

Product Maintenance Information



FORCE **5i**™ **Winch Series**

Model
FA2i and FA2i-MR

 **Save These Instructions**



Form MHD56303

Edition 1

July 2006

71452189

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Only allow **Ingersoll Rand** trained technicians to perform maintenance on this product. For additional information contact **Ingersoll Rand** factory or nearest Distributor.

For additional supporting documentation refer to **Table 1 on page 2**.

Manuals can be downloaded from www.winchandhoistsolutions.com.

The use of other than genuine **Ingersoll Rand** replacement parts may result in safety hazards, decreased performance and increased maintenance and may invalidate all warranties.

The original language of this manual is English.

Refer all communications to the nearest **Ingersoll Rand** Office or Distributor.

Table 1: Product Manuals

Publication	Part/Document Number	Publication	Part/Document Number
Product Safety Information Manual (Non-Man Rider)	MHD56250	Product Information Manual (Non-Man Rider)	MHD56301
Product Safety Information Manual (Man Rider)	MHD56251	Product Information Manual (Man Rider)	MHD56304
Product Parts Information Manual	MHD56302		

INSPECTION

Frequent inspections should be performed on equipment in regular service. Refer to Product Information Manual.

■ Periodic Inspection

Refer to Table 2: "Inspection Classifications" on page 2 for suggested winch inspection classifications for Periodic Inspection intervals. Select conditions most appropriate to application.

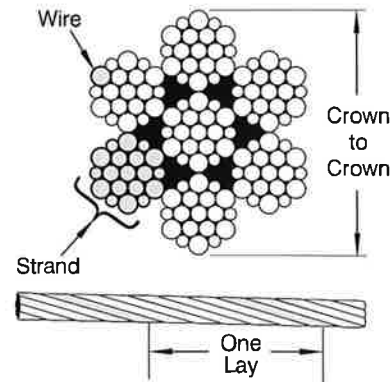
Table 2: Inspection Classifications

Conditions	Normal	Heavy	Severe
Typical Use (operating time)	Infrequent	Regular	Continual/Constant
Load Range	60% of Capacity 75% of Times Used	80% of Capacity 75% of Times Used	100% of Capacity 75% of Times Used
Installation	Protected/Enclosed/Dry	Not Sheltered/Exterior	Full Exposure
Atmosphere	Clean/Non-Corrosive	Dirty/Non-Corrosive/Freshwater Marine	Dirty/Corrosive/Saltwater Marine
Climate	Dry/Stable Temperature	Wet/Moderate Temperature Fluctuations	Wet/Severe Temperature Fluctuations

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 at the suggested intervals recommended in Table 3: "Maintenance Interval Chart" on page 3:

1. **Siderails and Uprights.** Check for deformed, cracked or corroded main components. Replace damaged parts.
2. **Fasteners.** Check retainer rings, 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 on page 2.
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 mid 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. Clean and replace components as necessary. Adjustments can be made to the drum band brake to compensate for normal brake lining wear. Refer to 'Adjustments' in the "MAINTENANCE" section. If brake band cannot be adjusted to hold rated load, replace the brake band assembly. Adjustments cannot be made to the disc brake. The disc brake must be repaired as described in the "MAINTENANCE" section.
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. **Limit Switches (optional feature).** Operate winch in both directions to activate limit switches. Limit switches should engage (stop winch operation) at established settings (+/- 2 feet [+/- 0.6 meters] Reset limit switch by operating winch in opposite direction. Refer to 'Limit Switch Adjustment' in "MAINTENANCE" section.

10. **Winch Guard (optional feature).** Verify fasteners are tight and in good condition. Ensure guard is in good condition.
11. **Emergency Stop Valve (optional feature).** During winch operation verify the emergency stop valve operation. Valve must stop winch operation quickly. Valve must reset properly. Refer to 'Emergency Stop Valve' in the "OPERATION" section in Product Information Manual for procedures.
12. **Overload Device (optional feature).** Ensure overload device is properly set to stop the winch when loads exceed 150% (+/- 25%) of winch rated capacity. If winch does not shut down, contact your distributor or the factory for repair information.



(Dwg. MHP0056)

■ 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.

SPECIFICATIONS

Model Code Explanation

Example: FA2i-MR24MK1G

FA2i-MR 24 M K 1 G

Series (Capacity):

- FA2i = 3,180 lbs (1,445 kgs) Personnel Rating; 4,400 lbs (1,996 kgs) Utility Rating
- MR = Man Rider

Drum Length (Distance between drum flanges):

- 24 = Standard (Refer to Table 3, "Available Drum Lengths," on page 4 for drum lengths)

Drum Brake:

- A = Automatic Drum Brake
- M = Manual Drum Brake

Disc Brake:

- K = Automatic Disc Brake

Control:

- 1 = Winch mounted lever throttle (Standard)
- * 2XX = Remote full flow lever throttle [XX = Specify hose length (feet), Maximum 20 ft. (6 metres)]
- * 3XX = Remote pilot pendant throttle [XX = Specify hose length (feet), Maximum 66 ft. (20 metres)]
- * 4XX = Remote pilot lever throttle [XX = Specify length (feet), Maximum 66 ft. (20 metres)]
- * 5XX = Remote electric over air throttle †

Options: **

- 7 = Drum Grooving (Number = wire rope size in sixteenths, e.g. 7/16 inch) †
- A = Drum Guard with manual wire rope guide (used with Disc and Auto Band brake only)
- B = Extended Warranty
- ** C = Low Temperature Components; C1 = -20° ABS, C2 = -20° DNV, C3 = -20° LRS
- D = Drum Divider Flange and additional wire rope anchor †
- E = Construction Cage †
- F1 = Air Line Accessories position 1 (wire rope take-off side)
- F2 = Air Line Accessories position 2 (operator side)
- G = Drum Guard
- J = Air Line Accessories (not mounted to winch)
- ** M1 = Material Traceability (typical material results) ††
- ** M2 = Material Traceability (actual material results) ††
- ** M3 = Material Traceability (actual material results for these parts in finished, as-delivered condition) ††
- N1 = American Bureau of Shipping (ABS)
- N2 = Det Norske Veritas (DNV)
- N3 = Lloyd's Register of Shipping (LRS)
- P = Marine 812 Grade Corrosion Preventative Finish
- P1 = Marine 812-X Grade Corrosion Preventative Finish
- R = Slack Wire Rope Detector
- S = Limit Switch (upper and lower)
- U = Underwound (wire rope operation)
- E = Compliance with European Machinery Directive
- V = Press Roller
- W1 = ABS witness test
- W2 = DNV witness test
- W3 = LRS witness test
- W4 = Customer witness test
- X = Testing; please specify
- Z = Sandblast and Carbozinc Primer †

Notes:

- * Remote throttles are provided with 6 feet (2 metres) of hose. Specify hose lengths greater than 6 feet. For lengths greater than 20 feet (6 metres) with the Remote Full Flow Throttle, or 66 feet (20 metres) with the Remote Pilot Lever and Remote Pilot Pendant Throttles contact your **Ingersoll-Rand** distributor or the factory for control acceptability. Metric lengths are provided for reference only, order lengths in feet. (Used with Disc and Auto Band Brake only.)
- ** 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.
- † Not covered in this manual.
- †† Refer to 'Traceability' on page 4 for a description of the differences between M1, M2 and M3.

Table 1: Specifications

Model	Air System			Air Motor Pipe Inlet Size		Minimum Air System Hose Size (inside diameter)		Drum Barrel Diameter		Drum Flange Diameter	
	Rated Operating Pressure	Air Consumption (at rated pressure and load)		inch	mm	inch	mm	inch	mm	inch	mm
		scfm	cu.m/min								
FA2.5i-MR	90 psig (630 kPs/6.3 bar)	335	10	1.0	25	1.25	32	10.75	273	19	483

Table 2: Rated Performance (at Rated Pressure/Volume)

Model	Personnel Rating				Utility Rating				Max Stall Pull 1st Layer		Net Weight *	
	Full Drum Line Pull		Mid Drum Line Speed		Full Drum Line Pull		Mid Drum Line Speed		lbs	kgs	lbs	kgs
	lbs	kgs	fpm	m/min	lbs	kgs	fpm	m/min				
FA2.5i-MR	3,180	1,445	67	20	4,400	1,996	37	11	8,543	3,875	906	411

* Weight of standard winch without wire rope.

Table 3: Available Drum Lengths

Drum Lengths							
in	mm	in	mm	in	mm	in	mm
12	305	16	406	20	508	24*	610*

* Standard Length

Refer to sales literature for winch drum wire rope storage capacities.

Table 4: Sound Measurements

Sound Pressure Level	Sound Power Level
dB(A)	dB(A)
87	99

Sound measurements have been made in accordance with ISO 11201, ISO 3744-3746 and ISO 4871 test specifications for sound from pneumatic equipment. Readings shown are based on the average noise level of each winch configuration, proportionate to the utilized time in a regular cycle.

Lpc (Peak Sound Pressure) does not exceed 130 dB.

Performance based on 90 psig (6.3 bar/630 kPs) operating pressure.

Traceability

Load bearing parts are documented to provide traceability. Documentation includes chemical and physical properties of raw material, heat treating, hardening, tensile and charpy tests as required for the part.

Units with M1, M2 or M3 in the model code have traceable load bearing components.

M1 – Material Traceability certificates according to EN 10204 (Ex DIN 50049) 2.2 on load bearing parts. Conformity documents affirm (by the manufacturer) that parts are in compliance with requirements of the order, based on non-specific inspection and testing (i.e. results are typical material properties for these parts).

M2 – Material Traceability certificates according to EN 10204 (Ex DIN 50049) 3.1b on load bearing parts. Conformity documents affirm (by a department independent of the manufacturing department) that actual parts are in compliance with requirements of the order, based on specific inspection and testing (i.e. results are actual material properties for these parts).

M3 – Material Traceability certificates according to EN 10204 (Ex DIN 50049) 3.1b on load bearing parts. Conformity documents affirm (by a department independent of the manufacturing department) that the actual parts used in the product are in compliance with the order, based on specific inspection and testing (i.e. results are actual material properties for these parts in a finished, as delivered condition).

Components with part numbers ending in CH are charpy parts for use under extreme cold conditions. Traceability requirements must be stated when reordering these parts for continued certification.

INSTALLATION

Prior to installing the winch, carefully inspect it for possible shipping damage. Winches are supplied fully lubricated from the factory. Check oil levels and adjust as necessary before operating winch. Refer to "LUBRICATION" section for recommended oils and lubrication intervals.

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. MHP0133 on page 11, A. Drum; Table 5 on page 4 and Table 6 on page 4.

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 lug locations are improper for your specific installation, great care should be taken to ensure that winch, when lifted, will be properly balanced. Determine weight of your winch by referring to "SPECIFICATIONS" section. Lift winch 3 to 4 inches (75 to 100 mm) off ground. Verify winch is balanced and secure before continuing lift. Mount winch so axis of drum is horizontal and that motor vent cap is not more than 15° off top vertical center. If winch is to be mounted in an inverted position, motor case must be rotated to position vent cap to the top.

1. The winch mounting surface must be flat and of sufficient strength to handle rated load plus weight of winch and attached equipment. An inadequate foundation may cause distortion or twisting of winch uprights and side rails resulting in winch damage.
2. Make sure mounting surface is flat to within 0.005 inch (0.127 mm) per inch of drum length. Shim if necessary. Refer to Table 5 on page 4.

Table 5: Mounting Surface Tolerance

Drum Length	Mounting Surface Minimum Flatness	
	inch	mm
12	0.06	1.52
16	0.08	2.03
20	0.10	2.54
24	0.12	3.05

3. Mounting bolts must be Grade 8 or better. Use self-locking nuts or nuts with lockwashers. Refer to Table 6, "Mounting Bolts," on page 4.
4. Tighten mounting bolts evenly and torque to specification in torque chart. Refer to Table 13, "Torque Chart," on page 10.
5. Maintain a fleet angle between sheave and winch of no more than 1-1/2°. The lead sheave must be on a center line with drum and, for every inch (25 mm) of drum length, be at least 1.6 feet (0.5 metre) from the drum. Refer to Product Safety Information Manual Form MHD56251.
6. Do not weld to any part of winch.

Table 6: Mounting Bolts

Mounting Bolts	
inch	mm
5/8	16

■ Wire Rope

⚠ CAUTION

- Maintain at least 3 tight wraps of wire rope on the drum at all times.
- Do not use wire rope as a ground (earth) for welding.
- Do not attach a welding electrode to winch or wire rope.
- Install wire rope to come off drum for overwind operation (normal application). Refer to Dwg. MHP2450 in Product Safety Information Winch Safe Operating Practices Manual Form MHD56251.

NOTICE

- Refer to Product Safety Information Manual Form MHD56251 for additional wire rope information.
- For underwound applications order the "U" option or contact factory prior to operation.

■ 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 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. Maximum wire rope diameter is limited by the wire rope anchor. It is recommended that wire rope construction be 6 X 19 or 6 X 37 IWRC right lay. Refer to Table 7 on page 5 for minimum and maximum recommended wire rope sizes.

Table 7: Minimum and Maximum Wire Rope Size

Minimum		Maximum	
inch	mm	inch	mm
1/2	13	5/8	16

Note 1: Maximum wire rope diameter is limited by size of wire rope anchor hole. Refer to Product Parts Information Manual Form MHD56302 for correct wire rope anchor part numbers.

Note 2: Wire rope diameter is fixed if grooved drum option is used.

■ Installing Wire Rope

NOTICE

- When installing wire rope, pressurize brake with a minimum of 45 psi (3.1 bar) air from an auxiliary source.

Refer to Dwg. MHP2686 on page 11, A. Anchor; B. Wire Rope.

1. Cut wire rope to length in accordance with wire rope manufacturers' instructions.
2. Feed end of wire rope through drum anchor pocket hole.
3. Forming a loop, wrap loop around anchor, approximately 22 inches (559 mm) of wire rope.
4. Pull wire rope anchor into position in drum anchor pocket. Ensure no extra (open end) of wire rope is extending out of drum anchor pocket.

⚠ CAUTION

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

■ Safe Wire Rope Handling Procedure

- Always use gloves when handling wire rope.
- Never use wire rope that is frayed or kinked.
- Never use wire rope as a sling.
- Always ensure wire rope is correctly spooled and the first layer is tight against drum.
- Always follow wire rope manufactures' recommendation on use and maintenance of wire rope.

■ 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 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 wire rope manufacturers' instructions 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 wire rope over a sharp edge. Use a correctly sized sheave.
4. When a lead sheave is used, it must be aligned with center of drum. The diameter of lead sheave must be at least 18 times diameter of wire rope. Refer to Dwg. MHP2449 in Product Safety Information Manual Form MHD56251.
5. Always maintain at least three full, tight wraps of wire rope on drum.

■ Winch Guard

Use of a winch guard is recommended on all winches.

⚠ WARNING

- Do not allow wire rope to come in contact with winch guard panels during winch operation. Wire rope could become worn and damaged. Adjust winch guard panels to clear wire rope travel angle.

Refer to Dwg. MHP2676 and Product Parts Information Manual Form MHD56302. Drum guard panels must be adjusted to suit wire rope departure angle. To reposition winch guard panels remove nuts (804) and slide out crossbar (806). Position panels to avoid wire rope contact and install crossbar and nuts.

■ Air Supply

The air supply must be clean, free from moisture and lubricated to ensure optimum motor performance. Foreign particles, moisture and lack of lubrication are the primary causes of premature motor wear and breakdown. Using an air filter, lubricator and moisture separator will improve overall winch performance and reduce unscheduled downtime.

Refer to Table 1, "Specifications," on page 4 for motor air consumption and rated operating pressure. If air supply varies from what is recommended, winch performance will change.

Install air line lubricator, filter and regulator as close as possible to air inlet on motor. Lubricator must be located no more than 10 ft (3 m) from motor. Air line accessories package can also be mounted to the winch guard panel on the operators side or opposite.

Refer to Dwg. MHP0191 on page 11, A. Air Out; B. Lubricator; C. Regulator; D. Air In; E. Filter.

■ Air Lines

Inside diameter of winch air supply lines must not be less than size specified in Table 1 on page 4. 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 lines.

■ Air Line Lubricator

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

⚠ CAUTION

- Lubricator must be located no more than 10 ft. (3 m) from motor.
- Shut off air supply before filling air line lubricator.

The air line lubricator should be replenished daily and set to provide 6 to 9 drops per minute of ISO VG 32 (SAE 10W) oil. A fine mist will be exhausted from throttle control valve when air line lubricator is functioning properly.

■ Air Line Filter

It is recommended that an airline strainer/filter be installed before the lubricator to prevent dirt from entering the motor. The strainer/filter should provide 20 micron filtration and include a moisture trap. Clean the strainer/filter periodically to maintain its operating efficiency.

■ Air Pressure Regulator

If an air pressure regulator is used, install between lubricator and filter.

■ 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 motor, or an aftercooler at compressor that cools air to condense and collect moisture prior to distribution through supply lines, are also helpful.

■ Mufflers

Ensure mufflers are installed in winch exhaust manifold and control valve exhaust port. An additional muffler is used on winches equipped with an emergency stop and overload device. Check mufflers periodically to ensure they are functioning correctly.

■ Motor

For optimum performance and maximum durability of parts, provide recommended air supply as measured at motor inlet. Refer to Table 1, "Specifications," on page 4. The air motor should be installed as near as possible to compressor or air receiver.

■ Limit Switches (optional feature)

Use two people to make adjustments. Pre-set limit switch settings prevent winch wire rope payout and haul-in by stopping air flow to the winch motor when a defined set point has been reached. It is the owner's and operator's responsibility to adjust winch operating limits prior to using winch.

To adjust set points:

Follow instructions in the order they appear for limit switch adjustment (**use two people to make adjustments**). Refer to Dwg. MHP2688 on page 12, A. Center Nut; B. Payout; C. Haul-In:

1. Remove cap from limit switch cover.
2. Partially unscrew center nut.
3. **PAYOUT:** Rotate (#1) screw (counterclockwise) while slowly paying out until winch shuts off.
4. **HAUL-IN:** Rotate (#2) screw (clockwise) while slowly hauling in until winch shuts off.
5. Tighten center nut.
6. Reinstall cap on limit switch cover and tighten.



WARNING

- Ensure limit switch setpoints are established and operating properly before using winch.

■ Slack Wire Rope Detector (optional feature)

Contact factory for information.

■ Manual Wire Rope Guide (optional feature)

Contact factory for information.

■ Press Roller (optional feature)

Ensure wire rope is positioned between press roller and drum barrel and springs keep press roller in tight contact with wire rope.

■ Initial Winch 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 a small amount of light oil into the inlet connection to provide initial lubrication.
2. 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.
3. Operate winch in both directions with no load for one to two minutes.
4. 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.
5. Check operation of brakes. Adjust if necessary as described in "MAINTENANCE" section in the Product Maintenance Information Manual Form MHD56303.
6. Check operation of limit switches, locking mechanisms and all safety devices when equipped.
7. Check foundation mounting fasteners are secure.
8. Install drum guard when provided.

For winches that have been in storage, the following start-up procedures are required:

1. Give the winch an inspection conforming to requirements of "Winches Not in Regular Use" in the "INSPECTION" section on page 7.
2. Pour a small amount of ISO VG 32 (SAE 10W) oil in motor inlet port.
3. Operate motor for 10 seconds in both directions to flush out any impurities.
4. The winch is now ready for normal use.

OPERATION

■ Winch Controls

The spring loaded, motor mounted, live air manual throttle control valve is supplied as a standard feature on this winch. Optional remote throttle controls are available. Reference model code on the winch nameplate and compare it to the "SPECIFICATIONS" section on page 3, to determine your configuration. The throttle controls provide operator control of motor speed and direction of drum rotation.

■ Winch Mounted Air Throttle (standard feature)

Refer to Dwg. MHP0447 on page 12, A. Counterclockwise Direction: Wire Rope Haul-In; B. View: Facing Air Motor; C. Clockwise Direction: Wire Rope Payout; D. 1-1/4 inch NPT; E. 90°; F. With lever at neutral position, fold down to prevent accidental winch operation.

The spring loaded, live air, manual control throttle valve mounts to the motor adapter valve.

When viewed from the air motor end, move the control throttle handle to the right (clockwise) to PAYOUT wire rope and to the left (counterclockwise) to HAUL-IN wire rope.

To ensure smooth operation of the winch, sudden movements of the control valve should be avoided.

When released, handle will return to the neutral or center position. The sliding handle will drop down to engage and lock the control handle in place.

■ Remote Live Full Flow Air Throttle (optional feature)

Provides for remote mounting of winch control at a fixed location at up to 20 feet (6 metres) away from winch motor. Air hoses connect throttle to winch motor to provide winch operation.

Move control throttle handle to the right (clockwise) to payout wire rope and to the left (counterclockwise) to haul-in wire rope. Avoid sudden movements of control valve to ensure smooth operation of winch.

■ Remote Pilot Pendant Throttle (optional feature)

Refer to Dwg. MHP0204.

Provides for remote winch control at distances of up to 66* feet (20 metres) away from winch. The pilot pendant control throttle is a two function movable control station for winch operation. Pilot pressure from pendant control activates winch control valve. The winch control valve, located on winch motor, controls motor speed and direction of drum rotation. Direction of drum rotation is determined by the pendant lever/button depressed.

■ Remote Pilot Lever Throttle (optional feature)

Provides for remote winch control at distances of up to 66* feet (20 metres) away from winch. The lever pilot control throttle is a fixed mounted lever control station for winch operation. Pilot pressure from lever pilot control throttle activates winch control valve. The winch control valve, located on winch motor, controls motor speed and direction of drum rotation. Direction of drum rotation is determined by the direction in which lever is shifted.

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

■ Underwound Operation (optional feature)

Underwound operation allows wire rope haul-in or payout off the bottom of drum. This is a special operation and requires a winch specifically designed for this usage.

■ Emergency Stop and Overload System (optional features)

When emergency stop or overload valve is activated, winch drum rotation will immediately cease.



CAUTION

- If winch continues to move (payout load) after emergency stop activates, brake(s) are not holding load and may require adjustment or repair.

When control valve senses a preset pressure difference between ports, a pilot signal is sent to stop flow of air, winch drum rotation will immediately cease.

■ Emergency Stop

Emergency stop device is located on the control valve. When activated, winch drum rotation will immediately cease. To activate emergency stop, conduct the following:

1. Depress (push down) red palm valve, located on top of control valve.

NOTICE

- If winch overload occurs, overload device, if equipped, also stops winch. To operate winch after an overload, reduce load and reset overload.

Emergency Stop Reset

1. Rotate red stop button, in (counterclockwise) direction until red stop button 'pops' up.
2. Winch is ready to resume operation.

Overload System

An overload system is available on winches with the emergency shut-off option. Overload system operation is based on differential pressure between air motor inlet and exhaust. The overload system is factory preset to actuate at 150% ($\pm 25\%$) of winch rated capacity. When an overload condition is sensed, the valve poppet closes, to cut off supply air to winch, stopping winch operation. If an overload shutoff occurs, winch load must be reduced. Reset the overload valve and operate winch in payout direction to lower load. Refer to 'Emergency Stop Reset' section on page 7.

Checking Overload Valve Setting

1. Attach load line to a load that is calibrated to maximum rated load for winch.
2. Move control lever to haul-in position. If winch does not lift load, adjust the adjustment screw. Refer to "Overload Valve Adjustment (optional feature)" in Product Maintenance Information Manual Form MHD56303.

Setting the Overload

1. Attach load line to a load that is calibrated to 150% of winch rated capacity. Shift control lever to haul-in position.
 - a. If overload valve activates, reset overload valve. Winch is ready for normal operation.
 - b. If winch lifts load, lower load. Turn adjustment screw counterclockwise in 1/4 turn increments until overload valve activates when control lever is shifted to haul-in position. After each 1/4 turn, retest winch.

Winch Brakes

Manual Drum Brake

Refer to Dwg. MHP0152 and MHP0209.

The manual drum brake may be applied by pushing down on handle and released by pulling up. If handle is pushed down fully, it should lock in that position and prevent drum rotation, until released by operator. The brake must be kept properly adjusted to hold required load. Refer to 'Adjustments' in "MAINTENANCE" section in Product Maintenance Information Manual Form MHD56303 for adjustment instructions.

Automatic Drum Brake

The automatic drum brake is a spring applied, air released brake which utilizes an air actuated, spring loaded cylinder, that automatically disengages brake when motor is operated. Air pressure in cylinder overcomes spring pressure to release brake. When control valve is placed in neutral position, air in cylinder is vented and spring automatically engages brake to prevent drum rotation.

The cylinder clevis must be kept properly adjusted to hold required load.

Automatic Disc Brake

The automatic disc brake is a spring applied, air released brake. Using an air actuated, spring loaded piston, the brake automatically disengages when motor is operated and engages when throttle is returned to neutral position. Air pressure ported through brake housing overcomes spring pressure and moves piston which releases brake. When control valve is placed in neutral position, air is vented, spring pressure overcomes air pressure and spring pressure moves piston, engages brake and prevents drum rotation.

Slack Line Detector (optional feature)

Contact factory for information.

Limit Switches (optional feature)

Pre-set limit switch settings prevent winch wire rope payout and haul-in by stopping air flow to the winch motor when a set point has been reached. It is the owner's and operator's responsibility to adjust winch operating limits prior to using the winch. To adjust the limit switch set points, refer to "INSTALLATION" section on page 4.

Manual Wire Rope Guide (optional feature)

WARNING

- Only allow personnel that are physically capable of simultaneously moving the wire rope guide handle through its full travel range and operating the winch control valve to use this equipment.
- Do not place hand(s) on any part of the manual wire rope guide other than the handle grip during winch operation.
- Ensure manual wire rope guide is moved the full length of the drum for even wire rope spooling.
- Do not allow body or clothing between the travel stop and the manual wire rope guide bar.
- Do not wear loose clothing, jewelry or accessories that can entangle the wire rope guide.

To operate manual wire rope guide, always have one hand on the manual wire rope guide handle and the other hand on the winch control valve. Operator must maintain a balanced, comfortable stance throughout the operating.

Operate manual wire rope guide in a side to side motion over the full drum length while operating winch in a HAUL-IN direction.

Stand clear of the wire rope guide when operating the winch in PAYOUT direction.

INSPECTION

Inspection information is based in part on American Society of Mechanical Engineers Safety Codes (ASME B30.7).

WARNING

- All new or repaired equipment should be inspected and tested by Ingersoll-Rand trained Service Technicians 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 Ingersoll-Rand trained Inspectors and include observations made during routine equipment operation. Periodic inspections are thorough inspections conducted by Ingersoll-Rand trained Service Technicians. ASME B30.7 states inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage. Refer to 'Inspection Classifications' chart and 'Maintenance Intervals' chart in Product Maintenance Information Manual Form MHD56303 for recommended maintenance intervals.

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 to ensure corrective action is taken.

A determination as to whether a condition constitutes a safety hazard(s) must be decided, and the correction of noted safety hazard(s) accomplished and documented by written report before placing the equipment in service.

Wire Rope Reports

Records should be maintained as part of a long-term 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 regular service, frequent inspections should be made by operators at the beginning of each shift. In addition, visual and audible inspections should be conducted during regular operation for indications of damage or evidence of malfunction (such as abnormal noises).

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 Product Maintenance Information Manual Form MHD56303.

1. SURROUNDING AREA. Visually check for winch oil leaks. Do not operate winch if leaking oil is found. Ensure surrounding area has no slippery surfaces and is obstruction free.
2. HOSES and FITTINGS. Visually inspect for damage, air leaks and loose connections. Repair all leaks or damage and tighten loose connections prior to starting daily tasks.
3. MUFFLER. Visually check for restrictions or external damage. Clear restrictions or replace if damaged.
4. MANUAL SHUT-OFF VALVE. Test shut-off valve to ensure proper operation and free movement.
5. GUARDS. Verify wire rope does not contact guard during winch operation and that guards are secure and undamaged.
6. WINCH. Visually inspect winch housings, control(s), external brake, side rails and drum for damage. Check that all external bolts are in place and secure. Report damage to supervisor and request additional inspection by a Ingersoll-Rand trained Service Technician.
7. WINCH OPERATION. Power winch in both directions. Winch must operate smoothly without sticking, binding or abnormal noises and have minimal vibration.

NOTICE

• The full extent of wire rope wear cannot be determined by visual inspection. At any indication of wear inspect wire rope in accordance with instructions in "Periodic Inspection." Refer to Product Maintenance Information Manual Form MHD56303.

8. PENDANT (optional feature). Ensure operation of pendant levers is smooth and winch is responsive to pendant control. Pendant levers must spring return to the neutral position when released.
9. MANUAL THROTTLE LEVER. Ensure operation of manual throttle lever is smooth and winch is responsive to lever movement. Lever must return to neutral and lock in place when released. If winch responds slowly or controls stick, do not operate winch until all problems have been corrected.
10. WIRE ROPE. Visually inspect all wire rope expected to be in use during the day's operations. Inspect for wear and 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 knowledgeable on wire rope safety and maintenance procedures.
11. WIRE ROPE SPOOLING. Visually check reeving and ensure wire rope feeds on and off the drum smoothly. Verify spooling direction (overwind or underwind) is correct for winch and application.
12. BRAKE(S). Lift and lower the load a short distance to test brake(s). Brake(s) must hold load without slipping. Automatic brake must release when winch control throttle is operated. If brake(s) do not hold load or do not release properly, they must be adjusted or repaired.
13. LUBRICATION. Refer to "LUBRICATION" section on page 8 for recommended procedures and lubricants.

14. LIMIT SWITCHES (optional feature). If equipped, ensure limit switches engage and prevent operation at the required set point and with drum rotating in correct direction. Ensure limit switch properly resets.
15. EMERGENCY STOP (optional feature). If equipped, run winch and activate emergency stop. Winch operation must stop quickly. Ensure valve resets properly.

■ 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 placed in service. Refer to Product Maintenance Information Manual Form MHD56303.
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.

■ Storing The Winch

1. Always store the winch in a no load condition.
2. Wipe off all dirt and water.
3. Oil the wire rope.
4. Place in a dry location.
5. Before returning winch to service, follow instructions for "Winches Not In Regular Use" in the "INSPECTION" section on page 7.

LUBRICATION

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

Refer to 'Maintenance Interval' chart in Product Maintenance Information Manual Form MHD56303 for recommended lubrication intervals. Use only those lubricants recommended. Other lubricants may affect winch performance. Approval for use of other lubricants must be obtained from your Ingersoll-Rand distributor. Failure to observe this precaution may result in damage to winch and/or its associated components.

Table 8: Lubrication Intervals

Component	Interval
Check Air Line Lubricator	Daily
Check Motor Oil level	Daily
Change Motor Oil	1 Year or 1,000 hrs of Winch Operation
Change Gearbox Oil	
Change Disc Brake Oil	

■ 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. Use of unsuitable oil may result in excessive temperature rise, loss of efficiency and possible damage to lubricated components. Refer to 'Recommended Lubricants' section on page 8.
2. It is recommend that the first oil change be done after approximately 50 hours initial operation. Thereafter, drain and replace oil according to Table 8, "Lubrication Intervals," on page 8.
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 collect lubricants in suitable containers and dispose of in an environmentally safe manner.

⚠ WARNING

- Pneumatic Winches use oil to prevent excessive heat build up and to prevent wear that could cause sparks. Oil levels must be properly maintained.

■ Recommended Lubricants

Table 9: Reduction Gear Recommended Lubricants

Temperature	Type Oil
Below 32° F (0° C)	2 EP (ISO VG 68)
32° to 80° F (0° to 27° C)	3 EP (ISO VG 100) *
Above 80° F (27° C)	4 EP (ISO VG 150)

* Units are shipped from factory with 3 EP (ISO VG 100) lubricant. Refer to Table 12 on page 9 for reduction gear oil capacities

Table 10: Air Motor and Disc Brake Recommended Lubricants

Temperature	Type Oil
Below 32° F (0° C)	ISO VG 32 (SAE 10W)
32° to 80° F (0° to 27° C)	ISO VG 68 (SAE 20W) *
Above 80° F (27° C)	ISO VG 100 (SAE 30W)

* Units are shipped from factory with ISO VG 68 (SAE 20W) lubricant.

Table 11: Recommended Grease

Temperature	Type Oil
-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

NOTICE

- Do NOT use synthetic lubricants in air motor. Synthetic lubricants will result in oil blowing by piston rings.

■ Motor

Refer to Dwg. MHP0222 on page 12, **A.** Level Plug; **B.** Drain Plug; **C.** Fill Plug. The motor is splash lubricated by oil in motor housing and has no other means of lubrication. It is therefore important to use only good quality, non-detergent motor oil to ensure maximum performance and minimum downtime for repairs. Refer to 'Recommended Lubricants' section on page 8.

Oil capacity for the motor is 3/8 quarts (0.35 litres). Add oil through filler opening until oil flows from level plug hole. 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 the end of shift for water to separate from oil but not long enough for it to freeze. Drain water then refill to level plug (225), located on side of motor housing (217). If desired, all oil may be drained at end of shift and motor refilled with new oil.

■ **Reduction Gear Assembly**

Refer to Dwg. MHP0140 on page 11, **A.** Fill Plug Position; **B.** Drum; **C.** Reduction Gear Assembly; **D.** Inboard Upright; **E.** Level Plug Position.

The reduction gear is filled to the correct levels prior to shipment from the factory. Check oil level before initial winch operation. This component is splash lubricated by oil in the housing and has no other means of lubrication. It is therefore important to use high quality Extreme Pressure (EP) rust and oxidation inhibited gear oil to ensure maximum performance and minimum down time for repair.

CAUTION

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

To ensure correct performance, highest efficiency and long life, it is essential that lubricating oil be maintained at correct level. Rotate drum until fill plug is located at top dead center then add oil up to level plug hole. Refer to Table 12, "Reduction Gear Capacities," on page 9 for reduction gear oil capacities.

Table 12: Reduction Gear Capacities

Capacity	
quarts	litres
1-1/2	1.4

■ **Disc Brake**

Refer to Dwg. MHP1348 on page 12, **A.** Breather Plug; **B.** Drain Plug.

The friction plates and drive plates are in a self contained oil bath and have no other means lubrication. After an oil change or winch overhaul remove the breather plug and pour a small amount of oil [4 to 6 ounces (0.2 litres)] through breather hole in brake housing. Allow oil to fully settle between fillings.

NOTICE

- If too much oil is added excess oil will be discharged through breather plug when control valve is actuated.

■ **Seals and Bearings**

If winch is disassembled, clean all parts thoroughly and coat bearings and seals with clean grease. Refer to "Recommended Lubricants" section on page 8. Use sufficient grease to provide a good protective coat. Lubricate grease fittings monthly with 2 or 3 pumps of a grease gun.

■ **Wire Rope**

Follow the wire rope manufacturers' 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 specified by the wire rope manufacturer.
2. Apply a wire rope lubricant, **Ingersoll-Rand LUBRI-LINK-GREEN®** or ISO VG 100 (SAE 30W) oil.
 3. Brush, drip or spray lubricant weekly, or more frequently, depending on severity of service.

Table 13: Torque Chart

Standard Coarse Thread Torque

Size	SAE Grade 5			SAE Grade 8		
	Dry	Lubricated	PTFE	Dry	Lubricated	PTFE
1/4-20	8-10	6-7	4	12-14	9-10	5-6
5/16-18	17-20	13-15	8-9	25-28	18-21	11-13
3/8-16	31-35	23-26	14-16	44-49	33-37	20-22
7/16-14	49-56	37-42	22-25	70-79	52-59	31-36
1/2-13	75-85	57-64	34-38	106-121	80-90	48-54
9/16-12	109-123	82-92	49-55	154-174	115-130	69-78
5/8-11	150-170	113-128	68-77	212-240	159-180	95-108
3/4-10	267-302	200-227	120-136	376-426	282-320	169-192
7/8-9	429-487	322-365	193-219	606-687	455-515	273-309
1-8	644-729	483-547	290-328	909-1030	681-772	409-463
1 1/8-7	794-900	596-675	357-405	1288-1460	966-1095	580-657
1 1/4-7	1121-1270	840-952	504-571	1817-2059	1363-1545	818-927

Standard Fine Thread Torque

Size	SAE Grade 5			SAE Grade 8		
	Dry	Lubricated	PTFE	Dry	Lubricated	PTFE
1/4-20	10-11	7-8	4-5	14-15	10-12	6-7
5/16-24	19-22	14-16	9-10	27-31	20-23	12-14
3/8-24	35-40	26-30	16-18	49-56	37-42	22-25
7/16-20	55-63	41-47	25-28	78-88	58-66	35-40
1/2-20	85-96	64-72	38-43	120-136	90-102	54-61
9/16-18	121-137	91-103	55-62	171-194	128-146	77-87
5/8-18	170-193	127-144	76-87	240-272	180-204	108-122
3/4-16	297-337	223-253	134-152	420-476	315-357	189-214
7/8-14	474-537	355-403	213-242	669-758	502-568	301-341
1-12	704-798	528-599	317-359	995-1127	746-845	448-507
1 1/8-12	1023-1159	767-869	460-572	1444-1637	1083-1227	650-736
1 1/4-12	1425-1615	1069-1211	641-727	2012-2280	1509-1710	905-1026

Metric Coarse Thread Torque

Size	Class 8.8/9.8			Class 10.9		
	Dry	Lubricated	PTFE	Dry	Lubricated	PTFE
M6x1	9-10	6-7	4	11-12	8-9	5-6
M8x1.25	21-23	16-18	9-11	26-30	20-22	12-13
M10x1.5	41-47	31-35	19-21	53-60	39-45	24-27
M12x1.75	71-81	54-61	32-36	91-103	68-77	41-46
M14x2	115-130	86-98	52-59	147-166	110-125	66-75
M16x2	165-187	124-140	74-84	227-257	170-193	102-116
M20x2.5	321-364	241-273	144-164	443-502	332-376	199-226
M22x2.5	439-497	329-373	197-224	605-686	454-514	272-309
M24x3	556-630	417-473	250-284	767-869	575-652	345-391
M30x3.5	1103-1250	827-938	496-563	1521-1724	1141-1293	685-776

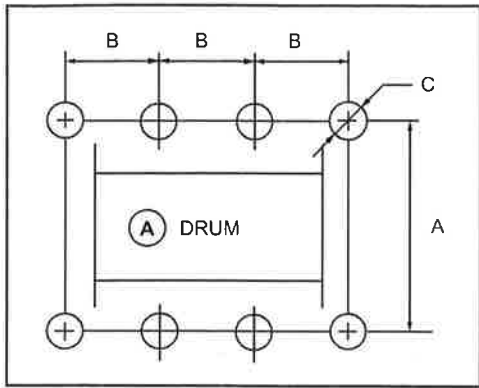
Metric Fine Thread Torque

Size	Class 8.8/9.8			Class 10.9		
	Dry	Lubricated	PTFE	Dry	Lubricated	PTFE
M8x1	22-25	17-19	10-11	28-32	21-24	13-14
M10x1.25	44-49	33-37	20-22	56-63	42-47	25-28
M12x1.25	78-89	59-67	35-40	100-113	75-85	45-51
M14x1.5	125-141	93-106	56-64	159-180	119-135	72-81
M16x1.5	176-200	132-150	79-90	243-276	183-207	110-124
M18x1.5	257-291	193-219	116-131	355-402	266-302	160-181
M20x1.5	358-406	268-304	161-183	494-559	370-420	222-252
M22x1.5	484-548	363-411	218-247	667-756	500-567	300-340
M24x2	609-690	456-517	274-310	839-951	630-713	378-428
M30x2	1227-1390	920-1043	552-626	1692-1918	1269-1438	761-863

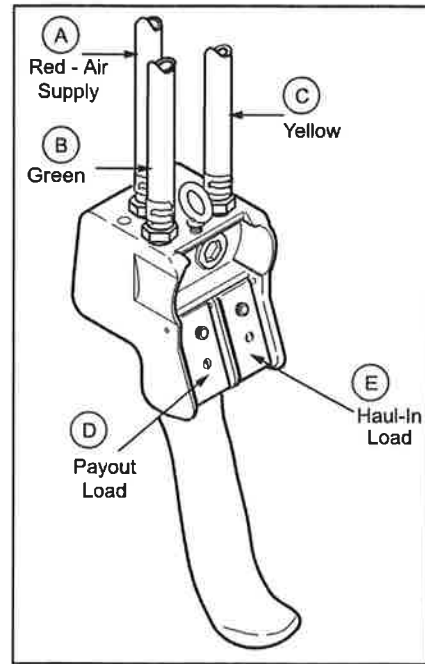
Notes:

- Definitions:
DRY: Cadmium plate, zinc plate, and oiled fasteners.
LUBRICATED: Moly sulfide paste, carnauba wax, moly sulfide grease and copper-based anti-sieze coated fasteners.
PTFE: 2% minimum PTFE (teflon) coated fasteners.
- All torque values foot-pounds unless noted.
- SAE grade 5 equivalent to ASTM A325 Type 2 and ASTM A449.
- SAE grade 8 equivalent to ASTM A354 Grade BD, ASTM A490 Type 1.
- If mixing fasteners use lowest torque value.
- Torque values 75 to 85% of fastener proof load ref.

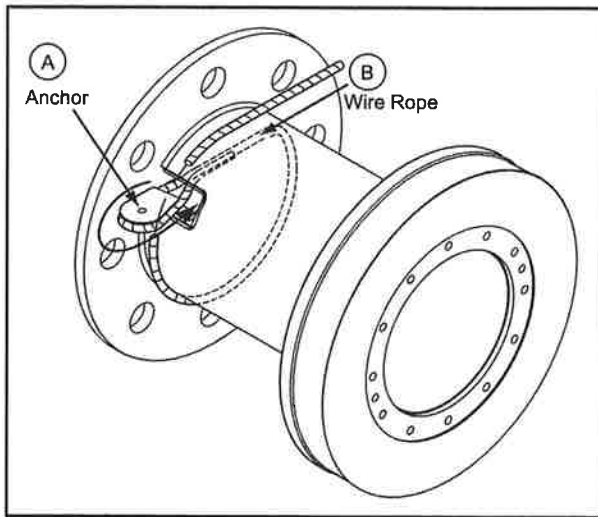
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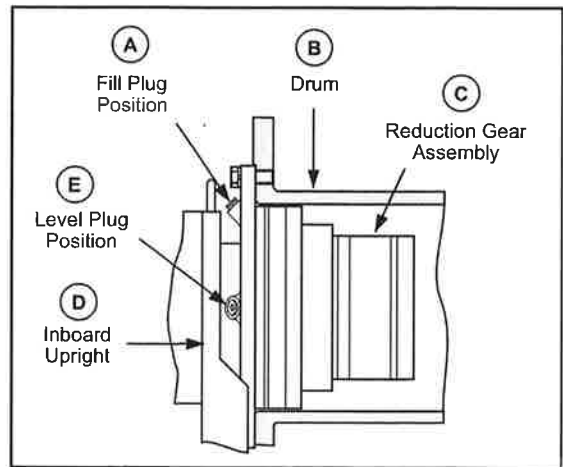
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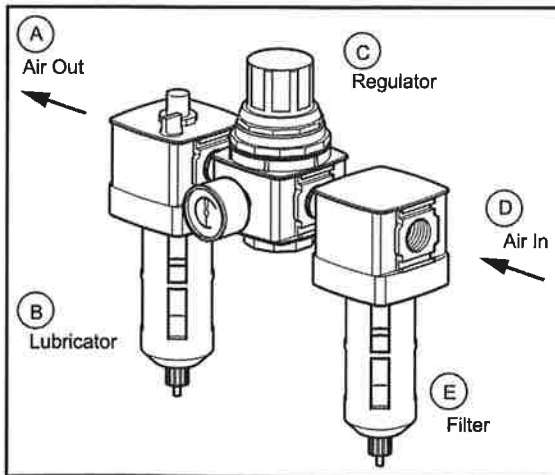
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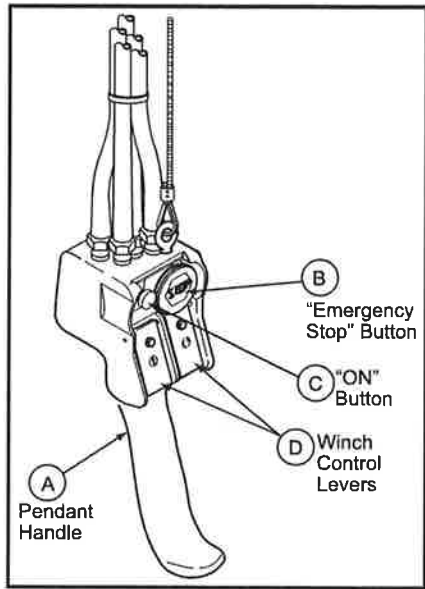


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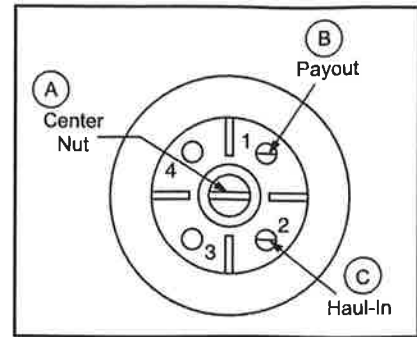


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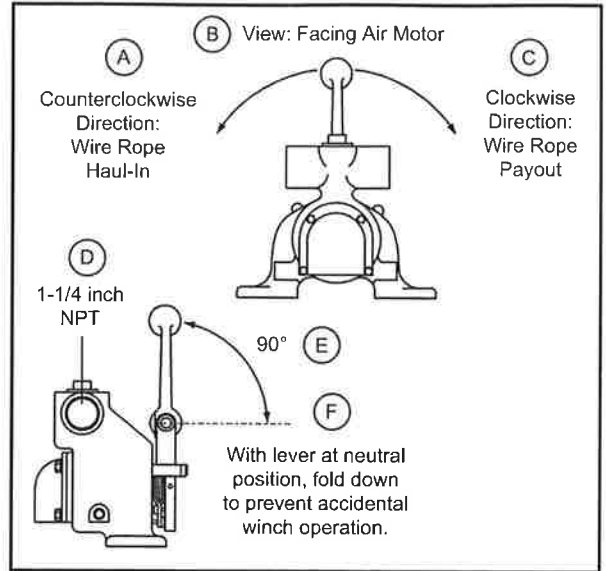
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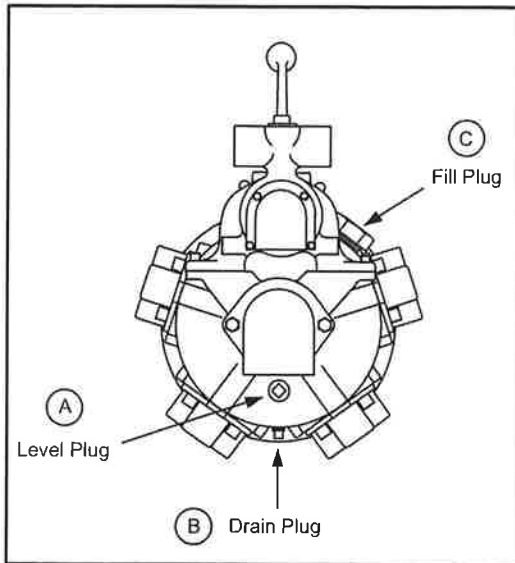
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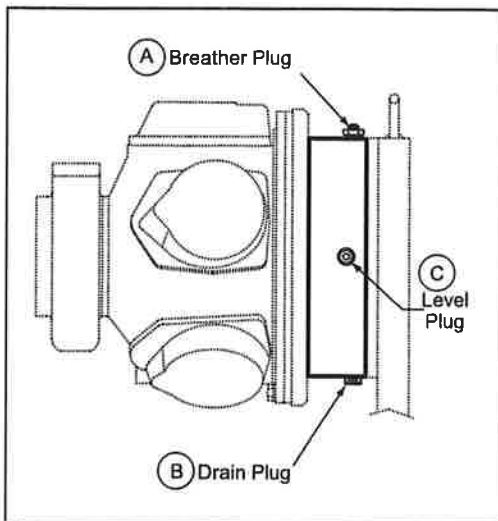
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SERVICE NOTES

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