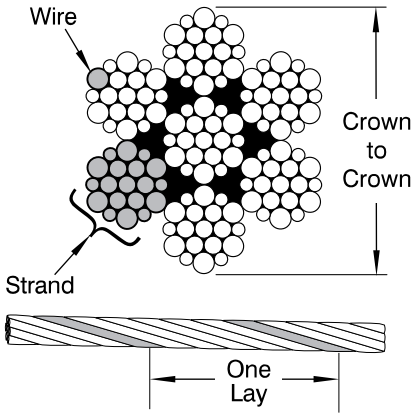
Periodic inspection intervals for winch use under various conditions is listed below:

NORMAL	HEAVY	SEVERE
yearly	yearly	quarterly

Disassembly may be required as a result of frequent inspection findings or in order to properly inspect the individual components. Disassembly steps are described in the "MAINTENANCE" section. Maintain written records of periodic inspections to provide an accumulative basis for continuing evaluation. Inspect all items listed in "Frequent Inspection." Also inspect the following:

1. SIDE RAILS and UPRIGHTS. Check for deformed, cracked or corroded main components. Replace damaged parts.
2. FASTENERS. Check retainer rings, split pins, capscrews, nuts, and other fasteners on winch, including mounting bolts. Replace if missing or damaged and tighten if loose.
3. DRUM AND SHEAVES. Check for cracks, wear or damage. Replace if necessary.
4. WIRE ROPE. In addition to Frequent Inspection requirements, also inspect for the following:
   a. Build-up of dirt and corrosion. Clean with steam or a stiff wire brush to remove dirt and corrosion if necessary.
   b. Loose or damaged end connection. Replace if loose or damaged.
   c. Check wire rope anchor is secure in drum.

d. Verify wire rope diameter. Measure the diameter of the wire rope from crown-to-crown throughout the life of the wire rope. Recording of the actual diameter should only be done with the wire rope under equivalent loading and in the same operating section as accomplished during previous inspections. If the actual diameter of the wire rope has decreased more than 1/64 inch (0.4 mm) a thorough examination of the wire rope should be conducted by an experienced inspector to determine the suitability of the wire rope to remain in service. Refer to Dwg. MHP0056.



(Dwg. MHP0056)

5. ALL COMPONENTS. Inspect for wear, damage, distortion, deformation and cleanliness. If external evidence indicates damage, disassemble as required to conduct a detailed inspection. Inspect gears, shafts, bearings, sheaves, springs and covers. Replace worn or damaged parts. Clean, lubricate and reassemble.
6. BRAKES. Individually test brakes installed to ensure proper operation. Brakes must hold a 125% rated load at full drum without slipping. If indicated, by poor operation or visual damage, disassemble and repair brake(s). Check all brake surfaces for wear, deformation or foreign deposits. If brake lining thickness is less than minimum, as described in the "MAINTENANCE" section, replace brakes. Clean and replace components as necessary.
7. FOUNDATION OR SUPPORTING STRUCTURE. Check for distortion, wear and continued ability to support winch and rated load. Ensure winch is firmly mounted and that fasteners are in good condition and tight.
8. LABELS AND TAGS. Check for presence and legibility of labels. Replace if damaged or missing.
9. GUARDS (optional feature). Check guards are in place and secure.

Winches Not in Regular Use

1. Equipment which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming to the requirements of "Frequent Inspection" before being placed in service.
2. Equipment which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection" before being place in service.
3. Standby equipment shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". In abnormal operating conditions equipment should be inspected at shorter intervals.

INSPECTION AND MAINTENANCE REPORT
Ingersoll-Rand Force 5 Series Air Winch

Model Number:	**Date:**
Serial Number:	**Inspected by:**

Reason for Inspection: (Check Applicable Box)

	1. Scheduled Periodic Inspeciton (___ Monthly ___ Yearly)	Operating Environment:
	2. Discrepancy(s) noted during Frequent Inspection	
	3. Discrepancy(s) noted during maintenance	Normal ___ Heavy ___ Severe ___
	4. Other: _____	

Refer to the Parts, Operation and Maintenance Manual "INSPECTION" section for general inspection criteria. Also, 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**	
Uprights and Side Rails					
Drum Band Brake (125% Load Test)					
Disc Brake (125% Load Test)					
Drum Band Brake (Visual Inspection)					
Disc Brake (Visual Inspection)					
Motor					
Limit Switches					
Controls					
Air System					
Fasteners					
Reduction Gears					
Labels and Tags			- - -		
Shafts					
Guards					
Wire Rope Anchor Wedge			- - -		
Other Components (list in NOTES section)					

TESTING	**Pass**	**Fail**	**NOTES**
Operational (No Load)			
Operational (10% Load)			
Operational (Maximum Test Load *)			

* Maximum test load is 125% of rated line pull at full drum.

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 winch symptoms, probable causes and remedies.

SYMPTOM	CAUSE	REMEDY
Winch will not operate.	No air supply to winch.	Check air supply line connections and hoses.
	Winch is overloaded.	Reduce load to within rated capacity.
	Disc brake does not release.	Pressurize disc brake release port and check for leakage. Replace brake piston seals if leakage is found.
	Shipping plugs may still be in place.	Remove shipping plugs in valve and motor exhaust ports.
Load continues to move when winch is stopped.	Drum brake is slipping.	Check drum brake adjustment and brake band lining wear.
	Winch is overloaded.	Reduce load to within rated capacity.
Winch does not lift load.	Motor may be damaged.	Remove and disassemble motor as described in the "MAINTENANCE" section. Examine all parts and replace any that are worn or damaged.
	Insufficient air supply.	Verify air supply pressure and volume at winch inlet meets the requirements listed in the "SPECIFCATIONS" section. Clean air line filter.
Throttle lever moves but winch does not operate.	Motor may be damaged.	Disassemble and clean the motor and replace any broken or damaged parts.
	Insufficient air supply.	Ensure the air pressure at the winch inlet is at least 90 psig (6.3 bar/630 kPa) at rated volume. Clean air line filter.
Motor runs hot or makes excessive noise during operation.	Low oil level.	Check oil levels in the motor. Drain or add oil as required to obtain the proper level.
	Improper lubrication.	Replace oil with type recommended in the "LUBRICATION" section applicable to the operating environment.
	Water in oil.	Drain and refill with oil. Operate winch with no load slowly, in both directions. If noise still exists or motor overheats disassemble and repair motor.
	Damaged or broken piston or connecting rod.	Disassemble and repair motor.
Winch runs slow.	Improper hose or fitting sizes.	Check fittings, connections and hoses for correct size and length. Replace parts that may cause restricted air flow. Inspect air line filter.
	Motor may be damaged.	Remove and disassemble motor as described in the "MAINTENANCE" section. Inspect all parts and replace all worn or damaged parts.
Air lines freeze.	Water in air supply.	Install or drain air system moisture traps, moisture collecting air receivers and compressor aftercoolers. After corrective actions have been taken, disconnect lines at winch inlet and purge with clean, dry air or nitrogen prior to attaching to and operating winch.

Automatic Disc Brake:

Brake fails to release.	Low air supply pressure.	Ensure the air pressure at the inlet to the disc brake is at least 50 psig (3.4 bar/340 kPa).
	Worn or damaged piston seals.	Inspect the brake breather. If air escapes from the brake breather when attempting to release the brake, the brake seals must be replaced.
	No release pressure at the brake port.	Check for proper operation of winch controls.
	Sticking brake piston.	Apply 50 psig (3.4 bar/340 kPa) to the brake release port and check for brake disc movement. (Brake discs can be viewed through the brake breather hole.) If brake discs do not move, disassemble and inspect the disc brake as described in the "MAINTENANCE" section.

⚠WARNING

• Never perform maintenance on the winch while it is supporting a load.
• Before performing maintenance, tag controls:
DANGER - DO NOT OPERATE -
EQUIPMENT BEING REPAIRED.
• Only allow personnel trained in safety and maintenance on this winch to perform service.
• After performing any maintenance on the winch, test winch to 125% of its rated capacity before returning to service.
• Turn off air system and depressurize air lines before performing any maintenance.

Maintenance Intervals

The Maintenance Interval chart is based on intermittent operation of the winch eight hours each day, five days per week. If winch operation is more than eight hours per day, or in heavy or severe environments, more frequent maintenance should be performed. Refer to "Periodic Inspection" in the "INSPECTION" section for additional information.

INTERVAL	MAINTENANCE CHECK
Start of each shift (Operator or Maintenance Personnel)	Make a thorough visual inspection of the winch for damage. Do not operate the winch if damaged.
	Operate the winch at low RPM in both directions. Winch must operate smoothly without sticking, binding or abnormal noises. Check the operation of the brake(s).
3 Months (Maintenance Personnel)	Inspect the drum brake friction linings. Clean or replace parts as required. Adjust drum brake as necessary.
Yearly (Maintenance Personnel)	Inspect the winch gearing, shafts and bearings for wear and damage. Repair or replace as necessary.
	Check all the supporting members, including the foundation, fasteners, nuts, sheaves and rigging, etc. for indications of damage or wear. Repair or replace as required.

Reduction Gear Assembly

It is recommend that the first oil change be done after approximately 50 hours initial operation. Always inspect removed oil for evidence of internal damage (metal shavings, dirt, water, etc.).

Check the oil in the reduction housing as recommended in the "LUBRICATION" section. If low, replenish. The oil should be changed at least once every year. Refer to the "LUBRICATION" section for recommended oil.

Adjustments

Disc Brake Adjustment

Disc brake adjustment is **not** required. If the disc brake does not hold the rated load disassemble and repair.
If the brake assembly is removed or disassembled ensure the breather (23) is installed and located at the top of the brake housing during reassembly.

Manual Drum Brake Adjustment

Refer to Dwg. MHP0627

1. Release wire rope tension on the drum.
2. Rotate handwheel (104) counterclockwise to release brake bands.
3. Loosen nut (120) and turn adjustment screw (127) to provide 1/16 to 1/8 inch (1.6 to 3.2 mm) gap between band lug and end of adjustment screw when brake is applied.
4. When correct gap is obtained tighten nut (120).
5. Check brake band is partially lifted from drum diameter to reduce drag when brake is not in use.

⚠CAUTION

• When any part of the brake lining thickness measures 0.062 inch (2 mm) or less, brake bands (128) must be replaced.

Pilot Air Control Valve Adjustment (optional feature)

Refer to Dwg. MHP0141
If winch operating speeds differ from performance specifications the pilot air control valve may require adjustment. Loosen nut (271) and adjust adjusting screw (270), located in the valve end cap (268), until drum speed for no-load haul-in equals the drum speed for full load pay-out. It is suggested that a chalk mark be placed on the drum flange so that drum rpm can be accurately counted.

Disassembly

General Disassembly Instructions

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the winch. Parts drawings are provided in the parts section.

If a winch 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 winch be performed in a clean dust free work area.
In the process of disassembling the winch, observe the following:

1. Never disassemble the winch 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 plastic mallet, 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 winch 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 winch.
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 a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
8. When removing ball bearings from shafts, it is best to use a bearing puller. When removing bearings from housings, drive out the bearing with a sleeve slightly smaller than the outside diameter of the bearing. The end of the sleeve or pipe which contacts the bearing must be square. Protect bearings from dirt by keeping them wrapped in clean cloths.

Removing Winch

Refer to Dwg. MHP0930

1. Remove the wire rope from the drum.
2. Operate the winch to position reduction gear drain plug at its lowest position.
3. Relieve pressure in the air lines by operating the winch control several times after the air supply has been disconnected.

⚠WARNING

• Shut off, bleed down and disconnect the air supply line before performing any disassembly procedures.
• The weight of a winch with a 24 inch long drum and no wire rope is 3550 lbs (1610 kgs). Exercise caution when lifting and moving winch.

4. Disconnect and tag the air lines.
5. Remove the winch from its mounting and take to a suitable work area before beginning disassembly.
6. Remove lower case drain plug (225) on K5B motor housing (217) and allow the oil to drain into a suitable container. Loosen fill cap (210) to vent the motor housing.
7. Drain oil from the reduction gear assembly by removing one plug (406) when positioned at it's lowest point. Refer to Dwg. MHP0567 in the "LUBRICATION" section.
8. For winches with a disc brake remove pipe plug (24) in brake housing (21) to drain brake oil. If the winch is equipped with a drum band brake the winch outboard end (opposite the motor end) must be elevated to prevent draining oil from contaminating the brake band lining.

⚠WARNING

• The K5B air motor weighs approximately 260 lb. (118 kg). Adequately support the air motor before removing the motor mounting capscrews.

Motor Removal

Refer to Dwg. MHP1007

1. For winches with a disc brake, remove air line (27) and fittings from control valve to brake housing (21).
2. Remove capscrews (4) and lockwashers (3) securing the motor assembly to the motor adapter (6).
3. Using a hoist to support the motor, pull the motor straight away from the winch. Refer to the "Motor Disassembly" section if motor disassembly is required.

Disc Brake Removal

If your winch does not have a disc brake go to 'Motor Adapter and Drive Shaft Removal' section.

Refer to Dwg. MHP0873

1. Alternately and evenly loosen the eight capscrews (1) until the brake spring compression has been relaxed. Remove capscrews, motor adapter (6) and 'O' ring (15).
2. Remove reaction plate (8) and springs (9).
3. Remove seal sleeve (14). Remove 'O' ring (13) from inside sleeve (14).
4. Remove the brake housing (21) and 'O' ring (33). If the brake housing sticks, tap it with a plastic mallet until the parts separate.
5. Remove the five friction plates (16) and four drive plates (17).
6. Remove brake piston (10) from brake housing (21). Tap lightly with a plastic mallet to separate parts if necessary.
7. Remove seals (11 and 12) from brake piston (10).
8. Remove retainer ring (18) from input shaft (7) and remove splined hub (19).
9. Remove retainer ring (36) from inside drum shaft (41) and pull out input shaft (7) along with bearing (37). If necessary tap with plastic mallet.
10. If coupling (49) came out with input shaft (7) remove at this time. If not reach into drum shaft (41) and remove coupling (49). Remove retainer ring (45) from inside coupling (49).
11. Remove retainer ring (38) from input shaft (7) and press shaft out of bearing (37).

Motor Adapter and Drive Shaft Removal

Refer to Dwg. MHP0930

This section applies to winches without a disc brake only.

1. Remove capscrews (1).
2. Remove motor adapter (6) and 'O' ring (33).
3. Remove sleeve (14) and 'O' ring (13) from inside sleeve (14).
4. Remove 'O' ring (5).
5. Remove retainer ring (36) from inside drum shaft (41) and pull out input shaft (7) along with bearing (37). If necessary tap with plastic mallet.
6. If coupling (49) came out with input shaft (10) remove at this time. If not reach into drum shaft (41) and remove coupling (49). Remove retainer ring (45) from inside coupling (49).
7. Remove retainer ring (38) from input shaft (7) and press shaft out of bearing (37).

Frame Disassembly

Refer to Dwg. MHP0930

1. Support the drum (96).
2. Remove capscrews (182) and lockwashers (181) which secure the side rails (98) to the inboard upright (42). Drive out dowel pins (183).
3. Remove inboard upright (42).
4. Remove capscrews (39) from drum shaft (41). Drive out dowels (40). Pry drum shaft (41) from upright (42).
5. Remove 'O' ring (43).

Manual Drum Brake Disassembly

If your winch does not have a band brake go to step 7.

Refer to Dwg. MHP0627

1. Remove nuts (102), lockwashers (103) and U-bolts (109).
2. Remove nut (110), handwheel (104), bearing (111) and tube (112).
3. Pull out brake screw (114). Catch spring (113) as brake screw clears.
4. Remove capscrews (116) and lockwashers (117). Remove anchor (118) and plate (122).
5. Slide brake band halves (128) off drum (96).
6. Remove capscrews (124) and nuts (115) and separate brake band halves.
7. Remove capscrews (196) and lockwashers (3).
8. Tap end cover (193) loose and remove.
9. Remove capscrews (192).
10. Remove shaft retainer (191).

11. Remove spacer (189).
12. Remove the remaining capscrews (182) and lockwashers (181) which attach the side rails (98) to the outboard upright (184). Drive out the remaining dowel pins (183) and remove side rails (98).
13. Pull outboard upright (184) away from drum (96).
14. Remove bearing (188) and seal (187).

Reduction Gear Removal

Refer to Dwg. MHP0930

1. Position the drum (97) vertically (with the reduction gear assembly facing up).
2. Remove capscrews (39) holding the drum adapter (52) onto the drum.
3. Install two 1/2 -13 NC x 2 inch capscrews into the threaded holes in the outer bolt pattern ring of the drum adapter (52). Use these capscrews as jacking bolts to break the seal. Attach suitable lifting eyes to each of the bolts and lift the reduction gear assembly out of the drum and place on a clean work surface.
4. Remove all plugs (406) from reduction gear.
5. Remove capscrews (50) and nuts (48). Using a hammer and punch, tap dowel pins (51) into support (405). With a plastic mallet, tap adapter ring (52) until it is free of support (405).
6. Replace plugs (406) and loosely tighten.

NOTICE

• It is extremely important to maintain a clean work area when the reduction gear assembly is disassembled.

Reduction Gear Disassembly

Refer to Dwg. MHP0875

1. Place the reduction gear assembly on a clean work bench. Have a couple of wooden blocks available to prevent assembly from rolling around. There will also be a small amount of oil remaining in housing so have some absorbent material readily available.
2. Using a hammer and punch, tap spring pins (404) in, until they are completely in input housing (424).
3. Remove capscrews (401) and using a plastic mallet, tap seal support (400) until loose and remove.
4. Remove oil seal (402) and 'O' ring (403).
5. Remove capscrews (425).
6. Using a plastic mallet tap support (405) and ring gear (409) to separate.
7. Remove 'O' ring (408) and ball bearing (407).
8. Pull out planetary support (410) assembly.
9. From planet gear side reach into planetary support hub and remove retainer ring (420). Spacer (422) may be on shaft (445) or still in spacer (418). Remove at this time.
10. Push spacer (418) out of planetary support and remove 'O' ring (419).

NOTICE

• Do not disassemble planetary gears from their housings unless required to replace damaged parts. The following disassembly directions 11 and 12 apply only to the planetary gears (415) housed in the planetary support (410). For information on the other planetary assemblies (430 and 440) contact your Ingersoll-Rand distributor or the factory.

11. Place planetary support (410) in a container. Holding the planet gear (415) with one hand, slowly push the planet gear shaft (417) out of the support. Carefully remove the planet gear. When thrust bearings (413) become free squeeze together with fingers. Once spring pins (412) are free they may fly out or roller bearings (414) might start to fall out. Remove planet gear assembly and carefully place in container.
12. Slide thrust bearings (413) off ends of planet gear (415) and push out all roller bearings (414) into container.
13. Separate ring gear (409) from input housing (424) and remove 'O' ring (408).
14. Remove spacer (423).
15. Remove capscrews (439).
16. Separate input housing (424) from ring gear (436) and remove 'O' ring (434).
17. Remove retainer ring (427) from input housing (424) and pull out cylinder roller bearing (426).
18. Remove sun gear (429) and spacer (428), separate the two.
19. Remove planetary assembly (430).
20. Remove sun gear (433) and spacer (422), separate the two.
21. Remove retainer ring (435) from sun gear (433).
22. Tap out dowel pins (437). Separate ring gear (436) from input housing (438) and remove 'O' ring (434).
23. Tap out dowel pins (443). Remove capscrews (448) and separate input housing (438) from ring gear (444) and end cover (446).
24. Remove planetary assembly (440) and 'O' ring (442).
25. Remove 'O' ring (442) and shaft (445).
26. Remove capscrews (452) and separate front cover (450). Remove thrust plate (449) and gasket (447).
27. Remove adjusting screw (453).

K5B Motor Disassembly

Refer to Dwg. MHP01007

1. Remove the five capscrews (253) from the exhaust flange (254). **DO NOT** remove the two capscrews (255) from the throttle valve assembly (260).
2. Remove the rotary valve housing (247) by pulling it out of the motor housing (217) as an assembly with the exhaust flange (254).

⚠ CAUTION

• Do not remove the exhaust flange (254) until the rotary valve (250) has been removed from the rotary valve housing (247).

3. Remove rotary valve (250) by pulling it out from the assembly through the motor housing end of the rotary valve housing (247).
4. Remove exhaust flange (254) and throttle valve assembly (260) by removing capscrews (255) and (257) and lockwashers (223), respectively.
5. Remove each cylinder head (201) by removing the four capscrews (200). Remove head gasket (209) and discard.
6. Remove mounting flange (216) by removing capscrews and then pulling mounting flange straight off.
7. Position the piston (204) at the top of its stroke. In this position, the wrist pin (203) can be removed. Remove one retainer ring (205) from either side of piston (204). Push the wrist pin (203) out by hand from one side. If the wrist pin is too tight it is acceptable to carefully heat the piston to 200° F (93° C) or less and then push the wrist pin out.

NOTICE

• If piston, wrist pin, connecting rod or cylinder head are to be reassembled, number each set. Also add radial alignment marks for each piston and cylinder head to the motor housing.

8. Remove the remaining pistons as described in step 7 as required. To remove the crank assembly, all pistons and cylinder heads must be removed.
9. Crank assembly (231) can now be removed, with the oil slinger (230), by pulling straight out from the motor housing (217). Use care while guiding the connecting rods (206) through the inside of the motor housing.

Crankshaft Disassembly

1. Remove cotter pin (236) and the pin nut (237).
2. Remove lock pin (235) by carefully driving it out of its location. Use care not to damage the threads.
3. Pull the crankshaft valve end (231) off the crankshaft.
4. Remove connecting rod rings (234), connecting rod bushing (233), sleeve (232) and connecting rods (206). Record the five connecting rod (206) numbers and foot directions so they can be reinstalled in the same order.
5. Oil slinger (230) does not have to be removed unless damaged. If removal is required heating of the five screws (229) may be required to loosen the Loctite® connection.

K5B Motor Live Air Throttle Valve Disassembly

Refer to Dwg. MHP0165

NOTICE

• Match mark throttle valve parts to ensure proper reassembly.

1. Remove the two capscrews (302) and lockwashers (304) that hold the valve retainer (305).
2. Mark the square end on the valve body (316) and the handle (300) to ensure correct orientation during reassembly.
3. Drive out pin (301) and remove handle (300).
4. Note the spring (303) position before removing it. Pull valve body (316) out of the valve bushing (314) while disconnecting the spring (303).
5. Remove seal rings (315) from valve body (316).
6. Inspect parts for score marks or wear.
7. Measure clearance between the valve bushing (314) and valve body (316). To prevent excessive air leakage, the maximum allowable clearance is 0.002 inch (0.05 mm). If clearance is excessive replace complete valve body with valve bushing. The components are manufactured as a matched set.

Drum Locking Pin Disassembly

1. Ensure pull rod (140) is engaged in the gland deep groove to relieve spring compression.
2. Depress the lock pin (136) into the gland cavity to allow access to the retainer ring (138).
3. Remove retainer ring (138) from pull rod (140). Release spring tension by slowly removing the lock pin (136) from gland cavity.

Cleaning, Inspection and Repair

Clean all winch component parts in solvent (except the drum brake bands and disc brake friction plates). The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments on the housings, frame and drum. If bushings have been removed it may be necessary to carefully remove old Loctite® from the bushing bores. Dry each part using low pressure, filtered compressed air. Clean the drum brake band using a wire brush or emery cloth. Do not wash the drum brake band in liquid. If the drum brake band lining is oil soaked, it must be replaced.

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 drum band brake lining for oil, grease and glazing. If the drum band brake lining is oil-soaked replace the brake bands as a set. Remove glazed areas of band brake lining by sanding lightly with a fine grit emery cloth.
6. Measure the thickness of the drum band brake lining. If the drum brake band lining thickness is less than 0.062 inch (2 mm) anywhere along the edges replace the brake bands (128) as a set.

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

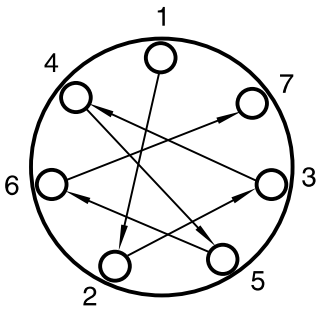
General instructions

- use all new gaskets and seals.
- replace worn parts.
- assemble parts using match marks attached during disassembly. Compare replacement parts with originals to identify installation alignments.
- lubricate all internal parts with a mixture of half oil (as recommended in the “LUBRICATION” section) and half molybdenum disulfide lubricant compound (eg. STP).
- when torquing capscrews and the pattern contains over three capscrews, use a crossing tightening sequence. Refer to Dwg. MHP0990.

  Tighten capscrews in three steps to prevent warping and provide a tight seal.

  1. Snug all capscrews.

2. Tighten all capscrews to 1/2 final torque value (using a crossing pattern).
3. Tighten to final torque (using a crossing pattern).



(Dwg. MHP0990)

K5B Motor Live Air Throttle Valve Assembly
Refer to Dwg. MHP0165

NOTICE

• During assembly align parts using match marks made during disassembly.

1. Install seal rings (315) on each end of valve body (316).
2. Install valve body (316) into valve bushing (314).
3. Insert valve bushing (314) into valve housing (311). Ensure ports in bushing and flat cutout in valve body are properly aligned with housing ports as shown in Dwg. MHP0165.
4. Install valve retainer (305) and secure with two capscrews (302) and lockwashers (304). Torque capscrews to 25 ft. lbs. (34 Nm).
5. If removed, reinstall spring retainer stud (306) and torque to 25 ft. lbs. (34 Nm).
6. Install spring (303) and handle (300) on square shaft of valve body (316). The spring (303) ends must straddle the spring retainer stud (306) on throttle handle (300). Install roll pin (301).
7. Check throttle handle moves fully left and right without sticking or binding. Throttle handle should center, by spring force, automatically when released.

K5B Motor Assembly
Refer to Dwg. MHP1007

1. Assemble throttle valve assembly (260), gasket (248) and exhaust flange (254) to rotary valve housing (247) using four capscrews (257) and lockwashers (223). Install the two capscrews (255) and lockwashers (256) that attach exhaust flange (254) to throttle valve housing.
2. Tighten capscrews (255 and 257) to 25 ft. lbs. (34 Nm). Throttle handle should move fully left and right without sticking or binding, and should center (by spring force) automatically when released.
3. Install bearing (252) on rotary valve (250) by pressing only on the inner race of the bearing. With the exhaust flange (254) down install rotary valve (250) into rotary valve housing (247). Slide rotary valve out of the rotary valve housing far enough to install seal ring (251) on the crank shaft end of the rotary valve (250). Slide rotary valve back into the rotary valve housing (247).
4. Install 'O' ring (244) into motor housing (217).
5. Install the rotary valve housing gasket (243) onto rotary valve housing (247). With the exhaust flange down on the bench, install motor housing (217) on to rotary valve housing (247). Check for any evidence of damage to 'O' ring (244) when the rotary valve housing is fully engaged. Install capscrews (253) and torque to 50 ft. lbs. (68 Nm).
6. If removed press crank bearing (228) on crank shaft assembly (231). Press only on the inner race of the bearing.
7. Place crank assembly (231) on a work bench with the oil slinger (230) down and slide the sleeve (232) (with tang up) on the crankpin.
8. Slide connecting rod bushing (233) over the sleeve (232) and first connecting rod ring (234) with the chamfer up.
9. Install the connecting rods (206) in the same order as removed, with all feet pointing in the same direction, using the first connecting rod ring (234) to hold one side of the connecting rod feet.
10. Slide the second connecting rod ring (234) over the other side of the connecting rod feet with the chamfer on the ring facing down (toward the stem of the connecting rod).
11. Slide the crank shaft (231) (valve end) over the crankpin while simultaneously aligning the tang on sleeve (232) with the slot in the crank shaft.
12. Rotate and position the crank shaft (valve end) relative to the crankpin to allow installation of the lock pin (235).
13. Tap the lock pin (235) in place and install the pin nut (237). Torque nut to 60 ft. lbs. (81 Nm).
14. Install cotter pin (236).
15. Install roll pin (240) and bearing (228) into the valve end of the crank shaft.
16. Check that all connecting rods move freely around the crank. Position the crank assembly (231) into the motor housing (217) with the bearing (228) seated and connecting rods (206) centered in the cylinder holes.

NOTICE

• Make certain that the roll pin (240) and the three lugs on the rotary valve (250) line up with the corresponding hole and lugs on the crank shaft.
• Do not allow the rotary valve (250) to slide back in rotary valve housing (247). If the rotary valve slides in too far, the seal ring (251) will lockup in the internal grooves of the rotary valve housing (247) and restrict further assembly.

17. Rotating the crank assembly, position one connecting rod (206) at the top of its stroke. Install a piston (204) with its rings (202 and 207) to the connecting rod (206) with wrist pin (203) and retaining rings (205).
18. Install a new cylinder head gasket (209) before installing the cylinder head (201).
19. Install the cylinder head (201) over the piston (204) by compressing both piston rings (202 and 207). Secure cylinder head to motor housing (217) with four capscrews (200). Torque capscrews to 60 ft. lbs. (81 Nm).
20. Repeat Steps 17 through 20 with the remaining cylinders.

NOTICE

• When installing the two lowest cylinder heads (201), use seal washers on capscrews (200).

21. Rotate motor by hand. Motor should rotate without binding.
22. Install mounting flange (216) and gasket (226) on large base side of the motor housing (217). Make sure notches on both parts are aligned. Temporarily secure parts with one capscrew (4), lockwasher (3) and a 1/2-NC nut.
23. Lightly lubricate 'O' ring (5) and install in groove on motor adapter (6).

NOTICE

• 'O' ring (5) listed in step 23 refers to part number 51459 as shown on winch assembly Dwg. MHP0930. This part must be placed between the mounting flange (216) and motor adapter (6).

24. Install eye bolts (213) and vent cap assemblies (210) in the motor housing (217).
25. Ensure oil drain (225) and level plugs (218) are installed.

Reduction Gear Assembly
Refer to Dwg. MHP0875

NOTICE

• During assembly of components apply a light coat of Loctite® 242 to all threaded fasteners. Clean all mating surfaces. 'O' rings can be held in place with a coating of EP grease applied to groove.
• It is extremely important to maintain a clean work area when the reduction gear assembly is reassembled. During reassembly clean each part thoroughly and lightly coat with the appropriate lubricant as described in "Recommended Lubricants" of the "LUBRICATION" section.

1. If removed, install the planetary gears (415) into the planetary support (410) as follows:
   a. Install a pair of spring pins (412) into the holes in the planetary support (410).
   b. Install and center roller spacer (416) in planet gear (415) bore.
   c. Place 40 roller bearings (414) in each side of the planet gear (415), a light coat of grease will help to hold them in place. Place a thrust bearing (413) on each side of the planetary gear assembly and squeeze.
   d. Depress one spring pin (412) and slide planetary gear assembly over it. Depress the other side and tip the gear assembly into the planetary support. Rotate gear assembly around spring pins until shaft hole aligns.
   e. Push planet gear shaft (417) into place. Repeat for remaining two gear assemblies.
   f. Ensure each planet gear (415) rotates freely, without sticking or binding.
2. Fasten thrust plate (449) to front cover (450) with screws (453) and loosely tighten.
3. Place a new gasket (447) on end cover (446). Install capscrews (452) through front cover (450), gasket (447) and into end cover (446) and tighten.
4. Lubricate and install new 'O' ring (442) into groove on end cover (446). Apply a bead of Loctite® 515 sealant to mating surface.
5. Align ring gear (444) with spring pins (443) and press ring gear on end cover (446). Apply a bead of Loctite® 515 sealant to mating surface.
6. Lubricate and install new 'O' ring (442) into input housing (438).
7. Slide shaft (445) into planetary assembly (440). Insert this assembly into ring gear (444).
8. Align spring pins (443) with input housing (438) and press down.
9. Insert capscrews (448) through end cover (446) and into input housing (438) and torque to 50 ft. lbs. (67 Nm).
10. Lubricate and install new 'O' ring (434) into groove on input housing (438). Apply a bead of Loctite® 515 sealant to mating surface.
11. Align ring gear (436) with spring pins (437) and press down.
12. Install retaining ring (435) onto sun gear (433) and slide down shaft (445) into planetary assembly (440).
13. Install spacer (422) into sun gear (433).
14. Install planetary assembly (430) into ring gear (436).
15. Slide sun gear (429) onto shaft (445) and into planetary assembly (430). Insert spacer (428) into sun gear (429).
16. Insert bearing (426) into input housing (424). Install retainer ring (427).
17. Lubricate and install new 'O' ring (434) into groove on input housing (424). Apply a bead of Loctite® 515 sealant to mating surface.
18. Align spring pins (437) with input housing (424) and press down.
19. Insert capscrews (439) through input housing (438) and into input housing (424) and torque to 145 ft. lbs. (195 Nm).
20. Insert spacer (423) into input housing (424) with bevel facing housing.
21. Lubricate and install new 'O' ring (419) onto outer groove on spacer (418). Insert spacer (422) into center recess in spacer (418). Place this assembly into planetary support (410) from the planet gear end.
22. Insert retainer ring (420) in planetary support to hold spacer assembly in place.
23. Lubricate and install new 'O' ring (408) into groove in input housing (424). Apply a bead of Loctite® 515 sealant to mating surface.
24. Align ring gear (409) with spring pins (404) and push down.
25. Insert planetary support assembly into ring gear (409).
26. Lubricate and install new 'O' ring (408) into groove in support (405). Apply a bead of Loctite® 515 sealant to mating surface.
27. Align support (405) with spring pins (404) and push down.
28. Insert capscrews (425) through input housing (424) into support (405) and torque to 220 ft. lbs. (295 Nm).
29. Insert ball bearing (407) into support (405).
30. Insert oil seal (402) into seal support (400) (lip facing out).
31. Lubricate and install new 'O' ring (403) in groove in support (405). Apply a bead of Loctite® 515 sealant to mating surface.
32. Align bolt holes with seal support (400) and support (405).
33. Insert capscrews (401) through seal support, into support and tighten.
34. Turn adjusting screw (453) in until end play is eliminated then back it out two turns.

Reduction Gear Installation
Refer to Dwg. MHP0930

NOTICE

• During assembly of components apply a light coat of Loctite® 242 to all threaded fasteners.
• Clean all mating surfaces. 'O' rings can be held in place with a coating of EP grease applied to groove.

1. Place drum (96) in vertical position, with reduction gear side facing up.
2. Remove plugs (406) from reduction gear support (405). Apply a bead of Loctite® 515 sealant on the reduction gear surface that mates with the adapter (52).
3. Place adapter (52) on reduction gear and align bolt holes. There is one place on the adapter with no hole, this should be positioned over one of the plug (406) holes. This becomes the drain/fill location (the other 3 plugs will be blocked). Install capscrews (50) through adapter (52) and attach nuts (48), torque to 205 ft. lbs. (278 Nm). With a hammer and punch, drive spring pins (404) into adapter (52) until about 1/16 inch (1.5 mm) below the surface.

4. Apply a bead of Loctite® 515 sealant to surface of the drum (96) where the adapter (52) will mate.
5. Install two 1/2 in.-13 NC x 2 in. capscrews with suitable lifting eyes into the threaded holes in the outer bolt pattern ring of the drum adapter (52). Lift the reduction gear assembly into drum (96). Align the bolt holes and install capscrews (39) through adapter (52) and into drum (96), torque to 205 ft. lbs. (278 Nm).
6. Place drum in horizontal position.

Manual Drum Brake Assembly (optional feature)
If your winch does not have this option go to next section.
Refer to Dwg. MHP0627
1. Clamp top of brake bands (128) together with a C-clamp.
2. Slide this assembly over drum (96).
3. Install capscrew (124) and nut (115) through bottom blocks on brake bands (128) and tighten.
4. Remove C-clamp.
5. Install brake screw (114) through lugs on top of brake bands (128), with spring (113) located between lugs.
6. Slide tube (112) over brake screw (114) followed by bearing (111).
7. Thread handwheel (104) onto brake screw (114) and loosely tighten.
8. Thread nut (110) onto brake screw (114) until 1/4 inch (6.5 mm) of threads are exposed.
9. Place anchor (118) over rear lug on bands (128). Rotate bands (128) until bolt holes in anchor align with holes in rear side rail (98).
10. Install capscrews (116) and lockwashers (117) through anchor (118), side rail (99) and into plate (122) and tighten.
11. Install adjustment screw (127) through nut (120) and into support (126). Expose 1/4 inch (6.5 mm) of threads.
12. Install capscrews (119) and lockwashers (117) through side rail (98) and into support (126) and tighten.
13. Tighten handwheel (104) all the way tight. Screw adjustment screw up or down until there is 1/16 to 1/8 in. (1.6 to 3.2 mm) clearance between screw (127) and lug on brake band (128).
14. When handwheel is loosened, brake band (128) should NOT touch drum surface. If band does touch drum then decrease gap in 1/16 inch (1.5 mm) increments until band does not touch.
15. With handwheel (104) fully tightened, place capscrews (106) through lockwashers (107) and bracket (108) into brake band (128). Tighten loosely.
16. Place U-bolt (109) over tube (112) and through bracket (108). Place lockwashers (103) and nuts (102) onto U-bolt (109) and tighten loosely.
17. Move bracket (108) up or down until tube (112) is level. Tighten capscrews (106) and nuts (102).

Frame Assembly
Refer to Dwg. MHP0930

NOTICE

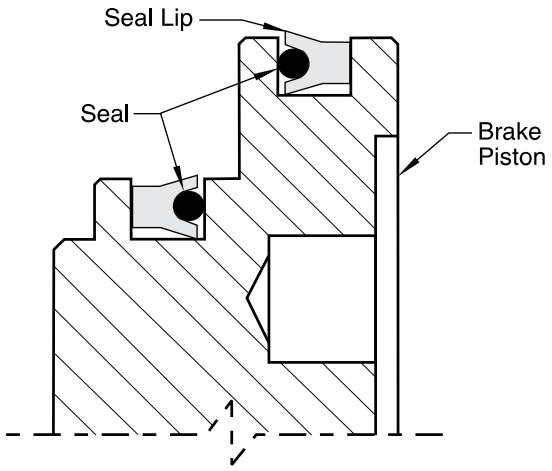
• During assembly of components apply a light coat of Loctite® 242 to all threaded fasteners.
• Clean all mating surfaces. 'O' rings can be held in place with a coating of EP grease applied to groove.

1. Install oil seal (187) in outboard upright (184) with lip toward drum.
2. Pack bearing (188) with grease and install in outboard upright (184).
3. Install outboard upright (184) on the drum end. Ensure assembly is kept centered on seal and journal during this step.
4. Install shaft retainer (191). Secure by installing capscrews (192) and torque to 30 ft. lbs. (41 Nm).
5. Install spacer (189).
6. Apply a bead of Loctite® 515 sealant to the mating surface of the outboard upright (184) and install end cover (193). Secure with capscrews (196) and lockwashers (194), torque to 30 ft. lbs. (41 Nm).
7. Lubricate and install 'O' ring (43) onto drum shaft (41).
8. Insert drum shaft (41) into inboard upright, aligning dowel pin holes.
9. Install dowel pins (40) flush or slightly below surface of drum shaft (41).
10. Install capscrews (39) and torque to 125 ft. lbs. (170 Nm).
11. Install inboard upright (42) onto reduction gear input shaft. Ensuring that splines on drum shaft (41) align with splines on reduction gear.
12. Install side rails (98) to uprights (42 and 184) and loosely secure using capscrews (182) and lockwashers (181).
13. Tap dowel pins (183) into position until flush with the side rails.
14. Tighten the capscrews (182) evenly. Torque to 140 ft. lbs. (190 Nm).

Motor Adapter and Drive Shaft Installation
If your winch has a disc brake assembly go to the next section.
1. Remove seals from bearing (37). Lightly coat input shaft (7) with Loctite® 609 and press bearing (37) onto input shaft (7). Install retainer ring (38).
2. Insert retainer ring (45) into the middle of coupling (49). Place onto reduction gear end of input shaft (7).
3. Install input shaft assembly into the drum shaft (41). Install retainer ring (36) in bore of drum shaft (41).
4. Lubricate and install 'O' ring (33) into back groove of motor adapter (6).
5. Mount motor adapter (6) to drum shaft (41). There is one pair of bolt holes in the outer pattern that are centered on a pair of bolt holes on the inner pattern. The small diameter outside pattern are motor mounting holes. The large diameter inside pattern are motor adapter mounting holes. This matched pair should be in the 6 o'clock position.
6. Install capscrews (1) and torque to 125 ft. lbs. (170 Nm).

Disc Brake Installation.
Refer to Dwg. MHP0873
1. Remove seals from bearing (37). Lightly coat input shaft (7) with Loctite® 609 and press bearing (37) onto input shaft (7). Install retainer ring (38).
2. Insert retainer ring (45) into the middle of coupling (49). Place onto reduction gear end of input shaft (7).
3. Install input shaft assembly into the drum shaft (41). Install retainer ring (36) in bore of drum shaft (41).
4. Slide splined hub (19) onto input shaft (7), gear teeth side in first. Install retainer ring (18).
5. Place five friction plates (16) and four drive plates onto splined hub (18). Lubricate all plates with 10W oil. Starting with a friction plate (16), then drive plate (17) until all plates are used.
6. Lubricate and install 'O' ring (33) into back of brake housing (21).
7. Locate brake port. This should be 45 degrees to the right of top center. There are two other ports which should be straight up and straight down (one becomes the drain the other becomes the vent).
8. Install pipe plug (24) into lower port in brake housing (21). Install reducer bushing (22) and breather (23) into top port on brake housing (21).
9. Slide brake housing (21) over brake plates. Apply a coating of 10W oil to inside surface of brake housing (21).

10. Lubricate and install seals (11 and 12) in brake piston (10) grooves so lips face each other. Do not over stretch seals during this procedure. Refer to Dwg. MHP0139.



(Dwg. MHP0139)

11. Install brake piston assembly into brake housing (21), ensuring that lips of seals are not pinched or rolled over. Gently tap into position using a plastic mallet until seated (cover brake port, during tapping, oil can spray out).
12. Lubricate and install brake springs (9) into each brake piston hole.
13. Lubricate and install 'O' ring (15) into top groove in brake housing (21).
14. Tap reaction ring (8) into motor adapter (6).
15. Mount motor adapter (6) to drum shaft (41). There is one pair of bolt holes in the outer pattern that are centered on a pair of bolt holes on the inner pattern. The small diameter outside pattern are motor mounting holes. The large diameter inside pattern are brake housing mounting holes. This matched pair should be in the 6 o'clock position.
16. There are two methods to compress the springs (9) and fasten capscrews (1).
    a. Use three, 1/2-NC x 5 inch socket head capscrews and evenly space them around the motor adapter (6), mark each position. Evenly tighten them down (compressing the springs). Install the regular capscrews (6) and torque to 125 ft. lbs. (170 Nm). Remove the three extra long capscrews and replace with capscrews (6) and torque to 125 ft. lbs. (170 Nm).
    b. Press down brake piston (10) until capscrews (1) can engage threads and torque to 125 ft. lbs. (170 Nm).
17. Place 'O' ring (13) into seal sleeve (14). Slide onto input shaft (7) with beveled end facing out.

Installing Motor
Refer to Dwg. MHP1007

⚠WARNING

• The K5B air motor weighs approximately 260 lb. (118 kg). Adequately support the air motor while installing the motor mounting capscrews.

1. Install 'O' ring (13) into center of sleeve (14). Slide this assembly onto input shaft (7). Ensure that bevel is facing motor. Apply a coating of grease over sleeve and exposed input shaft.
2. Apply a coating of grease to the oil seal (227) and crank bearing (228) in the motor.
3. Lubricate and install 'O' ring (5) in groove in motor adapter (6).
4. Slide motor over input shaft (7). Be careful not to damage oil seal. Motor might have to be rotated around input shaft slightly to align splines.
5. Remove the 1/2 in. nut from mounting flange (216). Push motor until flush with motor adapter (6). Insert capscrews (4) and lockwasher (3) through motor into motor adapter (6) and torque to 85 ft. lbs. (115 Nm).
6. On winches with a disc brake install fitting (31) into brake housing port. Attach dump valve (30) to fitting (31) followed by vented fitting (29). Connect air line assembly (28, 20 and 27) between vented fitting (29) and hose fitting (26) which is screwed into control valve.

Reconnecting Winch
1. Fill K5B motor with 3 quarts. (2.8 litres) oil. Refer to "LUBRICATION" section.
2. If reduction gear fill plug is in a good position fill with 5 quarts (4.8 litres) oil. Refer to "LUBRICATION" section. If not, and winch is equipped with a disc brake then put 2 quarts (1.8 litres) of oil in disc brake assembly. Add the additional 3 quarts (3 litres) when air is connected to the winch and fill plug can be rotated to the top. If there is no disc brake assembly then prior to operating winch fill with oil.
3. Move winch back to mounted site and fasten in place. Refer to "INSTALLATION" section.
4. Reconnect all air lines. Slowly return air pressure to winch.
5. Install wire rope. Refer to "INSTALLATION" section.

Testing

Operational Test
Prior to initial use, all new, altered or repaired winches shall be tested to ensure proper operation.
1. Check oil level in motor, reduction gear assembly and disc brake are correct. Top off levels as required before operation as described in the "LUBRICATION" section.
2. To initially 'break in' new or overhauled motors operate without load, in both directions, for 2 hours at 100 - 200 RPM.
3. New Drum Brake Band Lining Run-in Procedure: All new drum brake band linings require a 'run-in' period. Operate the winch without load in the payout direction while gradually applying the brake. Allow the brake to slip for approximately one minute. Winch motor may stall as drum brake band lining fully engages. Do not allow brake to overheat.
4. Check operation of brakes. Adjust band brake if necessary as described in the "MAINTENANCE" section.
5. Check operation of limit switches, locking mechanisms and all safety devices when equipped.
6. Check foundation mounting fasteners are secure.
7. Install drum guard when provided.

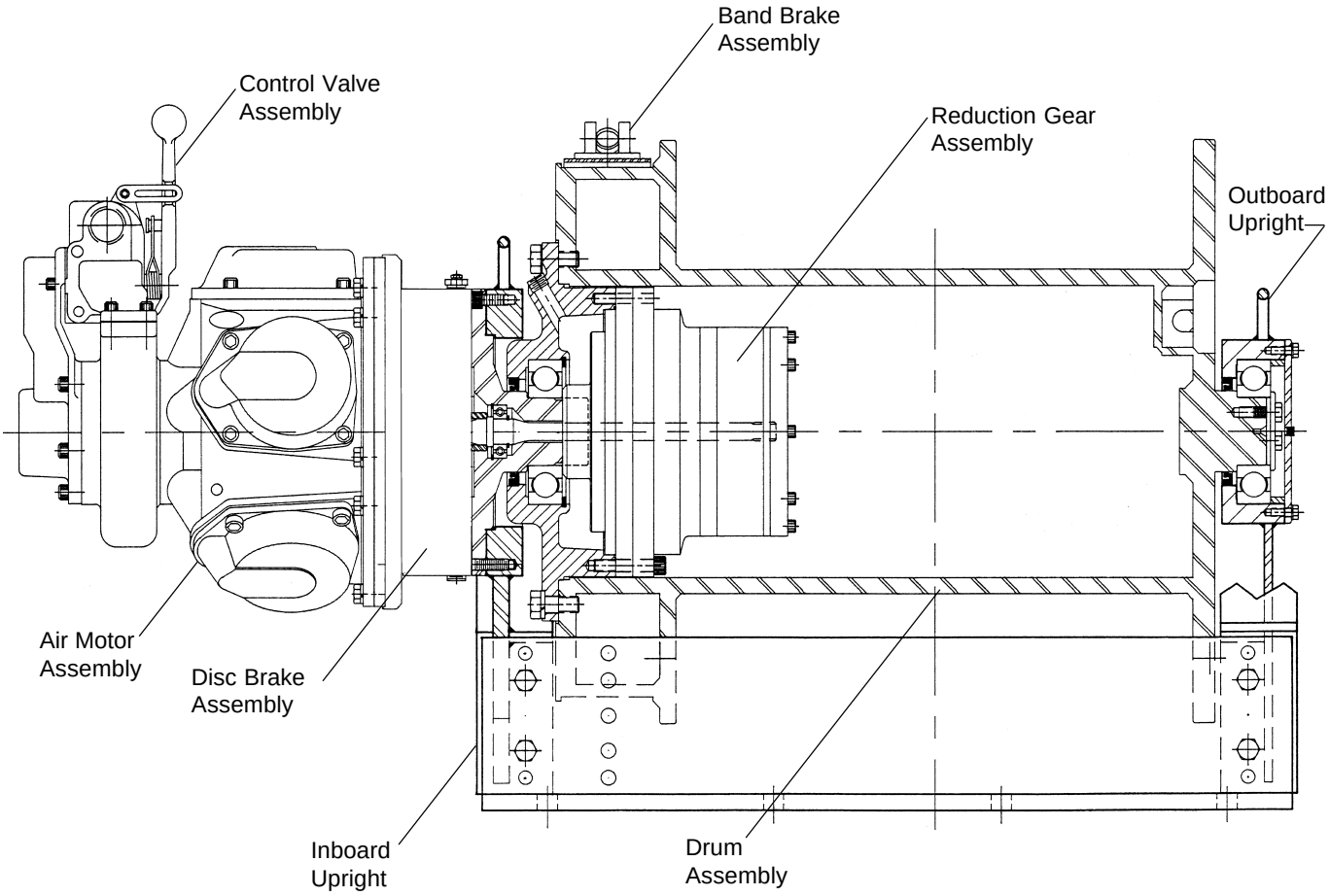
Load Test
Prior to initial use, all new, extensively repaired, or altered winches shall be load tested by or under the direction of a person knowledgeable in the operation of this winch and a written report furnished confirming the rating of the winch. Test loads shall not be more than 125% of the rated line pull.

To test the winch at 125% of the rated load apply the following load with the wire rope on the first layer of the drum:

FA10 Winch (test load)	34,500 lb. (15,698 kg)

SERVICE NOTES

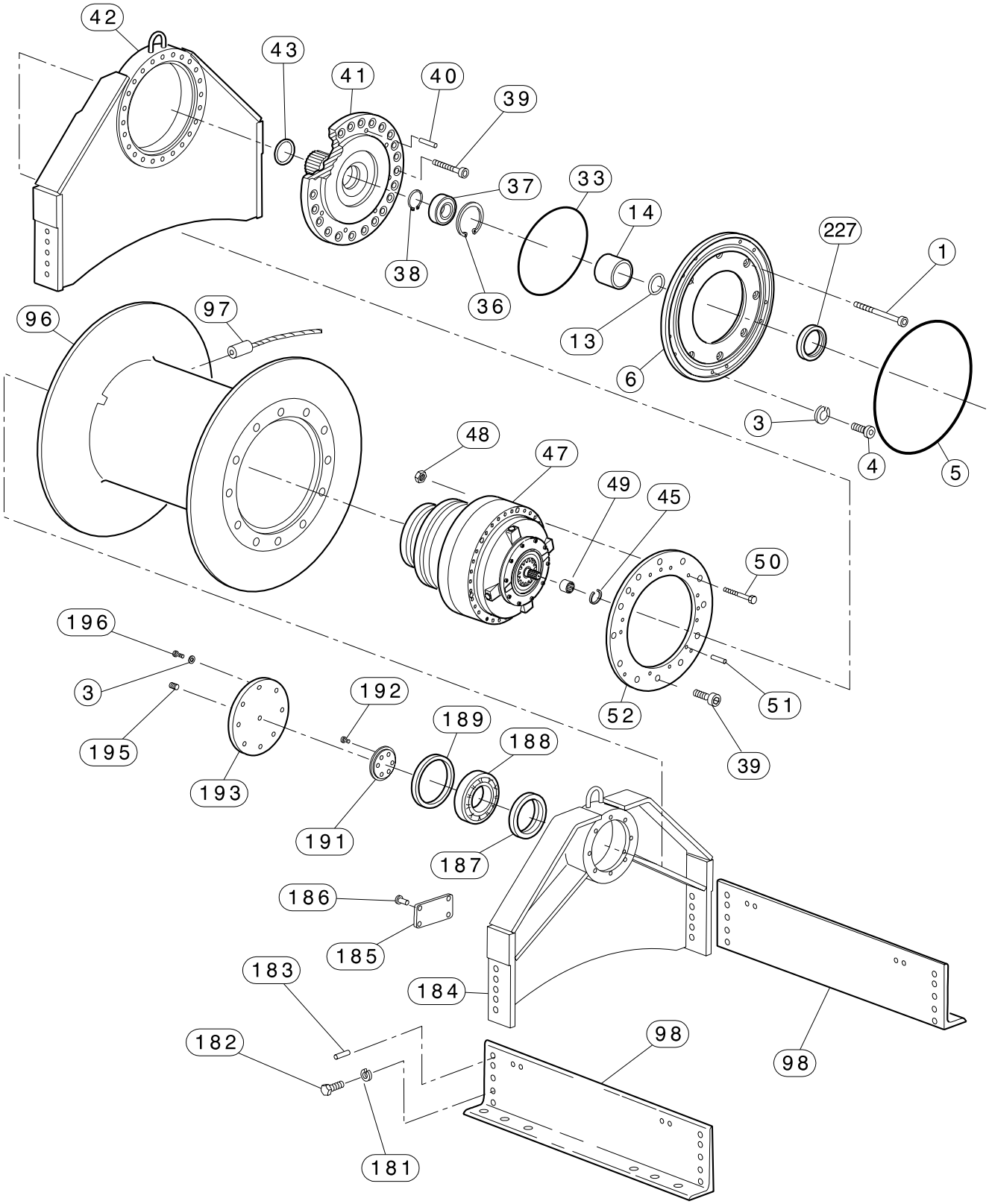
WINCH DRAWINGS AND PARTS LISTS TABLE OF CONTENTS



(Dwg. MHP0179)

Description **Page No.**

DRUM, BASE AND REDUCTION GEAR ASSEMBLY DRAWING



(Dwg. MHP0930)

DRUM, BASE AND REDUCTION GEAR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.	ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
1	Capscrew (with disc brake)	8	71087100	52	Adapter	1	11617
3	Lockwasher	18	50181	96	Drum	1	**
4	Capscrew	10	50197	97	Wire Rope Anchor - 3/4 inch	1	52000
• 5	'O' Ring	1	51459		Wire Rope Anchor - 7/8 inch		52308
6	Motor Adapter	1	14227		Wire Rope Anchor - 1 inch		52325
• 13	'O' Ring (Drive Shaft)	1	52537		Wire Rope Anchor - 1-1/8 inch		71087316
14	Sleeve	1	11711	98	Side Rail	1	**
• 33	'O' Ring	1	51460	181	Lockwasher	8	51012
36	Retainer Ring	1	52678	182	Capscrew	8	50902
• 37	Bearing	1	50998	183	Dowel Pin	12	53770
38	Retainer Ring	1	51192	184	Upright, Outboard	1	11657
39	Capscrew	36	53768	185	Nameplate	1	71106967-R
40	Pin, Dowel	2	51468	186	Screw, Drive	4	50915
41	Drum Shaft	1	14167	• 187	Seal	1	52535
42	Upright, Inboard	1	11658	• 188	Bearing	1	52534
• 43	'O' Ring	1	52536	189	Spacer	1	11613
45	Retainer Ring	1	52541	191	Shaft Retainer	1	11612
47	Reduction Gear Assembly	1	11626	192	Capscrew	6	53392
48	Nut	18	50812	193	End Cover	1	11614
49	Coupling	1	11901	195	Plug	1	54292
50	Capscrew	18	53769	196	Capscrew	8	50178
51	Dowel Pin	3	51468	• 227	Oil Seal	1	K5B-270

• Recommended spare

** Refer to DRUM ASSEMBLY AND SIDE RAIL PARTS LIST.

DRUM ASSEMBLY PARTS LIST

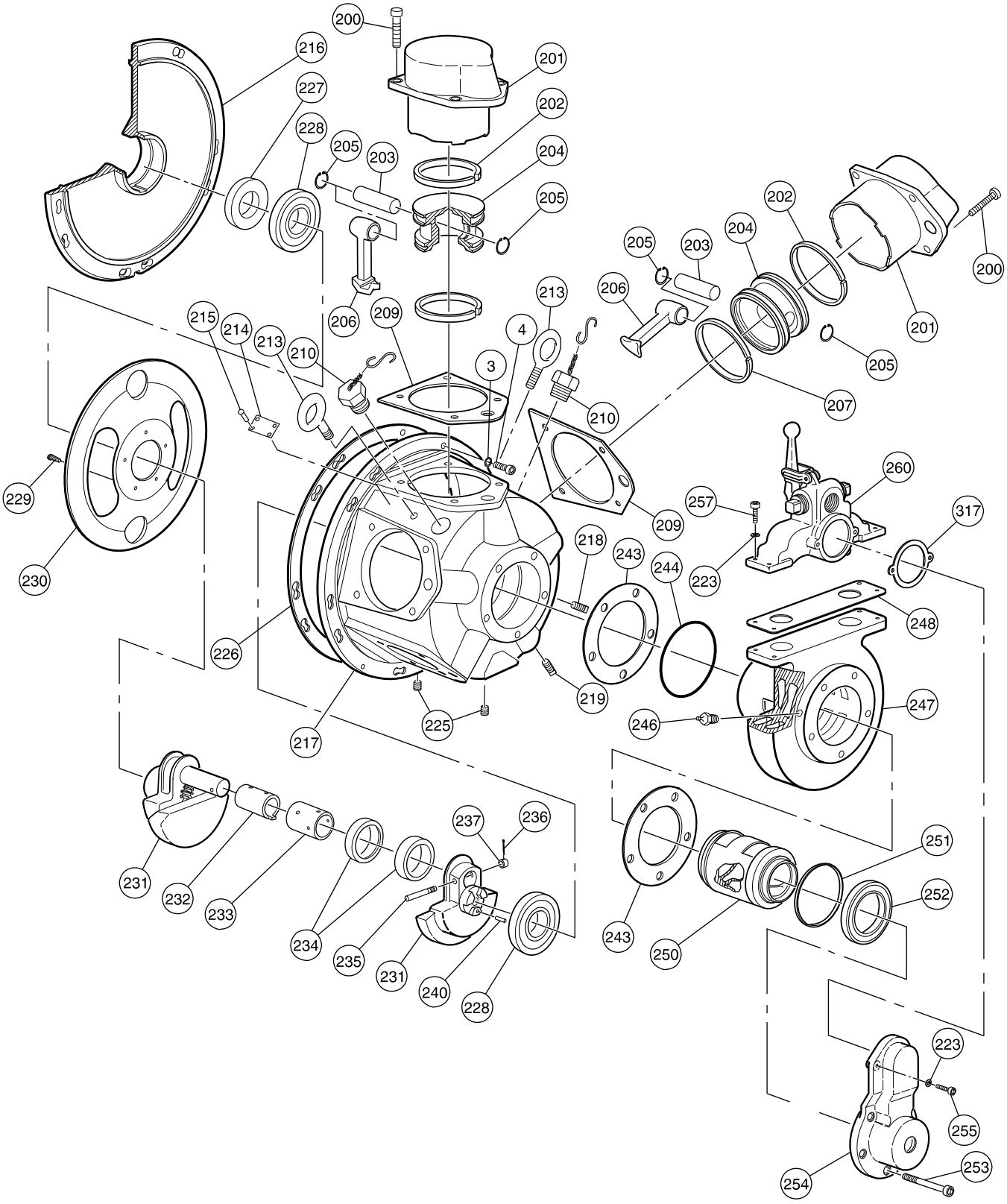
DRUM (ITEM 96) WITH BAND BRAKE	TOTAL QTY.	PART NO.	DRUM (ITEM 96) WITHOUT BAND BRAKE	TOTAL QTY.	PART NO.
Drum (24 inches long)	1	11943-5	Drum (24 inches long)	1	11608-5
Drum (30 inches long)		11943-6	Drum (30 inches long)		11608-6
Drum (36 inches long)		11943-7	Drum (36 inches long)		11608-7
Drum (40 inches long)		11943-8	Drum (40 inches long)		11608-8

SIDE RAIL PARTS LIST

SIDE RAIL (ITEM 98) WITH BAND BRAKE	TOTAL QTY.	PART NO.	SIDE RAIL (ITEM 98) WITHOUT BAND BRAKE	TOTAL QTY.	PART NO.
for 24 inch Drum	2	11988-5	for 24 inch Drum	2	11698-5
for 30 inch Drum		11988-6	for 30 inch Drum		11698-6
for 36 inch Drum		11988-7	for 36 inch Drum		11698-7
for 40 inch Drum		11988-8	for 40 inch Drum		11698-8

Contact your nearest Ingersoll-Rand distributor or the factory for additional replacement part information.

K5B MOTOR ASSEMBLY DRAWING



(Dwg. MHP1007)

K5B MOTOR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.	ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
**	Motor Assembly	1	K5B-550	229	Button Head Screw*	5	*
3	Lockwasher	10	50181	230	Oil Slinger*	1	*
4	Capscrew	10	50197	231	Crank Assembly	1	K5B-A516
200	Capscrew	20	52317	232	Sleeve	1	K5B-519
201	Cylinder Head	5	K5B-H505	233	Bushing	1	K5B-511
• 202	Compression Ring	1 Set	K5B550-KRING	234	Connecting Rod Ring	2	K5B-510
203	Wrist Pin	5	HU-514A	235	Lock Pin	1	HU-K520
204	Piston*	5	*	236	Cotter Pin	1	53456
205	Retainer Ring	10	902A45-632	237	Pin Nut	1	D02-394
206	Connecting Rod	5	K5B-509	240	Roll Pin	1	54257
• 207	Oil Ring	1 Set	K5B550-KRING	• 243	Gasket	2	K5B-928
• 209	Head Gasket	1 Set	K5B-507-5	• 244	'O' Ring	1	20A11CM248
210	Vent Cap Assembly	2	K5B-A303	246	Grease Fitting	1	53095
213	Eye Bolt	2	KU-888	247	Rotary Valve Housing	1	K5B-545
214	Nameplate	1	K5B-301	• 248	Gasket	1	K5B-547
215	Drive Screw	1 Pack	R4K-302-12	250	Rotary Valve	1	K5B-526EQ-R
216	Mounting Flange	1	K5B-502	• 251	Seal Ring	1	K5B-607A
217	Motor Housing	1	K5B-501A	• 252	Bearing	1	50138
218	Pipe Plug (Oil level)	1	ROH-377	253	Capscrew	5	51471
219	Pipe Plug	1	TC-368	254	Exhaust Flange	1	K5B-276
223	Lockwasher	1 Pack	D02-321-10	255	Capscrew	2	119A2A200
225	Pipe Plug (Drain)	2	GA57-95	257	Capscrew	4	51766
• 226	Gasket	1	K5B-592	260	Valve Assembly	1	K5B-REMOTE
• 227	Oil Seal	1	K5B-270	317	Gasket	1	K5B-275
228	Crank Bearing	2	51066				

• Recommended spare

* Parts not sold seperately. Refer to the "K5B Motor Assembly Kit List."

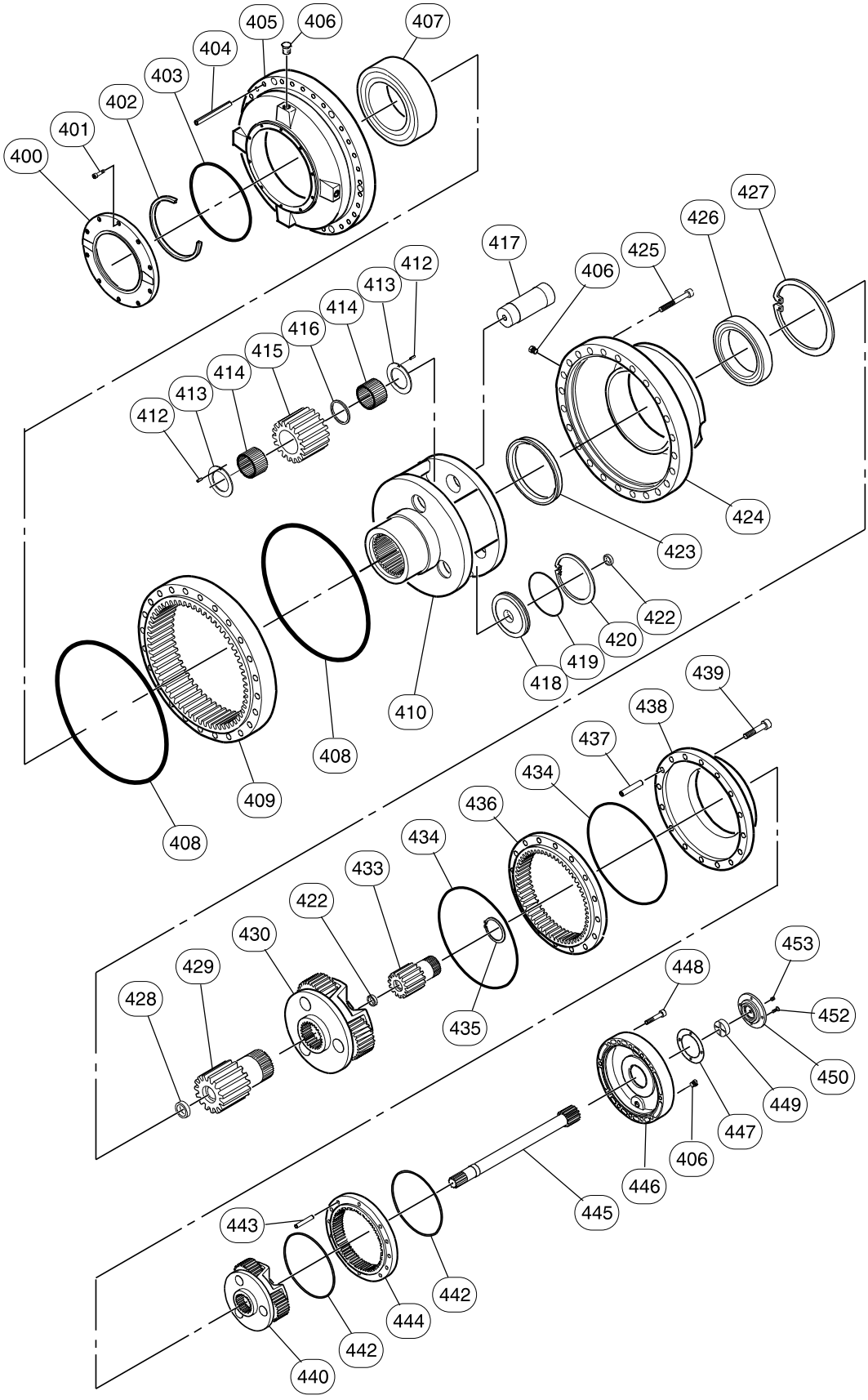
** Motor Assembly consists of items 200 through 260 and 317.

K5B Motor Assembly Kit List:

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
231	Crank Assembly (Includes items 206 and 228 through 237)	1	K5B-A516
261	Piston Assembly (Includes items 202 through 205 and item 207)	1	K5B-A513-50

Note: Kit number K5B550-KRING consists of (5) Compression Rings item 202 and (5) Oil Rings item 207.

REDUCTION GEAR ASSEMBLY DRAWING

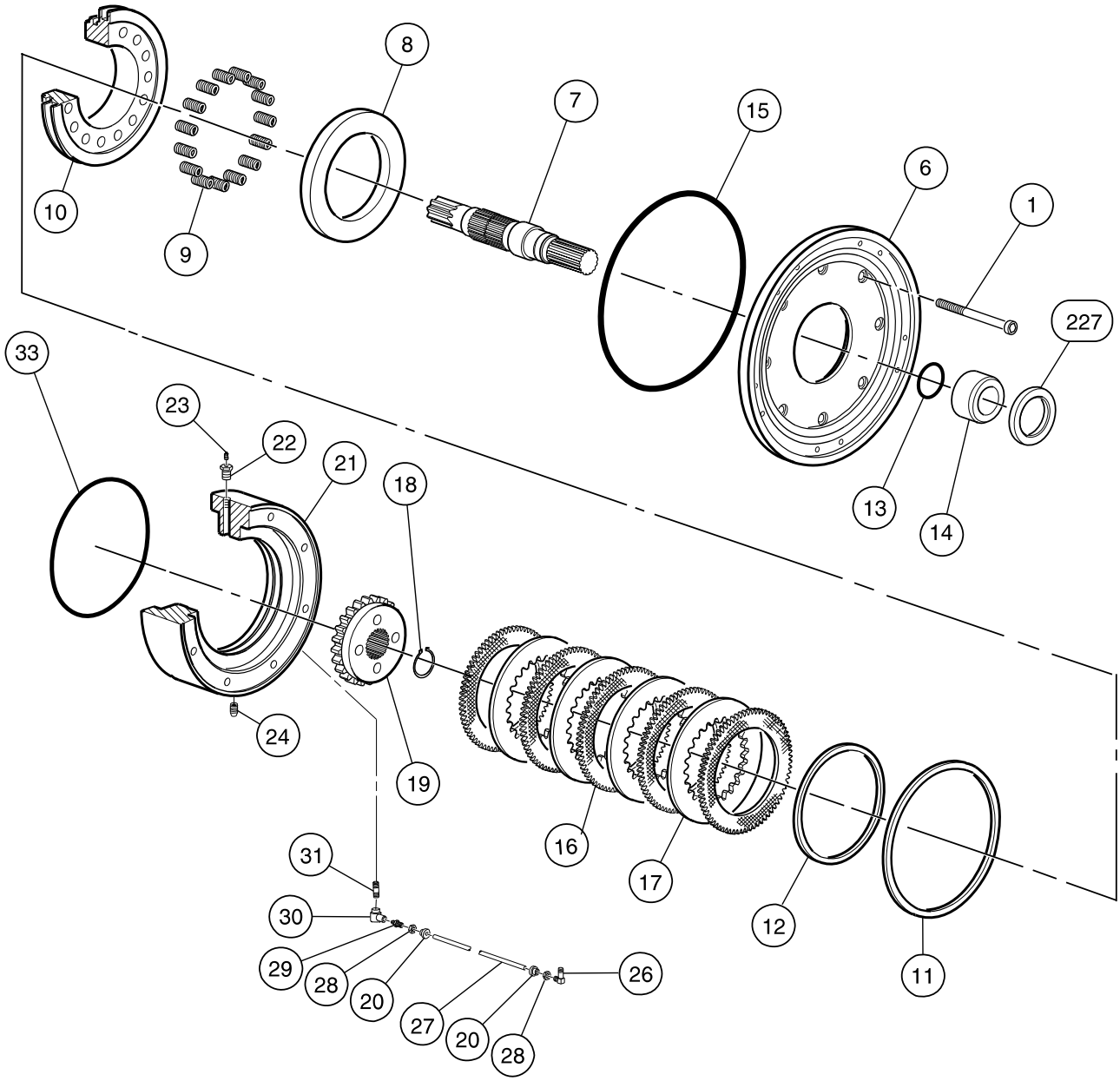


(Dwg. MHP0875)

REDUCTION GEAR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
47	Reduction Gear Assembly (includes items 400 through 453)	1	11626
400	Seal Support	1	154-1773
401	Capscrew	5	154-2522
402	Oil Seal	1	71308175
403	'O' Ring	1	71308183
404	Spring Pin	3	154B2240
405	Support	1	26.477
406	Plug	15	71068571
407	Bearing	1	71308191
408	'O' Ring	2	71308209
409	Ring Gear	1	154-1420
410	Planetary Support	1	154-1852
412	Spring Pin	6	71139018
413	Thrust Bearing	6	154-1681
414	Roller Bearings	240	154-2301
415	Planet Gears	3	154-1731
416	Roller Spacer	3	154-1473
417	Planet Gear Shaft	3	154-1551
418	Spacer	1	09.214
419	'O' Ring	1	71308217
420	Retainer Ring	1	154-2465
422	Spacer	2	20.091
423	Spacer	1	154-1507
424	Input Housing	1	154-1770
425	Capscrew	3	154B2235
426	Cylinder Roller Bearing	1	71305233
427	Retainer Ring	1	71308241
428	Spacer	1	20.092
429	Sun Gear	1	17.227
430	Planetary Assembly	1	P0144
433	Sun Gear	1	17.226
434	'O' Ring	2	71106728
435	Retainer Ring	1	71068597
436	Ring Gear	1	71068639
437	Spring Pin	3	71106710
438	Input Housing	1	71068589
439	Capscrew	12	154-2546
440	Planetary Assembly	1	P0093
442	'O' Ring	2	52149
443	Spring Pin	4	71068472
444	Ring Gear	1	71068548
445	Shaft	1	17.224
446	End Cover	1	154-1798
447	Gasket	1	71308225
448	Capscrew	8	154-2528
449	Thrust Plate	1	154-1711
450	Front Cover	1	154-1802
452	Screw	4	154-2576
453	Adjusting Screw	1	154-2601

DISC BRAKE ASSEMBLY DRAWING



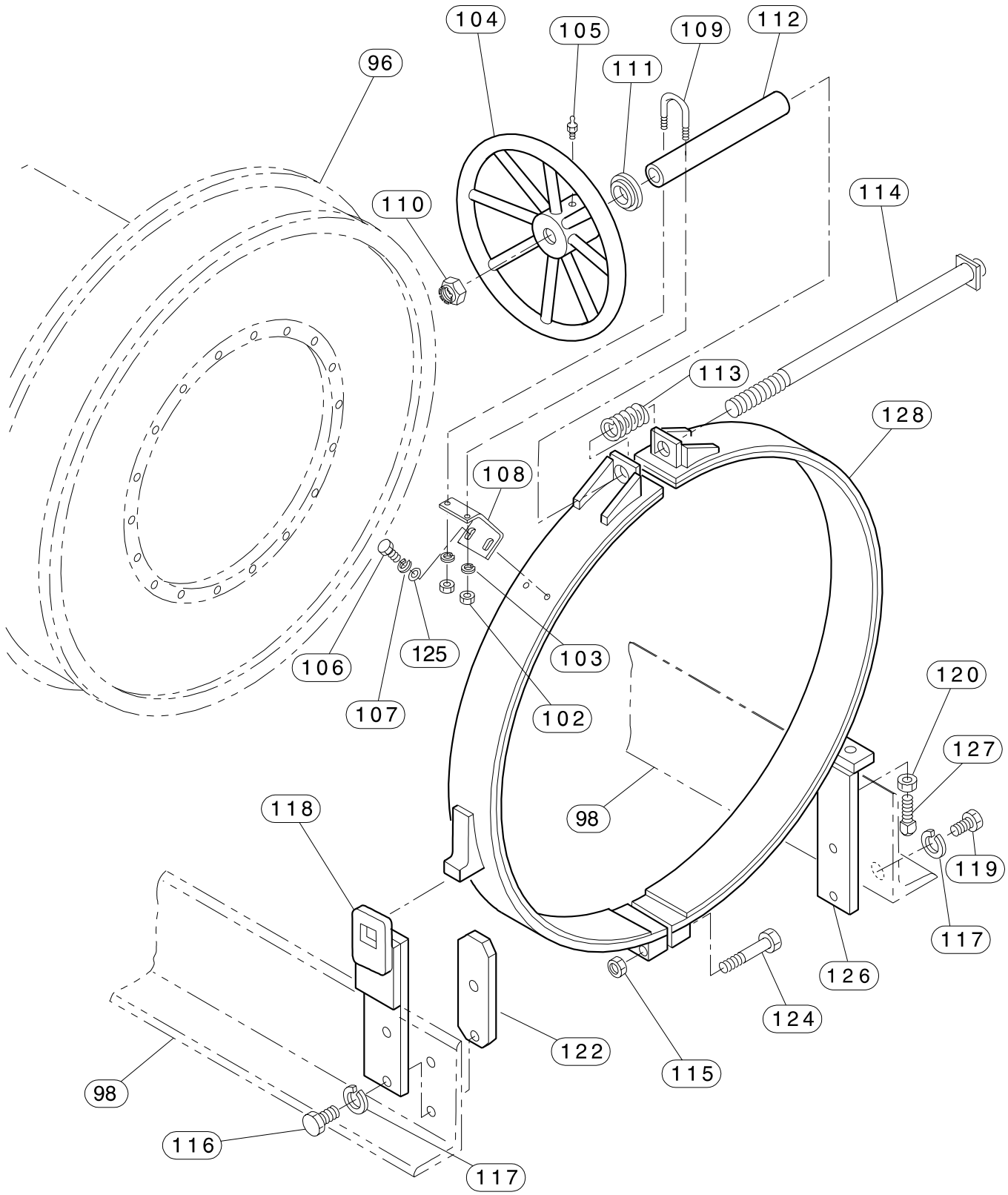
(Dwg. MHP0873)

DISC BRAKE ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
- - -	Disc Brake Assembly	1	11708
1	Capscrew (with Disc Brake)	8	71087100
6	Motor Adapter	1	14227
7	Input Shaft (with Disc Brake)	1	11595
8	Brake Reaction Plate	1	10597
• 9	Spring	15	50751
10	Brake Piston	1	15437
• 11	Seal	1	51461
• 12	Seal	1	51462
• 13	'O' Ring	1	52537
14	Seal Sleeve	1	11711
• 15	'O' Ring	1	51458
• 16	Friction Plate	5	50772
• 17	Drive Plate	4	50773
18	Retainer Ring	1	51761
19	Splined Hub	1	11594
20	Sleeve, Fitting	2	55014
21	Brake Housing	1	11593
22	Fitting, Reducer Bushing	1	51803
• 23	Breather	1	51857
24	Pipe Plug	1	50801
26	Fitting, Hose	1	71149975
27	Tubing	1	52520
28	Fitting, Nut	2	55013
29	Vented Fitting	1	20770
• 30	Dump Valve	1	50276
31	Fitting, Nipple	1	50859
• 33	'O' Ring	1	51460
•227	Oil Seal	1	K5B-270

• Recommended spare

DRUM BRAKE (OPTIONAL) ASSEMBLY DRAWING



(Dwg. MHP0627)

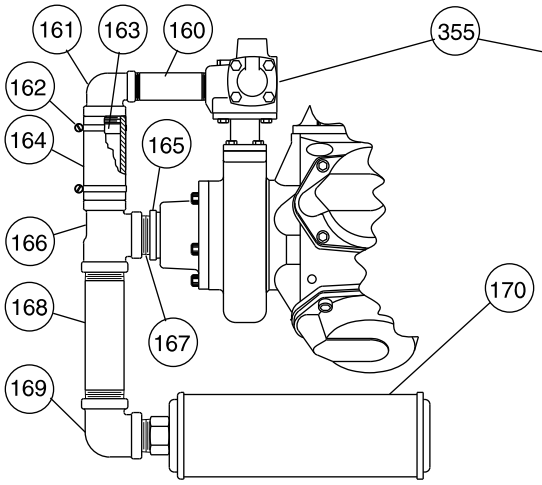
DRUM BRAKE (OPTIONAL) ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
96	Drum (for use with brake band)	1	Refer to Drum Assembly and Side Rail Parts List
98	Side Rail	2	
102	Nut	2	Order item 109, ‘U’ Bolt
103	Lockwasher	2	Order item 109, ‘U’ Bolt
104	Handwheel	1	12183
105	Lube Fitting	1	51469
106	Capscrew	4	50853
107	Lockwasher	4	50200
108	Bracket	1	12203
109	‘U’ Bolt (includes items 102 and 103)	1	52701
110	Nut	1	51775
111	Bearing	1	52707
112	Tube	1	12204
113	Spring	1	52717
114	Brake Screw	1	12182
115	Nut	4	51750
116	Capscrew	2	54221
117	Lockwasher	4	51012
118	Anchor	1	12096
119	Capscrew	2	52841
120	Nut	1	50205
122	Plate	1	12084
124	Capscrew	4	54896
125	Washer	2	50177
126	Support	1	12094
127	Adjustment Screw	1	54424
• 128	Brake Band	1 set	12083

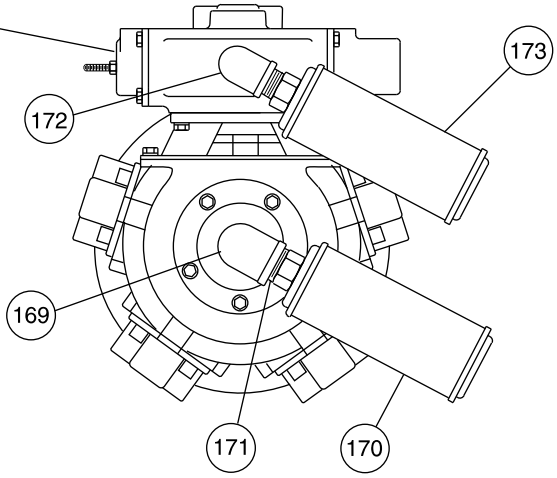
• Recommended spare

MUFFLER ASSEMBLY DRAWINGS AND PARTS LIST

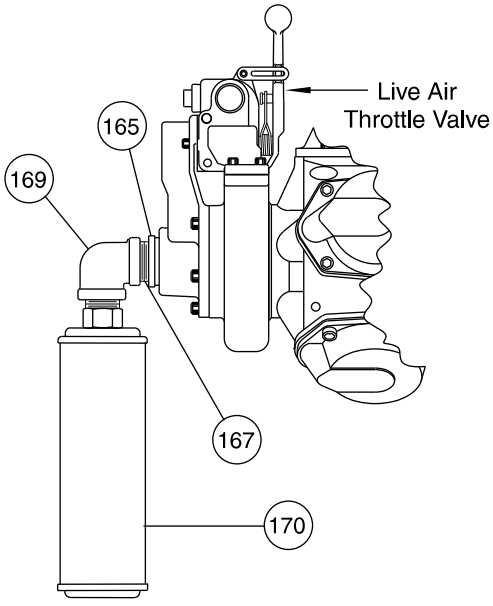
K5B Motor Muffler with Remote Actuated Pilot Control Valve (Old Style)
Note: If replacing parts retrofit to new style.



K5B Motor Mufflers with Remote Actuated Pilot Control Valve (New Style)



K5B Motor Muffler with Live Air Throttle Valve

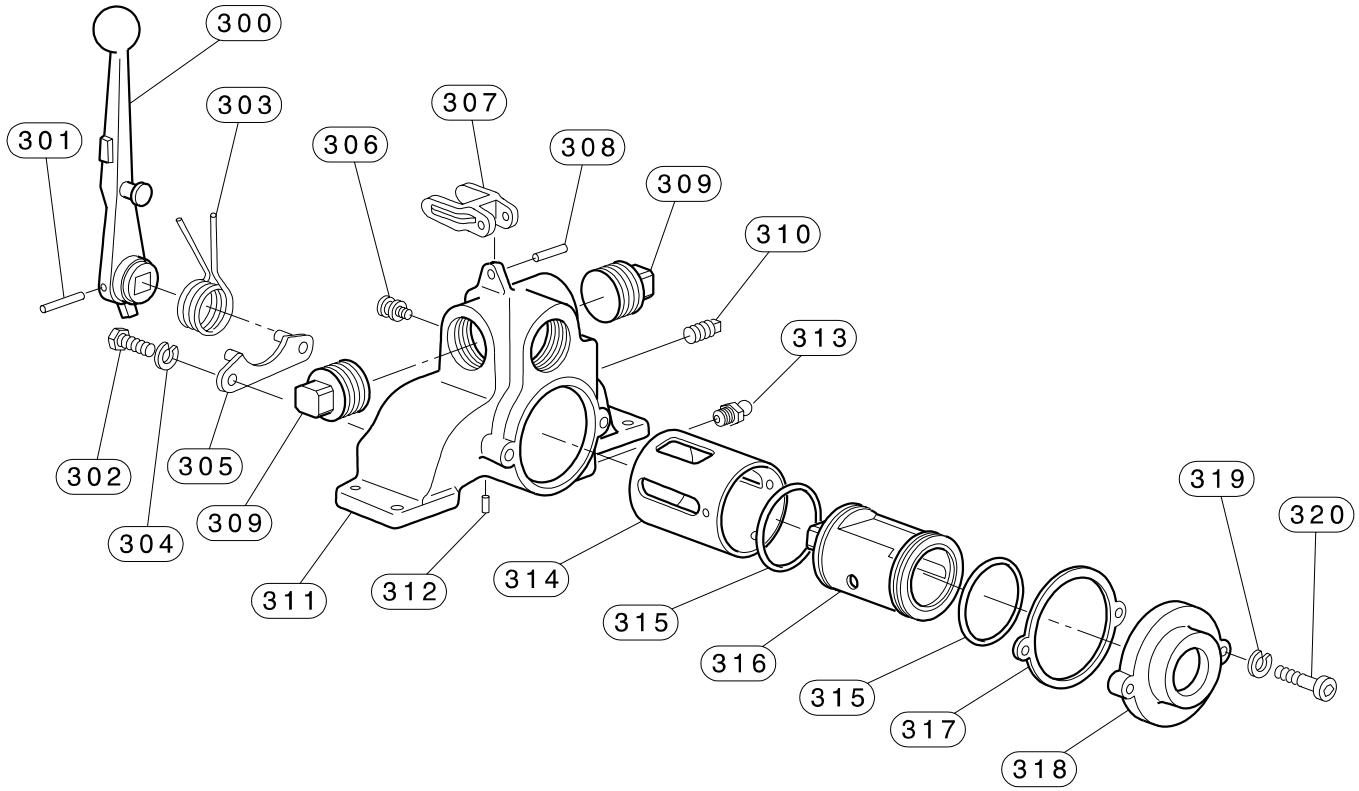


(Dwg. MHP0570)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.	
K5B Motor with Live Air Throttle Valve				
165	Reducer Bushing	1	71057459	
167	Pipe Nipple	1	71057467	
169	Pipe Elbow	1	71057434	
170	Muffler	1	50594	
K5B Motor with Remote Actuated Pilot Valve			**Old Style**	**New Style**
160	Pipe Nipple	1	*	- - -
161	Pipe Elbow	1	*	- - -
162	Hose Clamp	2	*	- - -
163	Pipe Nipple	2	71057483	- - -
164	Hose	1	*	- - -
165	Reducer Bushing	1	71057459	- - -
166	Pipe Tee	1	*	- - -
167	Pipe Nipple	1	71057467	
168	Pipe Nipple	1	*	- - -
169	Pipe Elbow	1	71057434	
170	Muffler	1	50594	
171	Pipe Nipple	1	- - -	51704
172	Pipe Elbow	1	- - -	52103
173	Muffler	1	- - -	52465
355	Valve Assembly	1	20993	

* Not available as a spare, retrofit to new style.

LIVE AIR CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST

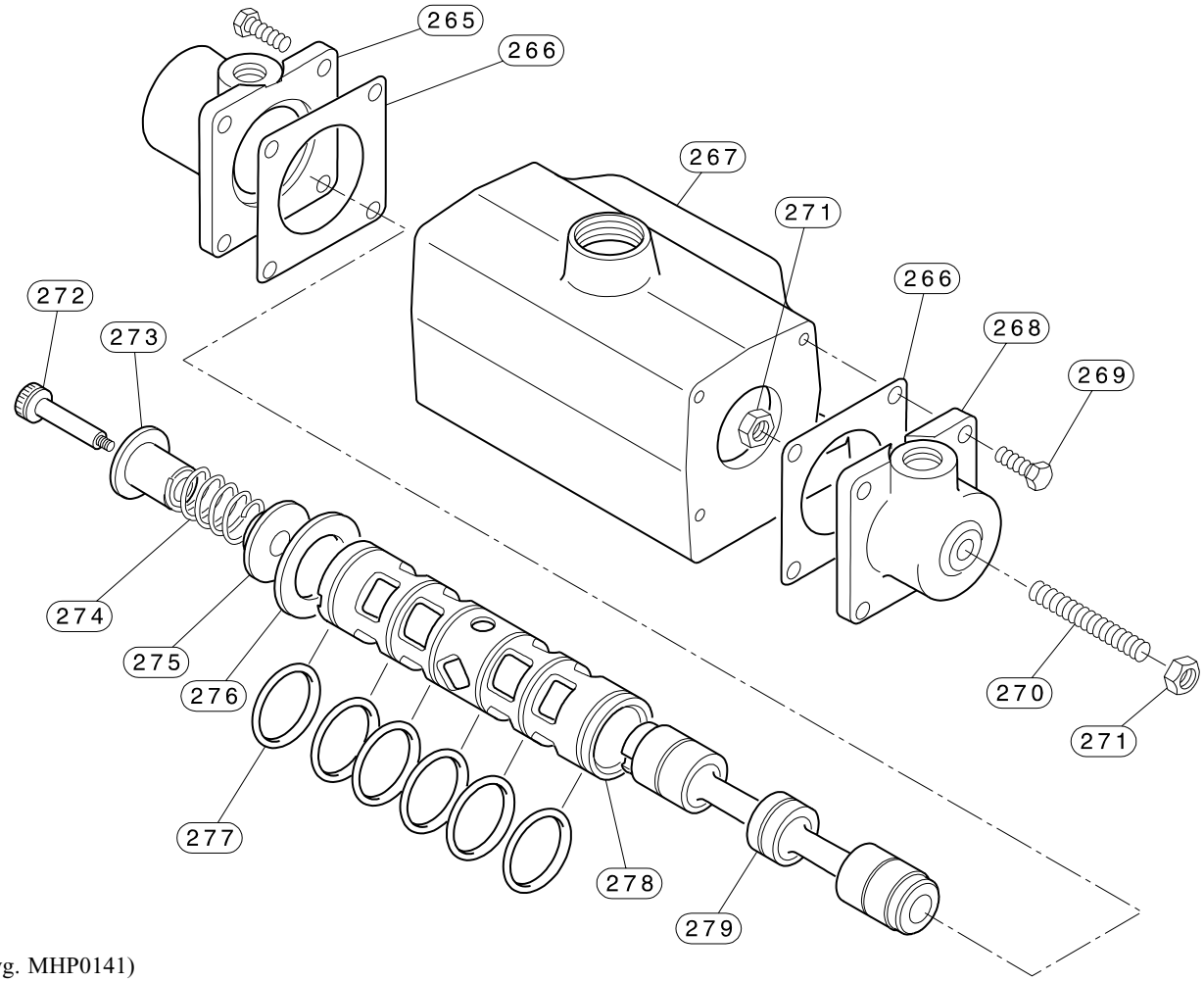


(Dwg. MHP0165)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.	ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
260	Valve Assembly (Includes items 300 through 320)	1	K5B-REMOTE	311	Valve Housing (matched set with items 312 and 314)	1	K5B-1101
300	Handle	1	K5B-556	312	Roll Pin	1	25A13C92
301	Roll Pin	1	K5B-1115	313	Grease Fitting	1	53095
302	Capscrew	2	50853	314	Valve Bushing (matched set with item 311)	1	K5B-1101 (order Valve Housing item 311)
• 303	Spring	1	K5B-412				
304	Lockwasher	2	50200				
305	Valve Retainer	1	K5B-1110A	• 315	Seal Ring	2	K5B-606
306	Spring Retainer	1	K5B-553	316	Valve Body	1	K5B-944
307	Latch	1	K5B-869A	317	Gasket	1	K5B-275
308	Roll Pin	1	HLK-20	318	Flange	1	KK5B-276S
309	Pipe Plug	2	E5UD-947	319	Lockwasher	2	D02-321-10
310	Pipe Plug	1	71026025	320	Capscrew	2	50853

• Recommended spare

PILOT AIR CONTROL VALVE (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST

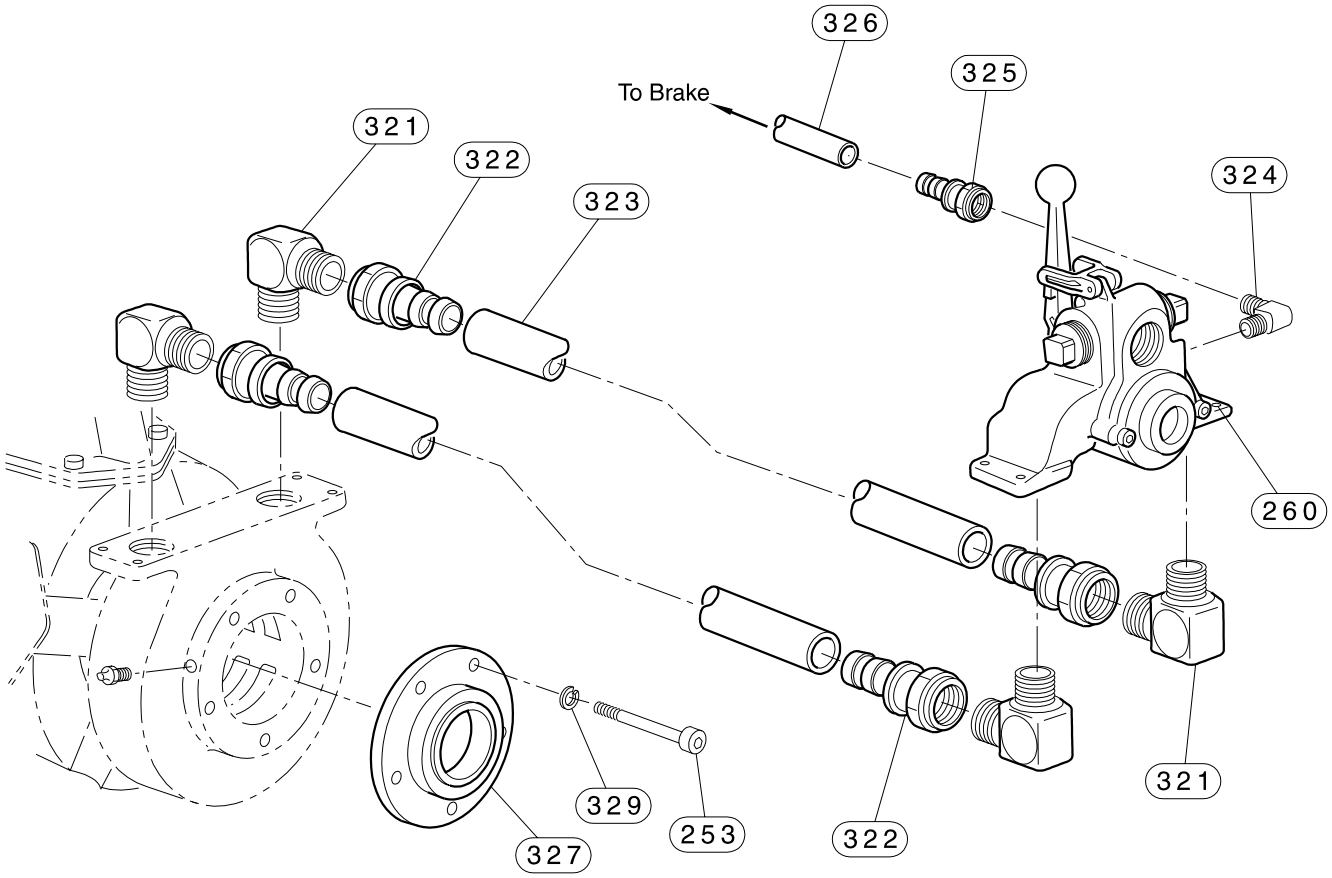


(Dwg. MHP0141)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
			510 size
355	Valve Assembly (includes items 265 through 279)	1	20993
265	End Cap	1	71136725
• 266	Gasket	2	71136733
267	Valve Body	1	Not sold separately, order item 355
268	End Cap (Inlet Side)	1	11778
269	Capscrew	8	71030118
270	Adjusting Screw	1	53545
271	Nut	2	50176
272	Shoulder Screw	1	54710
273	Guide	1	71136741
274	Spring	1	71136758
275	Washer	1	71136766
276	Spacer	1	71136774
• 277	'O' Ring	6	71136782
278	Valve Sleeve	1	Not sold separately, order item 355
279	Valve Spool	1	Not sold separately, order item 355

•	Recommended spare

REMOTE LIVE AIR CONTROL (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST

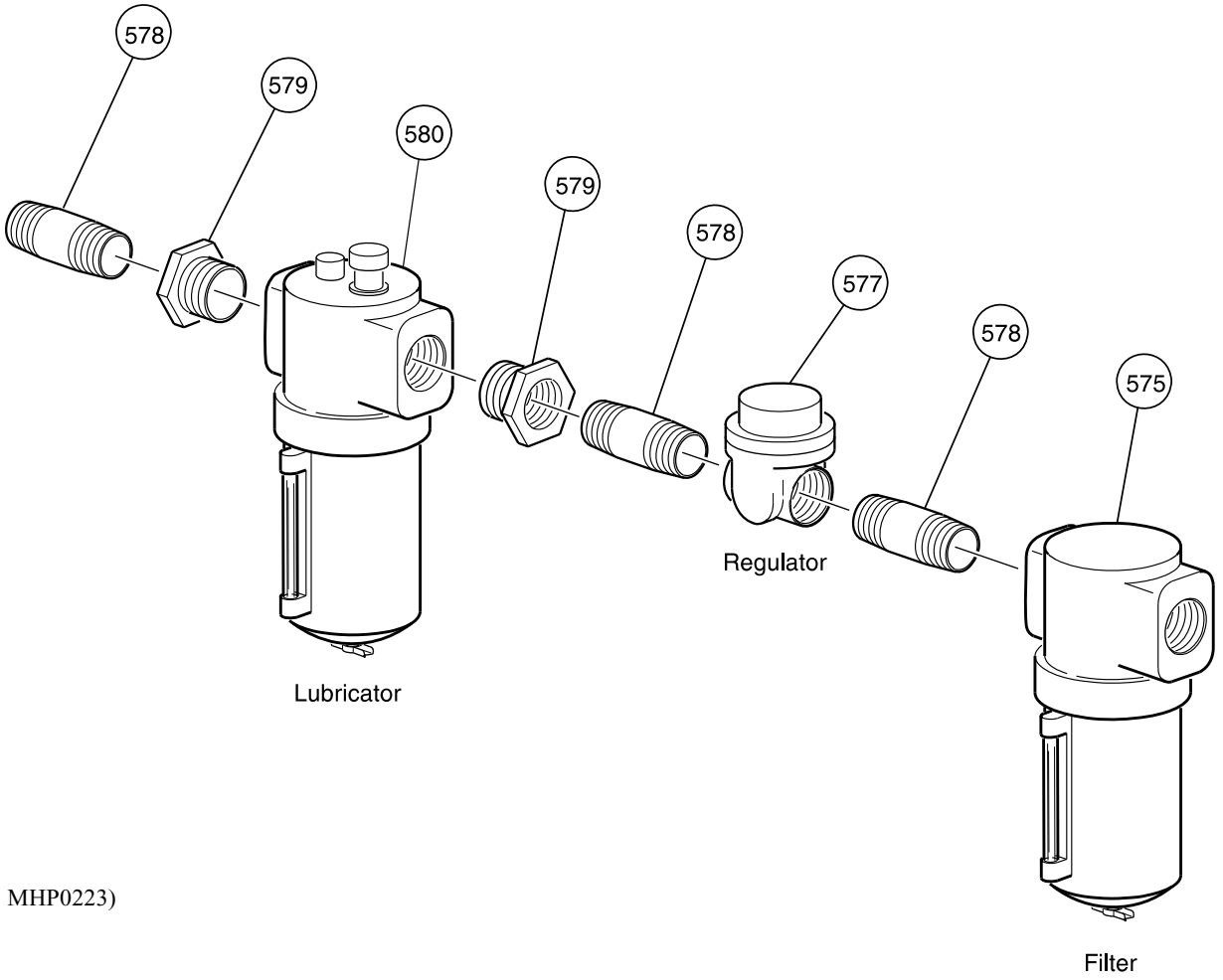


(Dwg. MHP0161)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
260	Control Valve Assembly	1	K5B-REMOTE
253	Capscrew	5	119A2A267
321	Elbow Fitting	4	54270
322	Hose End	4	54738
323	Hose	2	54737-*
324	Elbow Fitting	1	71149975
325	Hose End	2	51029
326	Hose	1	50923-*
327	Exhaust Cover	1	KK5B-276M
329	Lockwasher	5	50181

* Add hose length (feet/metres). Maximum length = 20 feet (6 metres). Contact Ingersoll-Rand for information on control suitability for lengths greater than 20 feet (6 metres). Metres are for reference only; order quantities in feet.

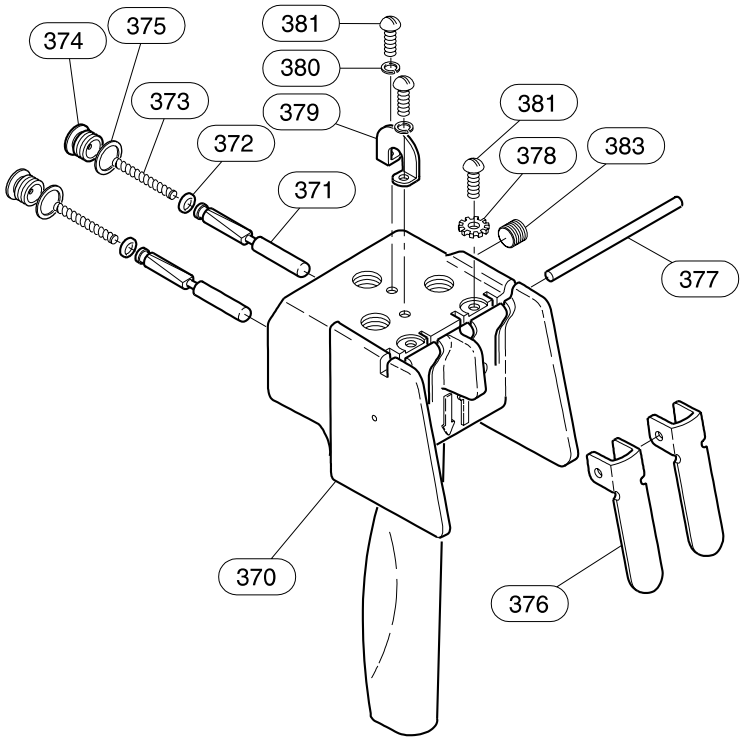
AIR PREPARATION (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST



(Dwg. MHP0223)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NUMBER
575	Filter	1	F42-0A-000
577	Regulator	1	R30-0A-G00
578	Pipe Nipple	3	51704
579	Pipe Bushing	2	51706
580	Lubricator	1	L40-0A-000

PENDANT CONTROL ASSEMBLY (OPTIONAL) DRAWING AND PARTS LIST



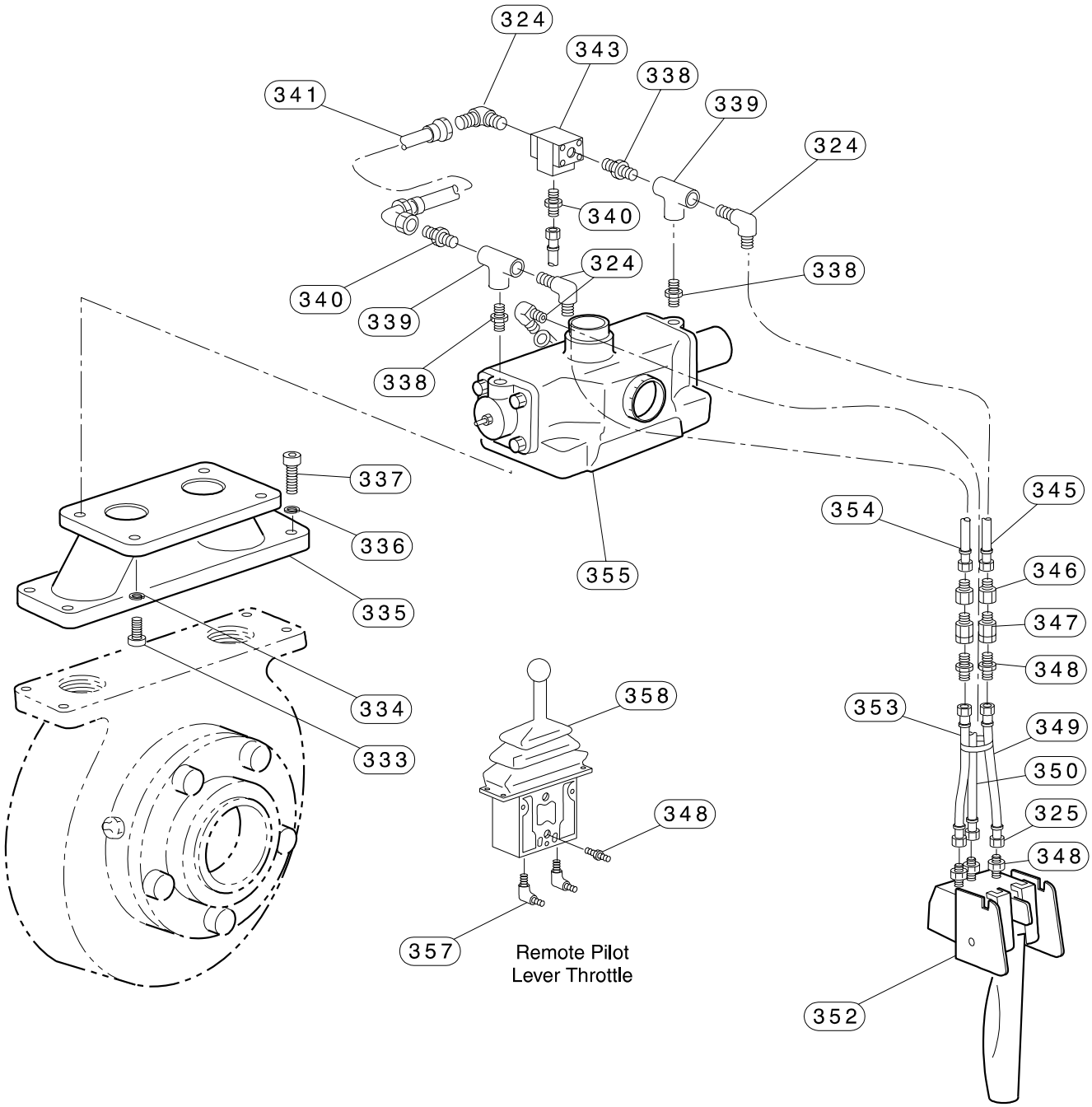
(Dwg. MHP0993)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.	ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
352	Pendant Assembly*	1	MLK-A269C	376	Lever	2	MLK-273
370	Pendant Handle	1	MLK-269	377	Throttle Lever Pin	1	DLC-120A
371	Throttle Valve	2	MLK-K264B	378	Pin Lockwasher	2	D02-138
372	Throttle Valve Face	2	R000BR1C-283	379	Support	1	MLK-450
• 373	Spring	2	MKL-51A	380	Lockwasher	1 Pack	H54U-352-10
374	Throttle Valve Cap	2	MLK-266A	381	Support Screw	4	HRE20A-68
• 375	Valve Cap Gasket	2	MLK-504	383	Pipe Plug	1	54247

• Recommended spare

*Assembly includes items 370 through 381 and 383.

REMOTE PILOT AIR CONTROL (OPTIONAL) ASSEMBLY DRAWINGS



(Dwg. MHP0167)

REMOTE PILOT AIR CONTROL (OPTIONAL) ASSEMBLY PARTS LISTS

Remote Pilot Pendant Throttle Control

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.			
			10 ft (3 m)	20 ft (6 m)	30 ft (9 m)	40 ft (12 m)
324	Elbow Fitting	4	52182			
325	Hose End Fitting	See ( )	51029 (6)	51029 (10)		51029 (14)
333	Capscrew	4	54681			
334	Lockwasher	4	50893			
335	Manifold	1	13881			
336	Lockwasher	4	50200			
337	Capscrew	4	50829			
338	Nipple Fitting	3	54274			
339	Pipe Tee Fitting	2	54678			
340	Adapter Fitting	2	51814			
341	Hose Assembly	1	17073-6			
• 343	Shuttle Valve	1	50277			
344	Hose Assembly (Brake)	1	17073-10			
345	Hose	Specify Length	50923***			
346	Adapter Fitting	As Req'd	- - -	71048284		
347	Exhaust Valve*	As Req'd	- - -	20417		
348	Adapter Fitting	As Req'd	71048268			
349	Hose	Specify Length	- - -	50923***		
350	Hose	Specify Length	50923***			
352	Control Pendant	1	MLK-A269A			
353	Hose	Specify Length	- - -	50923***		
354	Hose	Specify Length	50923***			
355	Valve Assembly	1	20993			
356	Hose**	Specify Length	- - -			50923***

Remote Pilot Lever Throttle Valve Associated Components

Note: Requires item #'s 325, 333 through 344 (Reference "Remote Pilot Pendant Throttle Control") plus the following parts. Part numbers and quantities are for a 30 foot (9 metre) hose assembly.

345	Hose	Specify Length	50923***
346	Adapter Fitting	2	71048284
347	Exhaust Valve*	2	20417
348	Adapter Fitting	1	71048268
349	Hose	Specify Length	50923***
350	Hose	Specify Length	50923***
353	Hose	Specify Length	50923***
354	Hose	Specify Length	50923***
357	Elbow Fitting	2	51281
358	Pilot Lever Throttle	1	71069561

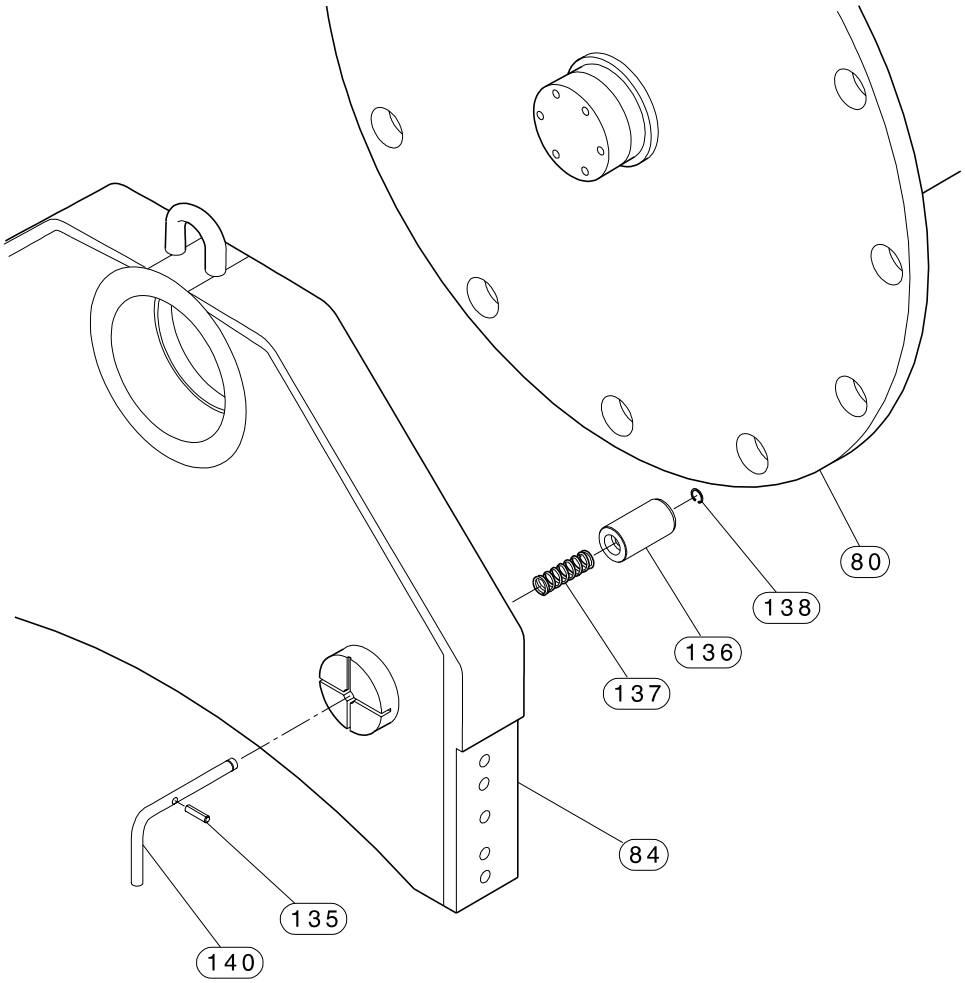
• Recommended spare

* Must be installed at 20 foot (6 metre) intervals. Part number 20417 (item 347) includes items 346 and 348.

** Not shown. Install between exhaust valves.

*** Available in 10 ft. (3 m) increments.

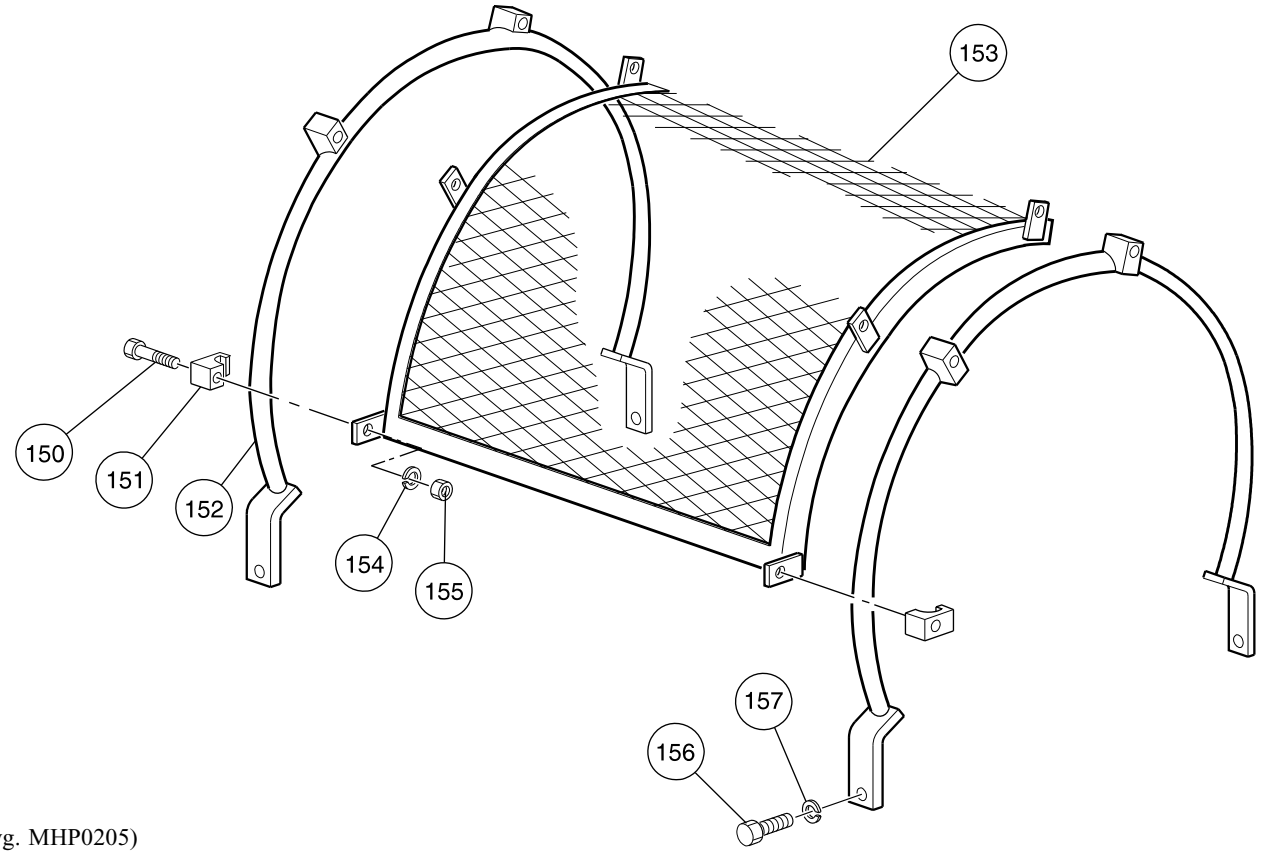
DRUM LOCKING PIN (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST



(Dwg. MHP0874)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
Drum with band brake			
80	Drum (24 inch)	1	Contact Factory
	Drum (30 inch)		
	Drum (36 inch)		
	Drum (40 inch)		
Drum without band brake			
80	Drum (24 inch)	1	Contact Factory
	Drum (30 inch)		
	Drum (36 inch)		
	Drum (40 inch)		
Common Parts:			
84	Outboard Upright	1	24119
135	Pin	1	71001135
136	Lock Pin	1	24121
137	Spring	1	71080881
138	Retainer Ring	1	54370
140	Pull Rod	1	21073

DRUM GUARD (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST

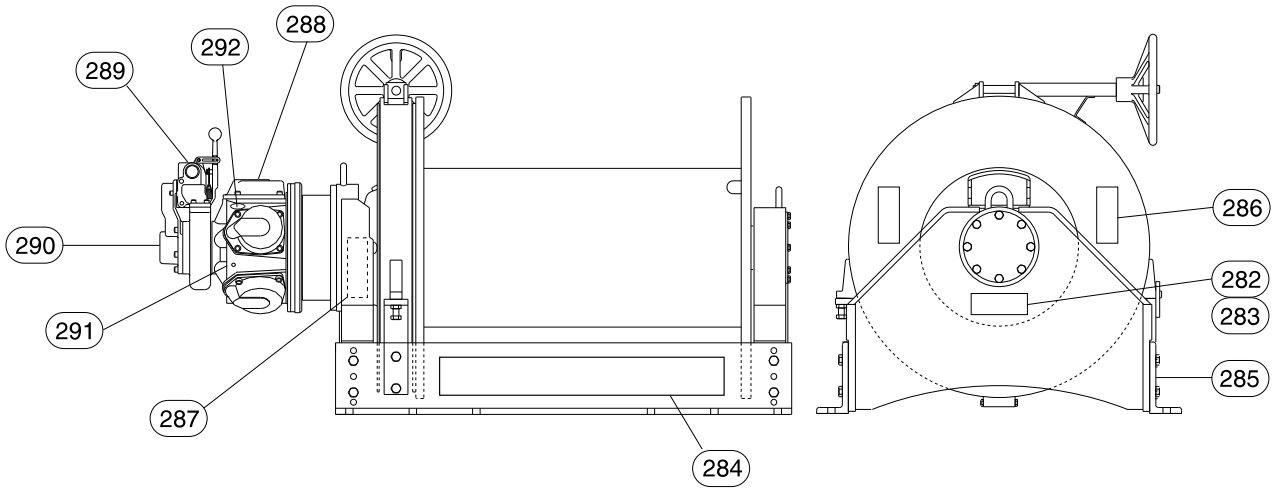


(Dwg. MHP0205)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
---	Drum Guard Assembly (24 inch long drum)*	1	11987-5
	Drum Guard Assembly (30 inch long drum)*		11987-6
	Drum Guard Assembly (36 inch long drum)*		11987-7
	Drum Guard Assembly (40 inch long drum)*		11987-8
150	Capscrew	8	71126742
151	Clamp	8	10399
152	Support	2	11947
153	Drum Guard (24 inch long drum)	1	11948-5
	Drum Guard (30 inch long drum)		11948-6
	Drum Guard (36 inch long drum)		11948-7
	Drum Guard (40 inch long drum)		11948-8
154	Lockwasher	8	50200
155	Nut	8	50198
156	Capscrew	4	50183
157	Lockwasher	4	50181

* Assembly includes items 150 through 157.

LABEL DRAWING AND PARTS LIST



(Dwg. MHP0871)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.
- - -	Label Kit (includes items 282 through 292) (24 in. and 30 in. long Drums)	1	24305–4
- - -	Label Kit (includes items 282 through 292) (36 in. and 40 in. long Drums)	1	24305–5
282	Nameplate	1	71106967-R
283	Rivet	4	71028849
284	Force Five Product Label (24 in. and 30 in. long Drums)	1	71111777
	Force Five Product Label (36 in. and 40 in. long Drums)		71109508
285	Ingersoll-Rand Label (24 in. and 30 in. long Drums)	1	71106272
	Ingersoll-Rand Label (36 in. and 40 in. long Drums)		71109102
286	Overwind Label	2	71109516
287	Warning Label (Refer to page 4 for sample)	1	71060529
288	Warning Label (Refer to page 4 for sample)	1	71107130
289	Air Supply Label	1	71046395
290	Exhaust Label	1	71042196
291	Oil Level Label	1	71043616
292	Caution Tag	1	71107148

ACCESSORIES

DESCRIPTION OF PART	PART NO.
Lubricant	LUBRI-LINK-GREEN
Touch-up Paint (Yellow)	FAP-237Y

SERVICE NOTES

PARTS ORDERING INFORMATION

The use of other than **Ingersoll-Rand** Material Handling Products replacement parts may invalidate the Company's warranty.
For your convenience and future reference it is recommended that the following information be recorded.

Model Number_____

Serial Number _____

Date Purchased_____

When ordering replacement parts, please specify the following:
1. Complete model number and serial number as it appears on the nameplate.
2. Part number(s) and part description as shown in this manual.
3. Quantity required.

The nameplate is located on the winch outboard upright.

NOTICE

• Continuing improvement and advancement of design may cause changes to this equipment 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.
• Sections of this manual may not apply to your winch.

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.
Winches which have been modified without **Ingersoll-Rand** approval, mishandled or overloaded will not be repaired or replaced under warranty. A printed copy of the warranty which applies to this winch is provided inside the back cover of this manual.

Disposal

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

For additional information contact:

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
or
Ingersoll-Rand Material Handling
Douai Operations
111, Avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 27-93-08-08
Fax: (33) 27-93-08-00

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

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Ingersoll-Rand Material Handling
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Fax: (708) 530-3891

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
Santa Fe Springs, CA 90670
Phone: (310) 948-4189
Fax: (310) 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 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) 213-4510
Order Desk
Fax: (416) 213-4506

Regional Sales Offices

Calgary, Alberta
44 Harley Road S.E.
Calgary, Alberta
T2V 3K3
Phone: (403) 252-4180
Fax: (403) 252-4462

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

Montreal, Quebec
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Fax: (514) 695-0963

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