OPERATION AND MAINTENANCE MANUAL
for
ELECTRIC WINCH MODELS

EBT1500A20-5
(Single Phase)
1500 lb (680 kg)

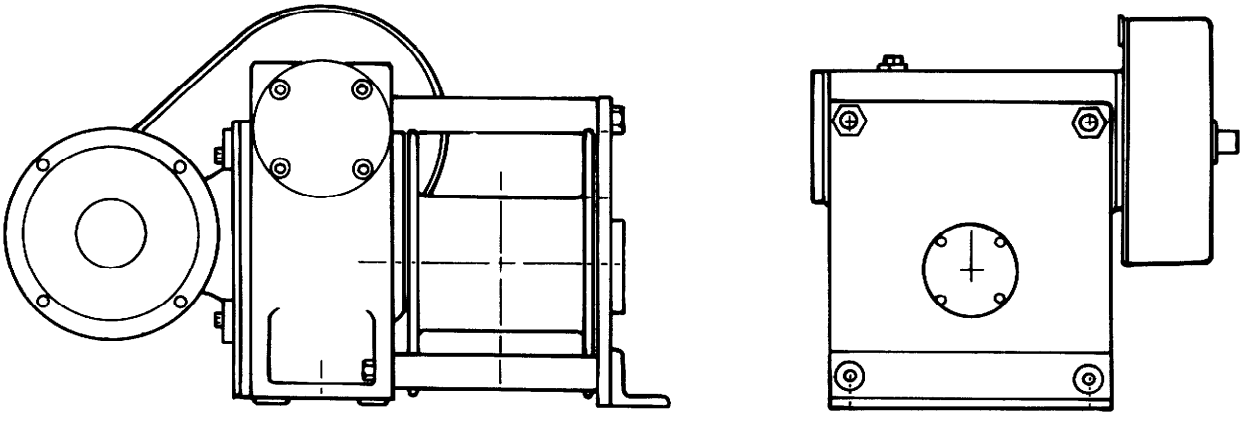
EBT1500B20-5
(Three Phase)
1500 lb (680 kg)

EBT2000B20-5
(Three Phase)
2000 lb (907 kg)

EBT1500A20-12
(Single Phase)
1500 lb (680 kg)

EBT1500B20-12
(Three Phase)
1500 lb (680 kg)

EBT2000B20-12
(Three Phase)
2000 lb (907 kg)



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 (ANSI B30.7) and any other applicable safety codes and regulations.

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

Form MHD56038
Edition 2
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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 must read and understand this manual before operating the product.

Danger, Warning, Caution and Notice

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

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

⚠ CAUTION — Caution is used to indicate the presence of a hazard which ***will*** or ***can*** cause ***minor*** personal 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 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. This is the customer's responsibility. If in doubt, consult a qualified structural engineer.

• Electrical installation should be performed by licensed electricians in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70) and any applicable local, state and national electrical codes and ordinances.

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: Employees who work near cranes or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting 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.

To the best of our knowledge, INGERSOLL-RAND Material Handling winches are manufactured in accordance with the latest standards in effect at time of manufacture.

However, contrary to common belief, the Occupational Safety and Health Act of 1970, as we understand it, generally places the burden of compliance with the user, not the manufacturer. Many OSHA requirements are not concerned or connected with the manufactured product but are, rather, connected with the final installation: "It is the owner's responsibility and user's responsibility to determine the suitability of a product for any particular use. Check all applicable industry, trade association, federal, state and local regulations. 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 ANSI/ASME B30.9 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

NOTICE

• Using other than genuine INGERSOLL-RAND Material Handling parts will result in the void of warranty.

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions have been adapted in part from American National (Safety) Standard ANSI B30.7 and are intended to avoid unsafe operating practices which might lead to personal injury or property damage.

INGERSOLL-RAND recognizes that most companies who use winches have a safety program 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.

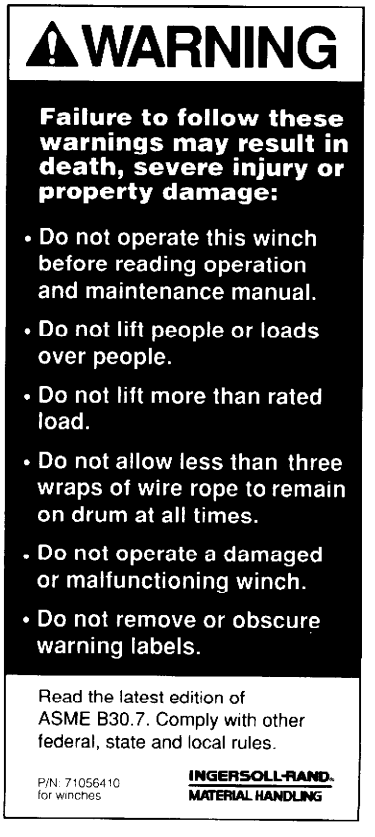
⚠ WARNING

• Winches with disengaging (Free Spool) clutch option must not be used for hoisting applications.

1. Only allow qualified personnel (trained in safety and operation) to operate and maintain a winch.
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 controls, do not operate the winch until the sign has been removed by designated personnel.
4. Before each shift, check the winch for wear or damage.
5. Never lift a load greater than the rated capacity of the winch. See warning labels and tags attached to winch.
6. Keep hands, clothing, etc., clear of moving parts.
7. Never place your hand in the throat area of a hook or in the vicinity of the wire rope as it spools onto the 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. Do not jerk the load.
14. Do not swing a suspended load.
15. Never suspend a load for an extended period of time.
16. Never leave a suspended load unattended.
17. Pay attention to the load at all times when operating the winch.
18. After use, properly secure winch and all loads.
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 TAG

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



SPECIFICATIONS

	Winch Model							
	EBT1500A20-5		EBT1500A20-12		EBT2000B20-5		EBT2000B20-12	
Drum Size:	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
Barrel Diameter	4	102	4	102	4	102	4	102
Flange Diameter	8	203	8	203	8	203	8	203
Distance Between Flanges	5	127	12	305	5	127	12	305

Model No.	Line Pull 2nd layer		Line Speed 2nd layer		Duty Cycle	Horse power	Net wt*	
	(lb)	(kg)	(fpm)	(m/min)	(min)	(hp)	(lb)	(kg)
EBT1500A20-5	1500	680	20	6.1	15	1-1/2	105	48
EBT1500A20-12	1500	680	20	6.1	15	1-1/2	111	51
EBT2000B20-5	2000	907	20	6.1	15	1-1/2	105	48
EBT2000B20-12	2000	907	20	6.1	10	1-1/2	111	51

*Winch without wire rope.

Model No.	**Drum Wire Rope storage ft. (m)							
	3/16 in.	5 mm	1/4 in.	6 mm	5/16 in.	8 mm	3/8 in.	10 mm
EBT1500A20-5	340	86	162	52	82	25	49	14
EBT1500A20-12	833	211	401	128	204	62	124	36
EBT2000B20-5	340	86	162	52	82	25	49	14
EBT2000B20-12	833	211	401	128	204	62	124	36

** Based on ANSI standards which require the top layer to be at least 1/2 in. (13 mm) below the drum flange diameter. Capacities shown may vary from those publishcd elsewhere.

Note: Winch specifications and performance for (three phase) Models EBT1500B20-5 and EBT1500B20-12 is the same as for equivalent (single phase) models EBT1500A20-5 and EBT1500A20-12.

INSTALLATION

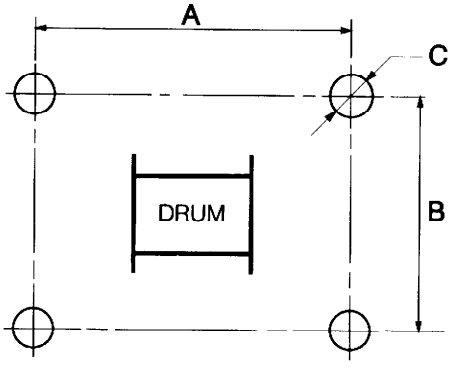
⚠ CAUTION

• 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

1. Mount the winch on a ridged surface which is capable of supporting the winch and will prevent deflecting or distortion of the winch under maximum load.
2. Choose a site that uses as short a length of wire rope as practical.
3. When a lead sheave is used, it must be aligned with the center of the drum. The diameter of the lead sheave must be at least 18 times the diameter of the wire rope.
4. Maintain a fleet angle between the sheave and winch of no more than 1-1/2 degrees. For every inch (25 mm) of drum length, the lead sheave must be at least 1.6 feet (0.5 m) from thc drum.
5. Make sure the mounting surface is flat to within 1/16 in. (2 mm). Shim if necessary.

Model No.	Bolt Pattern Dimension "A"		"B"		"C"	
	in.	(mm)	in.	(mm)	in.	(mm)
EBT1500A20-5	5-3/16	131	7	178	17/32	13
EBT1500A20-12	8-11/16	221	7	178	17/32	13
EBT2000B20-5	5-3/16	131	7	178	17/32	13
EBT2000B20-12	8-11/16	121	7	178	17/32	13



(Dwg. MHTPA0124)

6. Mounting bolts must be 1/2 in. diameter (12 mm) and be Grade 8 or better. Use self-locking nuts or nuts with lock washers.

7. Tighten mounting bolts evenly and torque to 30 lb.ft. (40N-m) dry. If the fasteners are plated, lubricated or a thread locking compound is used torque to 23 lb.ft. (31N-m).
8. Do not weld to any part of the winch.
9. Remove and discard solid shipping plug and install fill/vent plug (9).

Safe Installation Procedures

1. Do not use wire rope as a ground (earth) for welding.
2. Do not weld to the winch or attach a welding electrode to the winch or wire rope.
3. Never run the wire rope over a sharp edge. Use a correctly sized sheave. See instruction 3 under "Mounting".
4. Always maintain at least three full wraps of wire rope on the drum.

Wire Rope

⚠ CAUTION

• Maintain at least 3 wraps of wire rope on the drum at all times.
• Install the wire rope to come off the drum in an overwind position.

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.

⚠ WARNING

• Check wire rope diameter provides adequete safety factor.

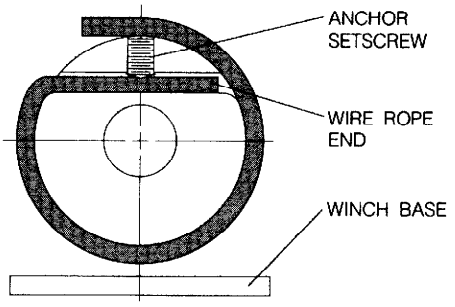
Minimum recommended wire rope diameter is 3/16 in. (5 mm). Maximum wire rope diameter is 3/8 in. (10 mm). The maximum wire rope diameter is limited be the size of the wire rope anchor hole.

Installing Wire Rope

⚠ CAUTION

• Position the wire rope so that it comes off the top of the drum.

1. Cut wire rope to length and fuse end to prevent fraying of strands in accordance with the wire rope manufacturer's instructions.
2. Feed the fused end of the wire rope into the wire rope anchor hole, past the anchor screw, and position the end just beneath the drum surface. (See Dwg. MHTPA0070)



(Dwg. MHTPA0070)

3. Secure by tightening anchor screw. Make sure anchor screw is below the surface of the drum when tightened.

⚠ CAUTION

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

Wire Rope Spooling

To allow for uneven spooling and decrease in line pull capacity as the drum fills up, use as short a wire rope as practical. To rewind wire rope apply tension to eliminate slack. This helps achieve level winding and tight spooling.

Rigging

Make sure all wire rope blocks, tackle and fastenings have sufficient safety margin to handle the required load. 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 manufacturer's handbook for proper sizing, use and care of wire rope.

Safe Wire Rope Handling Procedures

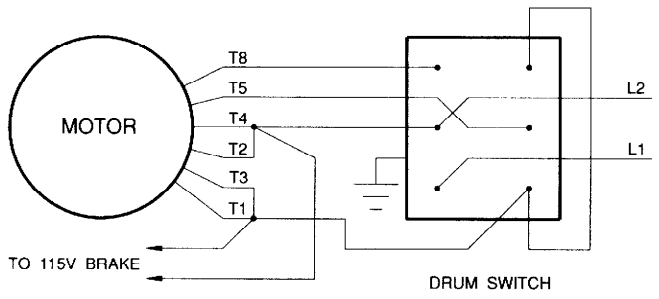
1. Always use gloves when handling wire rope.
2. Never use wire rope which is frayed or kinked.
3. Never use wire rope as a sling.
4. Always ensure wire rope is correctly spooled and first layer is tight.

Controls

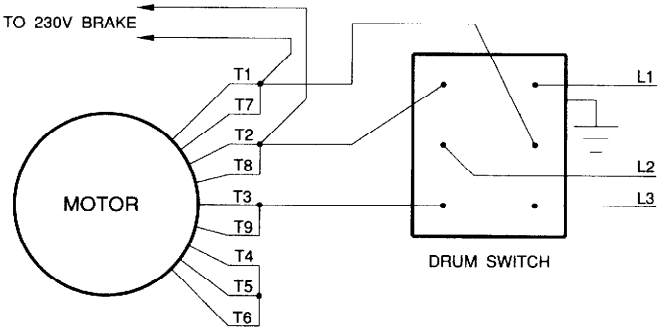
A momentary contact reversing drum switch is recommended for the winch control unless remote or automatic control of the winch is required. Refer to parts section for recommended switches. See Wiring Diagram Dwg. MHTPA0201 for both single and three phase motors.
If remote or automatic control is required, an electromagnetic reversing starter is recommended. The starter can be used with either a hand held pendant or with a wall mounted control station. Automatic control

DRUM SWITCH CONNECTION DIAGRAMS

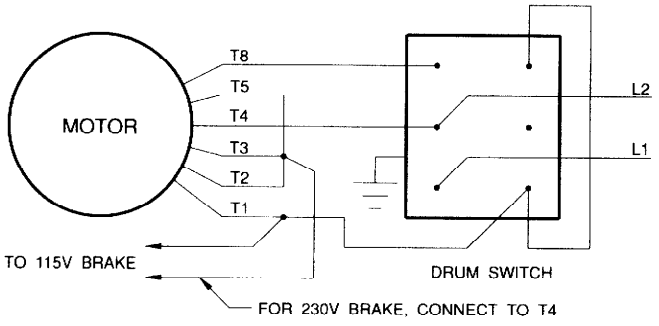
115 Volt Single Phase



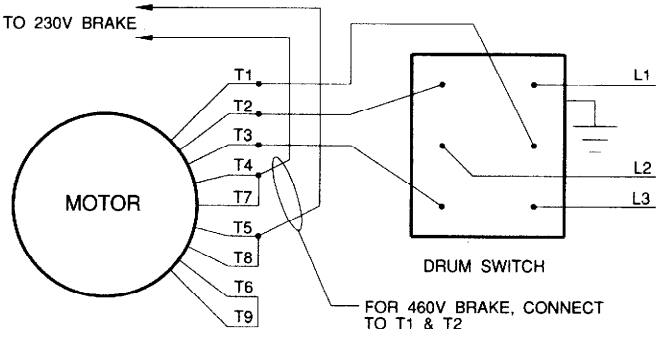
230 Volt Three Phase



230 Volt Single Phase



460 Volt Three Phase

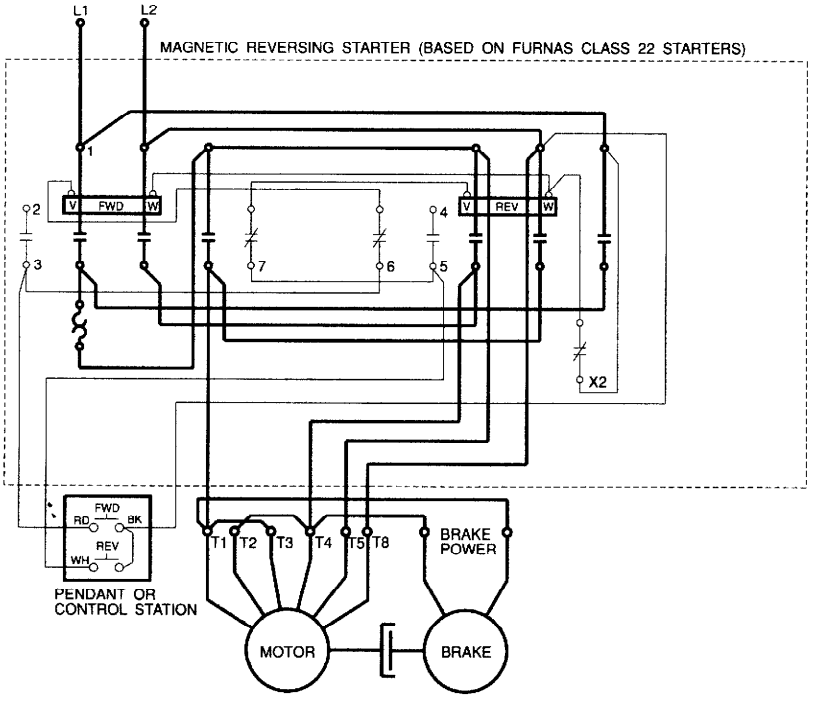


(Dwg. MHTPA0201)

Top of Drum Switch Diagram is Handle End, Knob Toward Viewer

WIRING DIAGRAMS

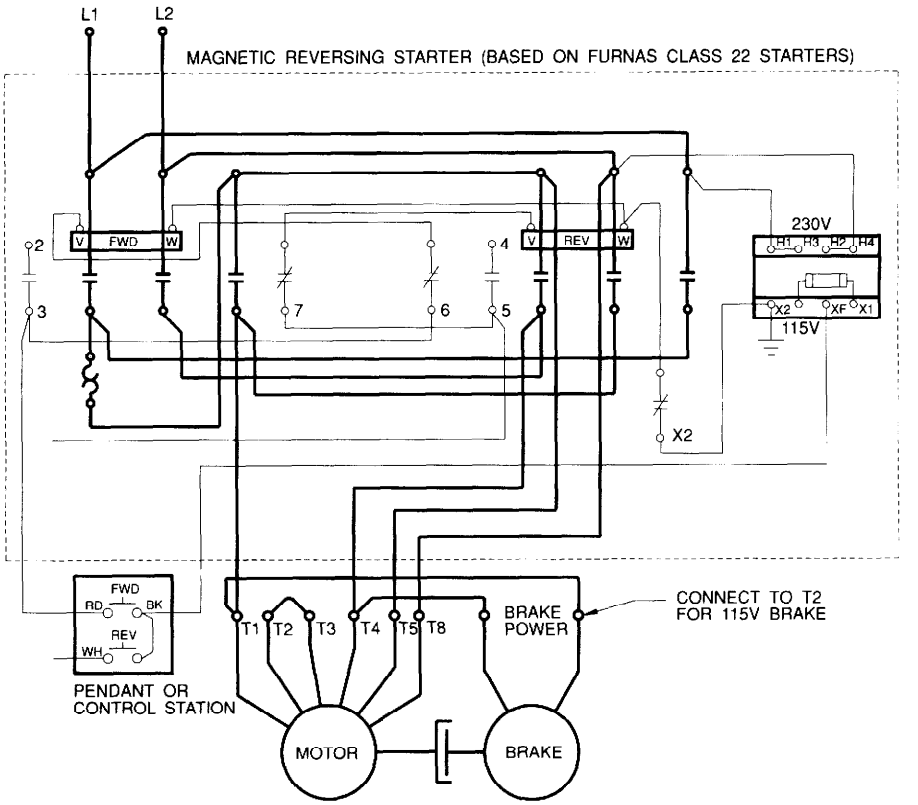
115 Volt Single Phase 60 Hz



(Dwg. MHTPA0199)

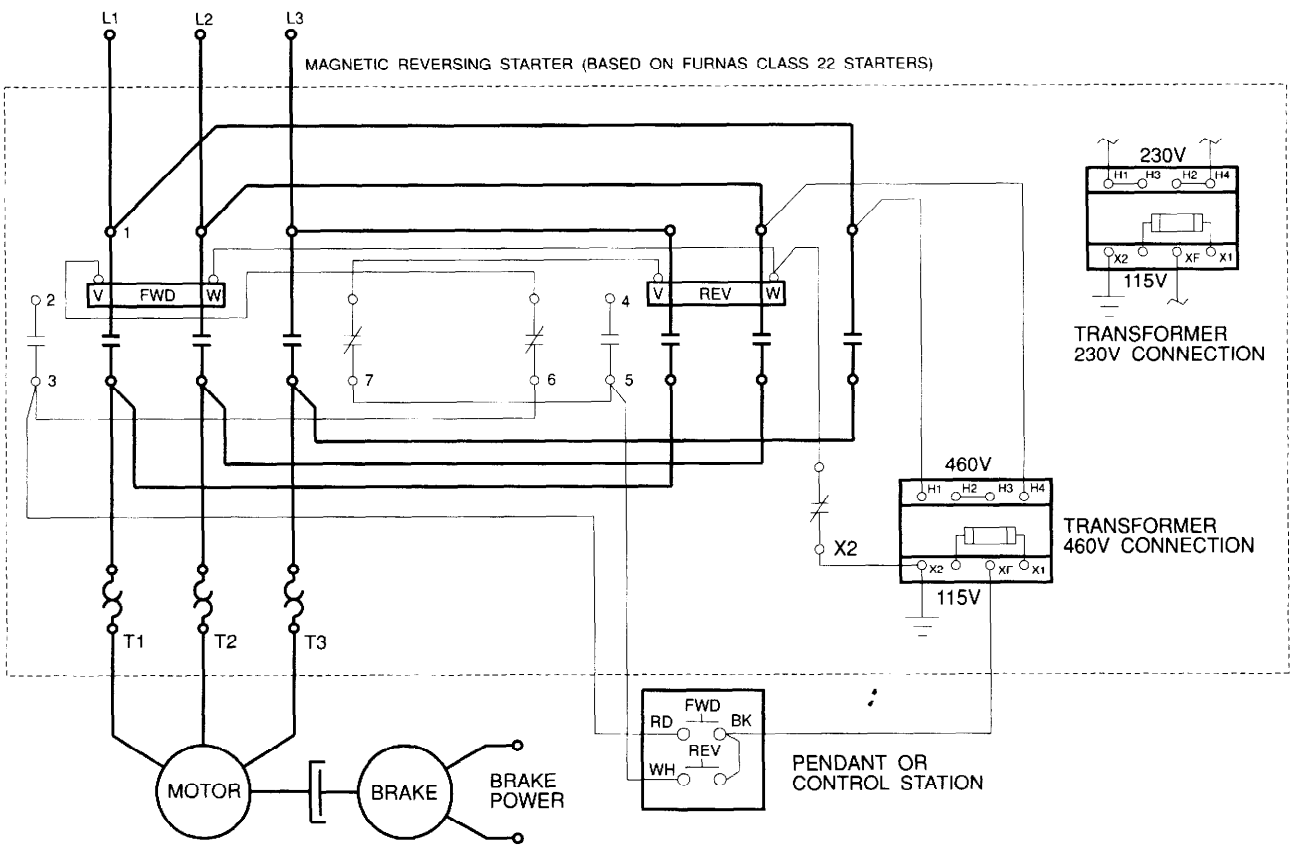
Wiring Diagram

230 Volt Single Phase



(Dwg. MHTPA0200)

230/460 Volt Three Phase



(Dwg. MHTPA0198)

depends on application. For distances in excess of 50 ft. (15 m) on single phase 115V connections, wire with a greater current carrying capacity may be required. Refer to wiring diagrams for winches using starters. For single phase motors see Dwgs. MHTPA0199 and MHTPA0200. For three phase motors see Dwg. MHTPA0198. Contact your nearest distributor or the factory for recommendations on specific applications.

NOTICE

• Reversing drum switches are not intended for remote control. They must be mounted on the winch.

Wiring

Be sure phase, cycle and voltage of motor, magnetic reversing starter and controls all match the electrical service being used. Check power supply is correctly grounded. All electrical connections must be properly insulated and enclosed.

⚠ CAUTION

• Never use a 115V winch motor with a 230V power supply or a 230V motor with a 115V power supply. The motor can be permanently damaged.

⚠ WARNING

• Reversing drum switches and starter enclosures must be grounded to electrical supply system.

OPERATION

The four most important aspects of winch operation are:

1. Follow all safety instructions when operating the winch.
2. Allow only qualified people to operate the winch.
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

• Only allow qualified personnel (trained in safety and operation) to operate a winch.
• To avoid damage to the rigging, the structure supporting the rigging, and the winch, do not "two-block" the end of the wire rope.

Emergency Manual Hand Crank Operation

(See Winch Assembly Drawing MHTPC0189)

An emergency hand crank is shipped with the unit. It's intended use is for manually lifting or lowering a load in an emergency situation. To operate the emergency hand crank, install handle (85) on the end of worm shaft (16). Push brake lever (61) down to disengage brake and turn handle (85).

⚠ WARNING

• To avoid injury to personel and damage to equipment due to the handle flying off while winch is operating, remove emergency manual hand crank before operating winch with motor.

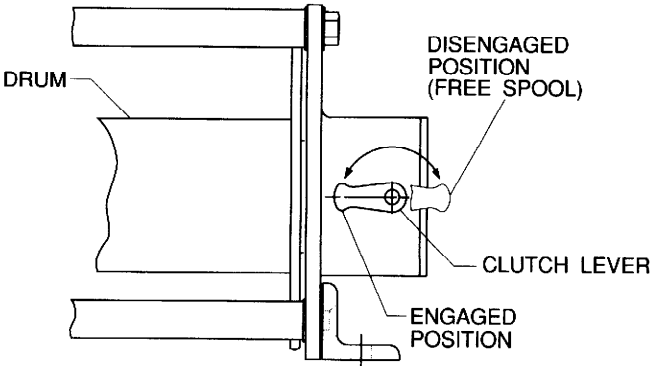
To Let Out Unloaded Wire Rope (Free Spool Clutch option)

(See Winch Assembly Drawing MHTPC0190)

⚠ WARNING

• To avoid injury to personnel and damage to equipment due to a falling load, disconnect the load before disengaging the drum to free-spool.
• Winches with disengaging (Free Spool) clutch option must not be used for hoisting applications.

1. Make sure there is no load on the winch.
2. Disengage the drum by turning the clutch lever (95) away from the drum (22) to lock in free-spool. (See Dwg. MHTPA0192)



(Dwg. MHTPA0192)

3. Pull end of wire rope to desired location.

4. Engage the drum by turning the clutch lever (95) toward the drum (22).

Power Operation

⚠ WARNING

• A creeping load can cause death or injury. Do not rely on the worm drive to hold a suspended load.
• Operating winch for time periods longer than suggested may result in damage to the motor.

The motor on the winch has a intermittent duty rating of 15 minutes. This is the number of minutes the motor may be operated during a one hour period when the winch is carrying the full rated load.
When operating the winch avoid unnecessary jogging of the controls.

Run In Period

Maximum efficiency of the worm gear is obtained after a "run-in" period. The length of time required will depend on the load applied and will be two to four hours at rated load and considerable longer at lighter loads. (overloading will not further decrease the "run-in" time and it may damage the worm gear.)
During "run-in" higher than normal temperature rise, and lower efficiency and output torque can be expected.

After "run-in" worm gears are designed to operate with a maximum temperature rise of 100° F (38° C) in the oil bath providing they are operated within limits of catalog rating of input horsepower, output torque and have the recommended oil level of the proper lubricant.

INSPECTION

There are two types of inspection, the frequent inspection performed by the operator and more thorough periodic inspections performed by qualified personnel.
Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.
Any deficiency revealed through inspection must be reported to an appointed person. A determination must be made as to whether a deficiency constitutes a safety hazard before resuming operation of the winch.

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

⚠ WARNING

• Never use a winch that inspection indicates is defective.

Frequent Inspection

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

1. OPERATION. Check for visual signs or abnormal noises which could indicate a defect. Do not operate a winch unless the wire rope feeds onto the winch drum smoothly. If wire rope binds or jumps, clean and lubricate the wire rope. If problem persists, replace the wire rope. Do not operate the winch until all defects have been corrected.
2. LIMIT DEVICES. If used, check that they operate properly.
3. BRAKE. Test brake operation by lifting a load 2 to 3 in. (50 to 75 mm) off the floor and check that the brake holds the load.
4. WIRE ROPE. Consult the wire rope manufacturer's inspection information or a recognized safety source, such as the latest edition of National Safety Council, Accident Prevention Manual for Industrial Operations or ANSI/ASME B30.7. Wire rope is a consumable item which must be replaced when worn. The following list is a guide to accepted standards by which wire rope must be judged and is not presented as a substitute for an experienced inspector.
   a. Damage, such as: bird cages, kinking, core protrusion, crushing and main strand displacement.
   b. Corrosion and nicking.
   c. Wear of crown wires. Replace at 1/3 wear of the original diameter of any crown wire.
   d. Broken wires or strands, particularly at connections. Replacement is necessary if one wire is broken at a connection; six wires broken within

one lay; three wires broken in one strand within one lay.

e. Lubrication.

Replace wire rope if any doubt exists as to wire rope serviceability.

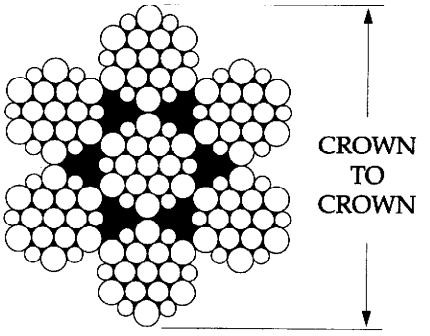
5. WIRE ROPE REEVING. Check reeving and ensure wire rope is properly secured to the drum. Make sure the wire rope anchor screw is tight and check for signs of slippage of the wire rope end. If slippage is evident, reinstall per wire rope anchor installation procedure.

Periodic Inspection

According to ANSI/ASME B30.7, frequency of periodic inspection depends on the severity of usage: **NORMAL**, yearly; **HEAVY**, semiannually; **SEVERE**, quarterly. Disassembly may be required for **HEAVY** or **SEVERE** usage. Keep accumulative records of periodic inspections to provide a basis for continuing evaluation.

Inspect all items in "Frequent Inspection" also inspect the following:

1. MEMBERS. Check for deformed, cracked or corroded
   main components. Replace damaged parts if necessary.
2. FASTENERS. Check rivets, cotter pins, capscrews and nuts on winch, including mounting bolts. Replace if missing or tighten if loose.
3. DRUM. Check for cracks, damage or excessive wear. Replace if necessary.
4. ALL COMPONENTS. Inspect for wear, damage, distortion and cleanliness. If external evidence indicates the need, for example poor performance or excessive noise, disassemble and inspect. Check pins, gears, shafts, bearings, sheaves, covers, etc. Replace worn or damaged parts.
5. MOTOR. Make sure it operates properly and conforms to applicable specifications. Check wiring connections are clean, dry and secure.
6. BRAKE. Remove cover bolts and inspect the brake lining after every 50 hours of use. When any part of the lining on either brake shoe measures 1/16 in. (2 mm) or less, the brake shoes should be replaced.
7. DRIVE BELT. Look for cracks and fraying. The belt, after use, tends to curl up at the edges. If this condition exists, then replace the belt and adjust belt tension as described in the "MAINTENANCE" section. Inspect the brake solenoid for proper gap adjustment and operation as described in the "MAINTENANCE" section .
8. SUPPORTING STRUCTURE. Check for distortion, wear and continued ability to support the winch and load.
9. ELECTRICAL COMPONENTS. Check for loose wires, corrosion or other signs of deterioration.
10. LABELS AND TAGS. Check for presence and legibility. Replace if necessary.
11. WIRE ROPE. Besides the items in a frequent inspection, inspect the following:
    a. Loose or damaged connections to wire rope. Check for build-up of dirt and corrosion. Clean if necessary.
    b. Check for changes in the size of the wire rope diameter. Measure the diameter from crown-to-crown. If the nominal diameter of the wire rope has decreased more than 1/64 in. (0.4 mm), replace the wire rope. (See Dwg. MHTPA0056)



(Dwg. MHTPA0056)

Winches Not in Regular Use

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

A winch which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection". Standby winches shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". If abnormal operating conditions apply winches may require a more frequent inspection.

Testing

Operational Tests

Prior to initial use, all new, altered or repaired winches shall be tested to ensure proper operation.

a) Operate winch in both directions with no load.
b) Check operation of clutch, brakes, and pawls.
c) Check operation of limit switches, and locking or safety devices when provided.
d) Check all tie-downs are secure.

Load Test

Prior to initial use, all new, extensively repaired, or altered winches shall be load tested by or under the direction of a qualified person, and a written report furnished confirming the rating of the winch. Test loads shall not be more than 110% of the rated line pull.

LUBRICATION

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 lubrication 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
Monthly	Lubricate grease fittings. Check the oil level in the gear housing assembly.
6 months	Drain and refill the oil in the gear housing assembly.

Gear Housing

The gear housing is filled at the factory and shipped with the proper amount of oil, a non-toxic, rust inhibiting worm gear oil AGMA #7 compound that is suitable for an ambient temperature of 50° F to 125° F (10° C to 52° C).

Before placing the winch in operation, make certain that the vent plug (9) is located at the highest position on the gear housing (1).

After the first 10 hours of operation, the oil should be changed. Thereafter it should be changed every 100 hours of service or every 6 months whichever occurs first. The oil is drained by removing pipe plug (19) located in the side of gear housing (1). It will be necessary to tilt the winch slightly to remove all of the oil. The oil should be changed, using one of the recommended lubricants or its equivalent.

Lubricant Chart

Temperature Range	Recommended Lubricant
50° to 125° F (10° to 52° C)	AGMA #7 EP
-10° to 50° F (-23° to 10° C)	AGMA #5 EP

Fill gear housing up to the level plug hole located on the side of the gear housing (1). The gear housing oil capacity is approximately 1 qt. (0.95 lts.)

Seals, Bearings and Clutch

If the winch is disassembled, clean all parts thoroughly and coat bearings, seals and clutch parts with clean grease. Use sufficient grease to provide a good protective coat. For temperatures -20° to 50° F (-29° to 10° C) use a multipurpose lithium-based EP 1 grease. For temperatures 30° to 120° F (0° to 49° C) use a multipurpose lithium-based EP 2 grease.

MOTOR

No lubrication required.

Wire Rope

Follow the wire rope manufacturer's instructions. At a minimum, observe the following guidelines.

1. Clean with a brush or steam if there is dirt, rock dust or other foreign material on the surface of the rope.

⚠ CAUTION

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

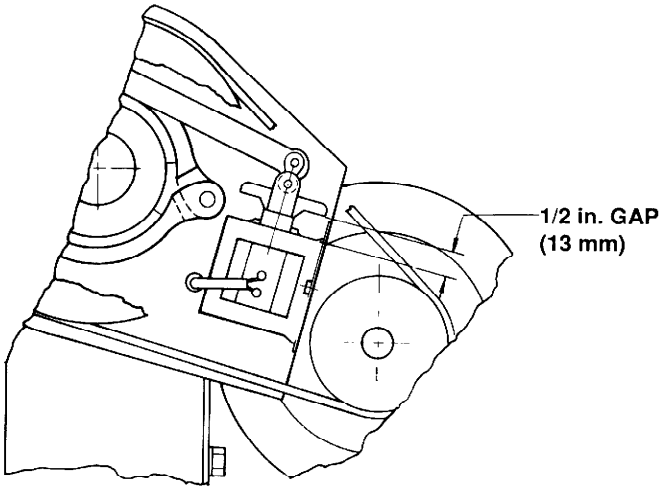
2. Apply a wire rope lubricant or SAE 30W oil.
3. Brush, drip or spray lubricant weekly, or more frequently, depending on severity of service.

⚠ WARNING

• Before performing maintenance, disconnect the load from the winch. A falling load could cause death, injury or property damage.
• Disconnect electrical power source before performing any maintenance. Accidental operation or contact with exposed power supply could cause death, injury or property damage.
• Before starting maintenance, tag winch: DANGER - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.
• Only allow qualified service personnel to perform maintenance.
• After performing maintenance on load bearing parts, test unit to 110% of its rated capacity before returning to service.

Brake Adjustment
If the brake lining and brake solenoid are satisfactory, then check the adjustments as follows:

1. Compression Spring: Adjust nut (74) on bolt (72) until top of nut is flush with the end of the bolt (72).
2. Solenoid Plunger Gap: Brake lining wear tends to increase solenoid gap. The brake is properly adjusted when the gap measures 1/2 in. (12.7 mm). To adjust, loosen nuts (74) on screws (73). Loosen both screws (73) to decrease the gap. Tighten nuts (74) when gap is correct.



(Dwg. MHTPA0196)

NOTICE

• When gap is measured, both screws (73) must be in contact with brake lever (61) lugs. Tighten nuts (74) when gap is correct.

3. Operate winch with no load and check for proper brake operation. When brake is released, solenoid plunger must be seated with zero gap or else the coil will be damaged. If plunger is not seating, check for correct voltage at coil and check for correct compression spring adjustment. Replace solenoid if voltage and spring adjustment are correct.

Belt Adjustment
Check the condition of the drive belt per instructions in the "INSPECTION" section. Check the drive belt adjustment as follows:

1. Place a straight edge on top of the drive belt (83) bridging the two sheaves.
2. Place a measuring rule on the top of the drive belt midpoint between the two sheaves. Apply an inward force perpendicular to the drive belt. Proper drive belt tension is 1/8 in. (3 mm) on the rule.
3. To increase belt tension, loosen motor bolts, slide motor towards hoist base and tighten the bolts. Repeat if necessary until proper drive belt tension is attained.

General Disassembly

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the winch. An exploded drawing of the winch is provided in the Parts Section to assist part indentification. 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 on a sturdy work bench 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 part with a soft hammer should be sufficient to loosen the part.
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 and shafts.
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.

Winch Disassembly

1. Unwind wire rope and remove wire rope anchor set screw (24) from drum (22).
2. Remove nuts (51) and lockwashers (52), then take off cover (84).
3. Remove pin (65) from brake drum (66).
4. Disconnect solenoid cord (46) from motor (47). Remove cord connector (45) and pull out solenoid cord (46).
5. Pull grommet (44) from solenoid cord (46).
6. Loosen nuts (51) and remove belt (83) from motor sheave (82) and reducer sheave (78).
7. Remove motor sheave (82) from the shaft of motor (47).
8. Remove motor base nuts (51), washers (53), lock-washers (52) and take off motor (47).
9. Unfasten screws (48) from output shaft cover (14) and remove motor base (54).
10. Remove capscrews (79) and reducer sheave (78) from brake drum (66).
11. Remove solenoid cord (46) from connectors on solenoid (59). Pull solenoid cord through hole in the bottom of bracket (77).
12. Disconnect solenoid (59) from brake lever (61) by removing link pin (58).
13. Remove nutserts (56) and screws (55) then remove solenoid (59) from bracket (77).
14. Unscrew nut (74) from bolt (72), remove spring (75) and slide bolt (72) out of brake shoes (71).
15. Remove screws (73) and nuts (74) from brake shoes (71).
16. Remove bolt (69) and brake shoes (71).
17. Remove retaining ring (68) and brake lever pins (67). Separate brake lever (61) from bracket (77).
18. Remove pin (63) and screw (64). Slide brake release pin (62) out of brake lever (61).
19. Remove pin (65) and slide brake drum (66) off of worm shaft (16).
20. Unscrew the four screws (15) and remove bracket (77) from cover (17).
21. Remove plugs (8) and (19). Drain lubricant from gear housing (1) into a suitable container. It may be necessary to tilt the winch slightly to remove all of the oil.

Instructions 22 through 25 apply only to winches with Free Spool.

22. Drive pin (96) out of clutch lever (95) and remove clutch lever (95) from clutch cam (106).
23. Remove the four screws (98) which secure cover (91) to side frame (97) and carefully remove cover.
24. Remove screws (107) and separate bracket (94), spring (92) and ball (93).
25. Remove screws (98) and pull out cap (99). Tap out clutch pin (96) and remove the collar (100) and link (105).
26. For 12 in. long drums remove nuts (111) from studs (32). On winches with 5 in. long drums remove bolts (32), spacer bars (43) and washers (38).
27. Remove screws (28) and foot bracket (27). Remove side frame (26) or (97). For 12 in. long drums remove spacer bars (43) and washers (38) from studs (32).
28. Remove capscrews (21) and bottom spacer bars (37) from gear housing (1). On winches with 12 in. long drums remove studs (32) from gear housing (1).
29. Remove drum retainer screws (23) from drum (22).

Instructions 30 and 31 apply only to winches with Free Spool.

30. Remove clutch slider (104) from drum (22) and gear and drum shaft (35).
31. Remove bushings (102) and bearing (101) from drum (22).
32. Pry drum (22) off of drum shaft (35) and remove drum keys (34).
33. Remove screws (15) and input shaft cover (17) from gear housing (1).
34. Remove worm shaft assembly from brake side of gear housing (1) with input shaft bearing cup (4).
35. Remove pin (7) from worm (6) and pull out worm shaft (16).
36. Remove input shaft bearing cones (5) from worm (6).
37. Remove four screws (15), cover (2) and cover shims (3).
38. Remove seal (18) from input shaft cover (17).
39. Tap second input shaft bearing cup (4) out of gear housing (1).
40. Remove screws (15), output shaft cover (33) and output shaft gaskets (13) from gear housing (1).
41. Remove seal (39) from output shaft cover (33).
42. Remove worm gear assembly and drum shaft from gear housing (1).
43. Remove output shaft bearing cone (11) and second spacer (41).
44. Remove worm gear (42) from gear and drum shaft (35).
45. Remove worm gear keys (36) from drum shaft (35), slide first bearing spacer (41) off of drum shaft (35). Remove remaining output shaft bearing cone (11) from drum shaft.
46. Remove screws (15), output shaft cover (14) and gaskets (13) from gear housing (1).
47. Remove output shaft bearing cup (12) from output shaft cover (14).

Cleaning, Inspection and Repair

⚠ CAUTION

• If bushings (102) are loose, worn or rotate in the drum they must be replaced. Failure to observe this precaution will result in additional component damage.

Clean all winch component parts in solvent. The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments on the housings, frame and drum. Dry each part using low pressure, filtered compressed air. Do not wash brake shoes (71), solenoid (59), belt (83) or motor (47) in liquid.

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. Original bore size of bushings (45) is 1.377 in. (35 mm). If bore size is more than 1.43 in. (36 mm) replace bushings.
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 brake shoe lining for oil or grease. If the brake shoe lining is oil-soaked, replace the brake shoe. If the brake shoe lining is glazed, sand it lightly using fine emery cloth.
6. Measure the thickness of the brake shoe lining. If the brake shoe lining is less than .062 in. (2 mm) at any point along its edge replace the brake shoe.
7. Check bearings for freeness of rotation. Replace bearings if rotation is rough or bearings are excessivly worn.

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 Parts Section 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 re-doing 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.

Winch Assembly

1. Press or tap output shaft bearing cups (12) into output shaft cover (14) and output shaft cover (33).
2. Place output shaft gasket (13) on drum side of gear housing (1).
3. Install output shaft cover (33) over output shaft gasket (13) and clamp in position with four screws (15) positioned opposite each other.
4. Press output shaft bearing cone (11) onto gear and drum shaft (35). Slide first spacer (41) onto drum shaft (35) and install worm gear keys (36).
5. Press worm gear (42) onto gear and drum shaft (35) being careful to line up the keyway slots in the worm gear with the worm gear keys (36).
6. Install second spacer (41) and output shaft bearing cone (11).
7. Install drum shaft and worm assembly inside gear housing (1).

NOTICE

• Place lube level hole in output shaft cover (14) at the 2 o'clock position or the motor plate bracket (54) will not fit correctly.

8. Install output shaft cover (14) and output shaft gasket (13) on motor side of gear housing (1). Check to see if worm gear assembly turns freely without binding or moving from side to side.

NOTICE

• Adjust gaskets (13) to provide zero side to side motion of the worm gear assembly.

9. Tap input shaft bearing cup (4) into gear housing (1) on the side opposite the brake.
10. Install input shaft cover (2) on gear housing (1) with shims (3). Secure with two of the four screws (15) positioned 180° apart.
11. Install input shaft bearing cones (5) on worm (6). Align pin hole in worm shaft (16) with pin hole in worm (6) and slide worm shaft into the end of the worm (6).
12. Install first pin (7) so it is slightly below the worm diameter.
13. Install assembled worm and worm shaft in brake side of gear housing (1).
14. Install second input shaft bearing cup (4) in housing (1).

NOTICE

• The first input shaft bearing cup (4) must be flush against cover (2) for accurate backlash reading.

15. Install input shaft cover (17) on housing (1) and tighten with four screws (15).

16. Rotate worm to check for tight spots and to see if backlash is between .004 - .008 in. (0.10 - 0.20 mm). Adjust shims (3) until correct backlash is achieved. Install remaining screws (15) in cover (2).
17. Install seal (18) in cover (17) so lip of seal fits over the worm and is toward the housing (1).
18. Install seal (39) in output shaft cover (33) so it is flush with the outside face of the cover. Seal lip must be toward the housing.
19. For Free Spool option check bushings (102) are installed in drum (22).

NOTICE

• The 1/8 in. (3 mm) adjustment of drum on the drum shaft is important to assure free rotation of the drum.

20. Install drum (22) on drum shaft (35) so keyway slots line up. Tap drum keys (34) into position. Position drum face approximately 1/8 in. (3 mm) past the shoulder of drum shaft (35). Install and tighten drum retaining screws (23).
21. For Free Spool option install slider (104) on end of gear and drum shaft (35). Check that slider (104) moves freely back and forth over the drum keys (34).
22. Bolt spacer bars (37) onto gear housing (1) with bolts (21).
23. Press bearing (25) into the bore on the drum side of side frame (26). For Free Spool option press bearing (101) into the bore on the drum side of side frame (97).
24. For 5 in. long drums install spacer bars (43) on gear housing (1). For 12 in. long drum install studs (32) then spacer bars (43).
25. Install one washer (38) on each spacer bar (37) and (43). Then install side frame (26). For Free Spool option install side frame (97).

NOTICE

• Install one washer (38) on each spacer bar to provide drum float and ensure side frame remains square.

26. Install foot bracket (27) with screws (28).
27. For the 5 in. long drum install bolts (32) through spacer bars (43). For the 12 in. long drum, install nuts (111) on studs (32).
28. Install oil level plug (8), fill/vent plug (9) and pipe plug (19).

Instructions 29 through 35 apply only to winches with Free Spool .

29. Insert link (105) in the center hole of cap (99). Align pin holes in collar (100) and link (105). Install pin (96).
30. Install cam (106) through the hole in bracket (94) and side frame (97).
31. Install assembled cap (99) on slider (104) with screws (98). Check cam (106) is located in the slot in link (105).
32. Install ball (93) followed by spring (92) in the center bore of the bracket (94).
33. Carefully keep the ball (93) and spring (92) in position while securing bracket (94) to cover (91) with screws (107).
34. Attach cover to side frame (97) with screws (98).
35. Install clutch lever (95) on cam (106). Align pin hole and install pin (96).
36. Remove previously installed screws (15). Install bracket (77) on output shaft cover (17) and secure with four screws (15).
37. Slide brake drum (66) on worm shaft (16) and install first pin (7).

NOTICE

• Support worm shaft (16) so it doesn't bend while installing pins (7) and (65).

38. Install first link (57) onto brake release pin (62).
39. Install brake release pin (62) into the hole on end of brake lever (61).
40. Install second link (57) onto other side of brake release pin (62).
41. Install pin (63) into hole on end of brake release pin (62).
42. Install screw (64) into brake lever (61) securing brake release pin (62).
43. Install brake lever assembly to bracket (77) with brake lever pins (67) and retaining ring (68).
44. Install brake shoes (71) around brake drum (66) and locate in position with bolt (69).
45. Install screws (73) and nuts (74) in brake shoes (71).
46. Install bolt (72) through hole in brake shoes (71).
47. Install spring (75) on bolt (72) and tighten with nut (74).
48. Install solenoid (59) on bracket (77) and secure with screws (55) and nutserts (56).
49. Attach brake lever (61) to solenoid (59) with link pin (58). To adjust the brake, refer to Brake Adjustment in the "MAINTENANCE" section.
50. Hot solder solenoid cord (46) to connectors on solenoid (59) and pull other end of solenoid cord through the hole in the bottom of bracket (77).
51. Locate reducer sheave (78) on brake drum (66) and secure with capscrews (79).
52. Mount motor base (54) on cover (14) and secure with screws (48).
53. Install motor (47) on motor base (54) and loosely secure with washers (53), lockwashers (52) and nuts (51).
54. Install key (49) on motor shaft. Tap motor sheave (82) onto the shaft of the motor (47).
55. Align reducer sheave (78) and motor sheave (82).

56. Install belt (83) on reducer sheave (78) and motor sheave (82), then adjust per instructions in the "MAINTENANCE" section and tighten the four nuts (51).
57. Install grommet (44) into cord connector (45) and loosely attach to motor (47).
58. Pull solenoid cord (46) through grommet (44) and cord connector (45) and attach wires to motor. Tighten cord connector (45).
59. Install pin (65) in worm shaft (16) and install cover (84) with washers (52) and nuts (51).
60. Refer to "INSTALLATION" section for wire rope installation.

PARTS ORDERING INFORMATION

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

1. Complete winch model and serial number.
2. Part number and part description as shown in this manual.
3. Quantity required.

For your convenience and future referance please take a few moments to add the following information:

Winch Model Number.....
Winch Serial Number.....
Date Purchased.....

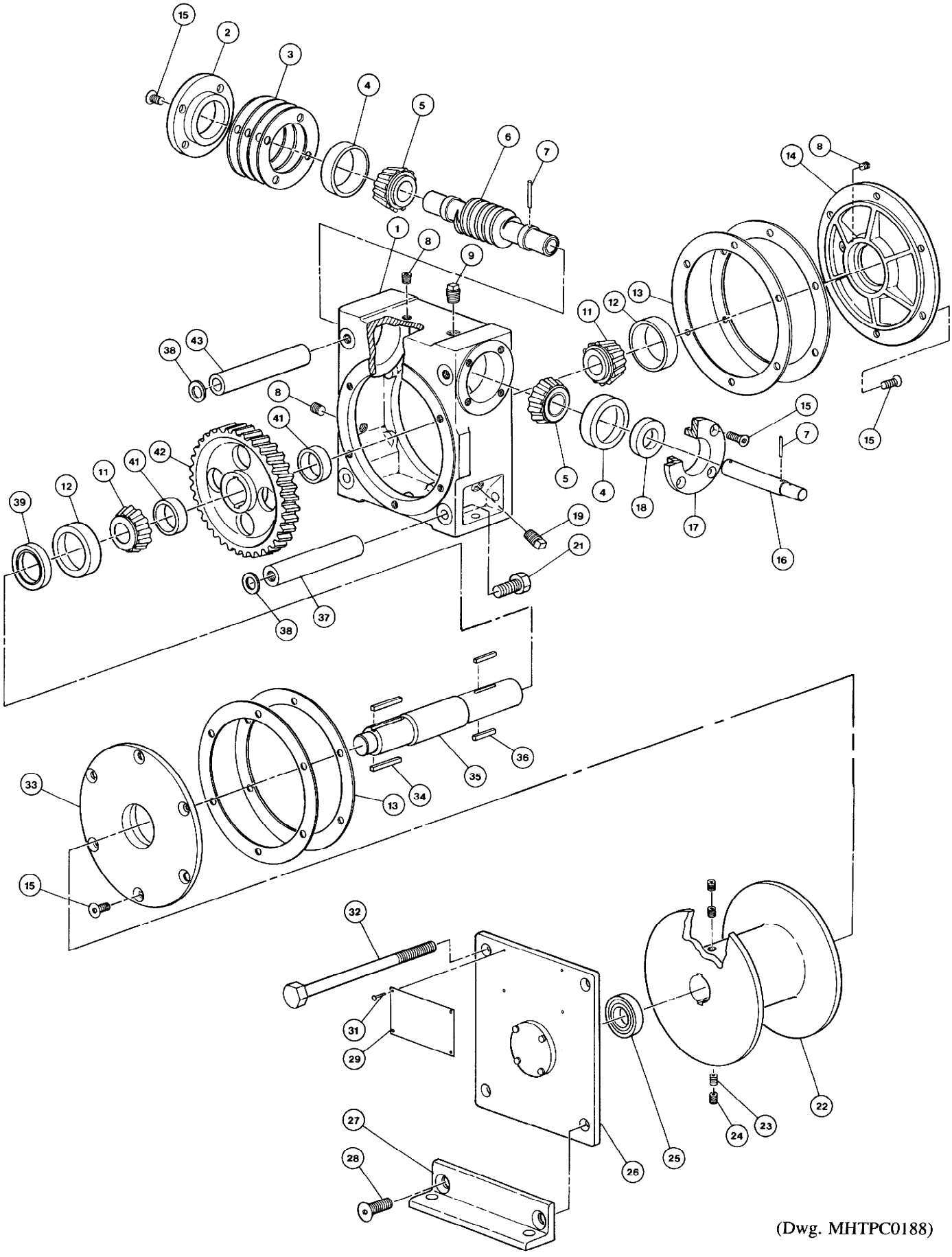
Return Goods Policy

INGERSOLL-RAND will not accept any returned goods for warranty or service unless prior arrangements have been made and written authorization has been provided from the location the goods were purchased.

NOTICE

• Continuing improvement and advancement of design may cause changes to this winch 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.

WINCH ASSEMBLY DRAWING



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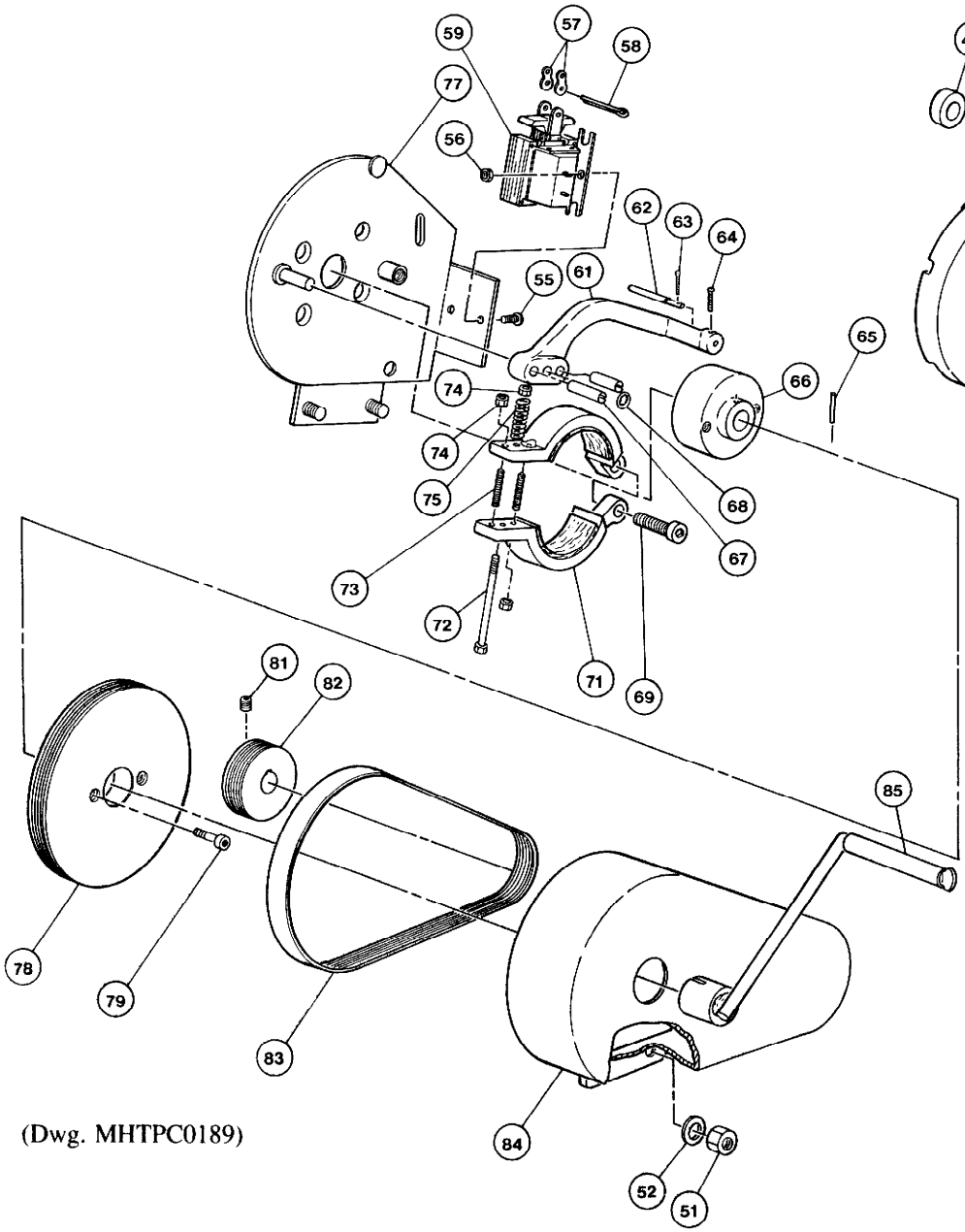
WINCH MOTOR, BRAKE AND FREE SPOOL ASSEMBLY DRAWING



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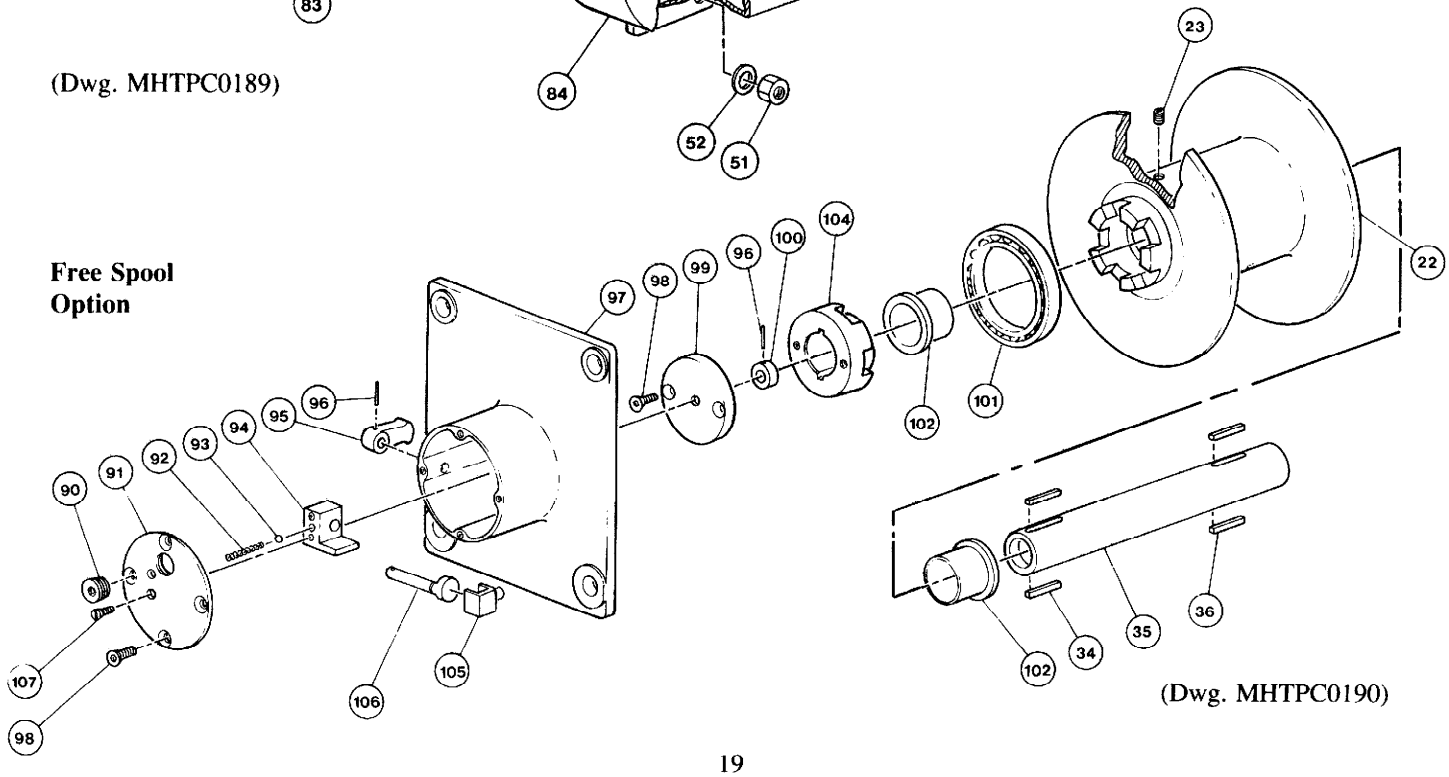
Free Spool Option



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WINCH ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.
1	Gear Housing	1	B-5060
2	Cover	1	3115
3	Shim .005 in. (.127 mm)	3	51075
	Shim .007 in. (.118 mm)	3	51076
	Shim .020 in. (.508 mm)	1	51077
• 4	**Input Shaft Bearing Cup**	**2**	**51073**
• 5	**Input Shaft Bearing Cone**	**2**	**51072**
6	Worm	1	4886
7	Pin	2	51932
8	Oil Level Plug	3	52271
9	Fill/Vent Plug	1	6671
• 11	**Output Shaft Bearing Cone**	**2**	**50244B**
• 12	**Output Shaft Bearing Cup**	**2**	**51577**
• 13	**Output Shaft Gasket**	**2 sets**	**3118**
14	Output Shaft Cover	1	3117
15	Screw	18	51596
16	Worm Shaft	1	4887
17	Input Shaft Cover	1	4888
• 18	**Seal**	**1**	**51283**
19	Pipe Plug	2	51467
21	Spacer Bolt	2	50827
22	Drum (5 in. long)	1	4885-5
	Drum (12 in. long)		4885-12
23	Drum Retainer Setscrew	2	50855
24	Wire Rope Anchor Setscrew	2	53354
• 25	**Bearing**	**1**	**50841**
26	Side Frame	1	4883
27	Foot Bracket	1	3672
28	Screw	2	53504
29	Name Plate	1	T-50
31	Drive Screw	4	50915
32	Bolt (5 in. long drum)	2	4265-1
	Stud (12 in. long drum) *		4265-6
33	Output Shaft Cover	1	3116
34	Drum Key	2	4890-23
35	Gear and Drum Shaft (5 in. long drum)	1	4889-1
	Gear and Drum Shaft (12 in. long drum)		4889-2
36	Worm Gear Key	2	3667
37	Spacer Bar (bottom) (5 in. long drum)	2	3107-1
	Spacer Bar (bottom) (12 in. long drum)		3107-2
38	Washer	4	50182
• 39	**Seal**	**1**	**51578**
41	Spacer	2	4147
42	Worm Gear	1	3830
43	Spacer Bar (top) (5 in. long drum)	1	3108-1
	Spacer Bar (top) (12 in. long drum)		3108-2

WINCH ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.
44	Grommet	1	71072359
45	Cord Connector	1	51505
46	Solenoid Cord 25 in. (635 mm) long	1	51816
47	Motor (Single Phase)	1	E17501P
	Motor (Three Phase)		E17503P
48	Screw	2	51815
49	Motor Shaft Key	1	Not sold separately
51	Nut	6	52265
52	Lockwasher	4	51013
53	Washer	6	50918
54	Motor Base	1	4891
55	Screw	2	51818
56	Nutsert	2	51817
57	Link	2	51819
58	Link Pin	1	51820
• 59	**Solenoid (115v)**	1	**4-240**
	Solenoid (230v)		**4-894**
61	Brake Lever	1	4135
62	Brake Release Pin	1	4399
63	Pin	1	52161
64	Screw	1	53153
65	Pin	1	71001135
66	Brake Drum	1	4312
67	Brake Lever Pin	2	51821
68	Retaining Ring	1	51829
69	Bolt	1	51824
• 71	**Brake Shoe**	2	**4137**
72	Bolt	1	51823
73	Screw	2	51822
74	Nut	3	53541
• 75	**Spring**	1	**51891**
77	Bracket	1	4892
78	Reducer Sheave	1	4140
79	Capscrew	2	52982
81	Motor Sheave Screw	1	52912
82	Motor Sheave	1	4155
• 83	**Belt**	1	**280J6**
84	Cover	1	4893
85	Handle Assembly	1	863-4
90	Plug	1	71056410
*108	Mounting Bracket (Optional)	1	6473
*109	Warning Tag	1	71056410
*111	Nut	2	50171

• Recommended Spare

* Not Illustrated

WINCH ASSEMBLY PARTS LIST

Free Spool Winch

The following parts are required on all EBT winches with Free Spool option.

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.
21	Spacer Bolt	2	53347
22	Drum (5 in. long)	1	3707-1
	Drum (12 in. long)		3707-2
34	Drum Key	2	6550-65
35	Gear and Drum Shaft (5 in. long drum)	1	3112-1
	Gear and Drum Shaft (12 in. long drum)		3112-2
91	Cover	1	3169
92	Spring	1	51852
93	Ball	1	6550-66
94	Bracket	1	3670
95	Clutch Lever	1	3671
96	Pin	2	6550-67
97	Side Frame	1	3996
98	Screw	6	52269
99	Cap	1	3122
100	Collar	1	3668
• 101	**Bearing**	**1**	**51849**
• 102	**Bushing**	**2**	**51851**
104	Slider	1	3121
105	Link	1	3124
106	Cam	1	3669
107	Screw	2	51818

• Recommended Spare

Winch Controls

See "INSTALLATION" Section for additional information

DESCRIPTION OF PART	PART NO.
Drum Switch (General Purpose NEMA 1)	50249
Drum Switch (Watertight NEMA 4)	51626
Magnetic Reversing Starter (Single Phase 115V General Purpose NEMA 1)	52588
Magnetic Reversing Starter (Single Phase 115V Watertight NEMA 4)	52589
Magnetic Reversing Starter (Single Phase 230V General Purpose NEMA 1)	71029243
Magnetic Reversing Starter (Single Phase 230V Watertight NEMA 4)	71029284

DESCRIPTION OF PART	PART NO.
Magnetic Reversing Starter (Three Phase 230/460V General Purpose NEMA 1)	52596
Magnetic Reversing Starter (Three Phase 230/460V Watertight NEMA 4)	51344
Wall Mounted Control Station NEMA 1	50235
Wall Mounted Control Station NEMA 4	50248
Hand Held Pendant NEMA 3R (Weatherproof)	70555
Hand Held Pendant NEMA 4X (Watertight)	52761

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
510 Hester Drive
P.O. Box 618
White House, TN 37188
Phone (615) 672-0321,
Telex: 786573
Fax: (615) 672-0601

For Technical Support:

INGERSOLL-RAND Material Handling
2724 Sixth Avenue South
P.O. Box 24046
Seattle, WA 98124-0046
Phone (206) 624-0466
Telex: 3723554
Fax: (206) 623-0464

Atlanta, GA
111 Ingersoll-Rand Drive
Chamblee, GA 30341
(404) 455-6200

Chicago, IL
888 Industrial Drive
Elmhurst, IL 60126
(708) 530-3800

Detroit, MI
22122 Telegraph Road
Southfield, MI 48037
(313) 353-3400

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

Los Angeles, CA
5533 East Olympic Blvd.
Los Angeles, CA 90022
(213) 725-2826

Philadelphia, PA
900 E. 8th Ave., Suite 103
King of Prussia, PA 19406
(215) 337-5930

International

Office and distributors in principal cities throughout the world. Contact the nearest Ingersoll-Rand office for the name and address or the distributor in your country or write to:
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Material Handling
P.O. Box 24046 Seattle,
WA 98124-0046 USA

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Ingersoll-Rand Material Handling Division
123 Bowser Avenue
North Vancouver, British Columbia V7P 3H1
Phone: (604) 985-4470
Fax: (604) 985-0160

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Power Tool Division
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