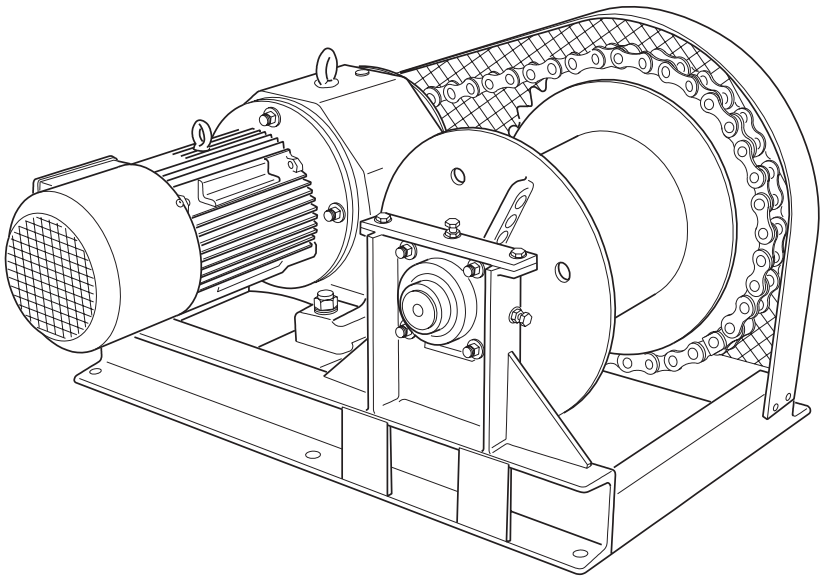
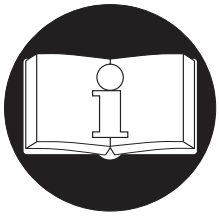
PARTS, OPERATION AND MAINTENANCE MANUAL
for
ELECTRIC WINCH MODELS*
200 lbs. to 25,000 lbs. Capacity
(91 kg to 11,364 kg)



* This manual specifically covers winches built in 1989 or later. Information in this manual may apply to older models, if a problem cannot be resolved contact the factory or your nearest distributor.



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.

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

Form MHD56054
Edition 2
February 1997
71082143

INGERSOLL-RAND
MATERIAL HANDLING

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SAFETY INFORMATION

Inspection and safety information contained in this manual is based, in part, on the American National Standards Institute Safety Code (ASME B30.7). However, it should be noted that ASME B30.7 covers "Base Mounted Hoists" and does not specifically apply to winches used as barge pullers or in horizontal pulling applications.
This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read this manual before operating the product.

Danger, Warning, Caution and Notice

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

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

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

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

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

Safety Summary

⚠WARNING

• The supporting structures and load attaching devices used in conjunction with this winch must provide an adequate safety factor to handle the rated load, plus the weight of the winch and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.
• 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 material handling equipment or assist in hooking on or arranging a load should be instructed in safe rigging procedures. From a safety standpoint, one factor is paramount: conduct all pulling operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out of the line of force of any load.

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

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

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

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

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

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

SAFE OPERATING INSTRUCTIONS

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

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

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

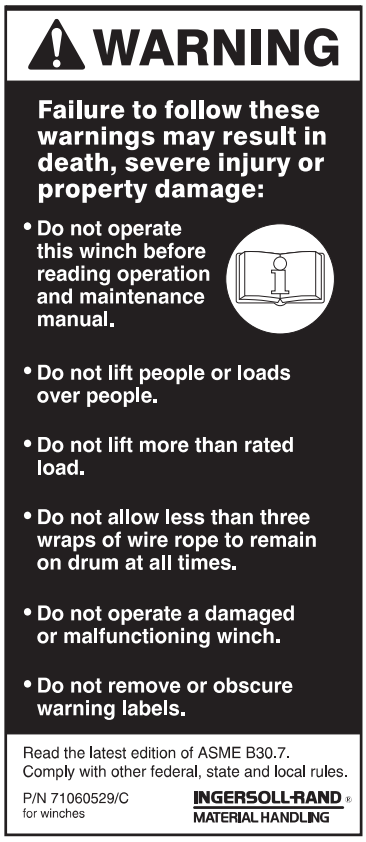
1. Only allow personnel trained in safety and operation on this winch to operate and maintain this product.
2. Only operate a winch if you are physically fit to do so.
3. When a "**DO NOT OPERATE**" sign is placed on the winch, or controls, do not operate the winch until the sign has been removed by designated personnel.
4. Before each shift, the operator should inspect the winch for wear or damage.
5. Never use a winch which inspection indicates is worn or damaged.
6. Do not use winch if hook latch has been sprung or is broken.
7. Only pull loads less than or equal to the rated capacity of the winch. Refer to the "SPECIFICATIONS" section and the nameplate attached to the winch.
8. Check that the hook latches are engaged before using.
9. When using two winches on one load ensure that each winch has a rated capacity equal to or more than the load. This provides adequate safety in the event of a sudden load shift.
10. 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.
11. Position load correctly. Do not attach load on hook except in a straight pulling line. Do not "side pull" or "yard"
12. Keep hands, clothing, etc., clear of moving parts.
13. Do not force a hook into place by hammering.
14. Be certain the load is properly seated in the saddle of the hook.
15. Do not pull the load on the tip of the hook.
16. Never run the wire rope over a sharp edge. Use a sheave.
17. Pay attention to the load at all times when operating the winch.
18. Make sure all people are clear of the load path.
19. Never use the winch for lifting or lowering loads and never allow anyone to stand on a moving load.
20. Ease the slack out of the wire rope when starting a pull.
21. Never weld or cut on a load held by the winch.
22. Do not operate winch if jamming, overloading, or binding occurs.
23. After use or when in a non-operational mode, the winch should be secured against unauthorized and unwarranted use.
24. Always rig loads properly and carefully.
25. Do not operate the winch with the guard removed or improperly installed.

LABELS AND TAGS

Each winch is supplied from the factory with the labels and tags shown. If one of the labels or tags is not attached to your winch, order a new one and install it. Refer to the parts list for the part number. Read and obey all label and tag instructions and other safety information attached to this winch. Labels and tags are shown smaller than actual size.

Tag part number 71107148 is attached to the reducer gear assembly.

Tag part number 71107155 is attached to the reducer gear assembly. This label may be discarded after vent plug is installed.



Label part number 7106529 is attached to the winch frame.

Label part number 71107130 is attached to the electric motor.

SPECIFICATIONS

Model	Line Pull Capacity		HP	Line Speed		Ship wt. (4)		Model	Line Pull Capacity		HP	Line Speed		Ship wt. (4)	
	lbs	kg		fpm	m/min	lbs	kg		lbs	kg		fpm	m/min	lbs	kg
200A40*	200	91	3/4	40	12	160	73	2000A20	2000	909	1-1/2	20	6	375	170
200B40*								2000B20							
250A20*	250	114		20	6			2000A40	2000	909	3	40	12	465	211
250B20*								2000B40							
500A20*	500	227				250	114	2000A60*	2500	1136	5	55	16.8	540	245
500B20*								2000B60*							
500A40*				40	12	260	118	3000A40	3000	1364		40	12		
500B40*								3000B40							
700A40*	700	318	1			250	114	3500B80*	3500	1591	12	80	24	825	375
700B40*								4000A20	4000	1818	3	20	6	525	239
800A20*	800	364	3/4	20	6			4000B20						495	225
800B20*								4500B50	4500	2045	7-1/2	50	15	680	309
1300A20	1300	591	1			370	168	6000B20	6000	2727	5	20	6	839	381
1300B20								6000B40			7-1/2	40	12	878	399
1400A40	1400	636	2	40	12			10000B20	10000	4545		20	6	1374	625
1400B40								10000B40			15	40	12	1600	727
1600A90*	1600	727	5	90	27	540	245	15000B20	15000	6818	12	20	6	2850	1295
1600B90*								25000B25	25000	11364	25	25	7.5	3550	1614

Notes:

1. 115V Single phase is only available on 3/4 through 2 hp models
2. * Indicates direct drive models. All other models are chain driven.
3. Capacities shown are with wire rope on the 1st layer.
4. Shipping weights are approximate and are based on winches with standard length drums, without wire rope and without options.

Model	Drum Wire Rope Storage Capacity					
	Wire Rope Size		2nd Layer		Full Drum	
	in	mm	ft	metre	ft	metre
200A40 to 800B40	1/4	6	81	25	288	88
1300A20/B20	5/16	8	120	37	605	184
1400A40/B40						
1600B90 to 2000B60	3/8	10	105	32	460	140
3000B40	7/16	12	119	36	422	129
3500B80			125	38	875	267
4000A20/B20	1/2	13	107	33	309	94
4500B50						
6000B20/B40	5/8	16	146	45	422	129
10000B20/B40	3/4	19			323	98
15000B20	1	25	230	70	600	183
25000B25	1-1/4	32	240	73	860	262

Model Code Explanation

Example: 2000B40M4-12-8G-M4P1-50 — **2000 B 40 M 4 - 12 - 8 G - M4 P1-50**

Series

Capacity Single Line Pull (2nd layer lbs.)

Configuration

A = Single Phase
B = Three Phase

Line Speed (approximate)

20 = 20 feet per minute (6 m/min)
40 = 40 feet per minute (12 m/min)
80 = 80 feet per minute (24 m/min)

Motor Type

\- = Standard Totally Enclosed Fan Cooled
M = Marine Duty Motor (3 Phase motors only)

Voltage

1 = 115-1-60
2 = 230-1-60/230-3-60
3 = 380-3-50
4 = 460-3-60
5 = 575-3-60
6 = 208-3-60
7 = 415-3-50
8 = 400-3-50

Drum Length

XX = Specify drum length (between flanges)
Model 200-800 (8 std., 12, 16 and 20 in.)
Model 1300-4500 (12 std, 16, 20 and 24 in.)
Model 6000-10000 (16 std, 20, 24, and 30 in.)
Model 15000-25000 (24 std, 30, 36 and 42 in.)

Wire Rope Size

8 = Wire rope diameter in sixteenths (e.g. 1/2 in. = 8/16 = 8)

Winch Options

D = Drum Divider Flange and additional wire rope anchor**
G = Drum Grooving**
H = Heater in Motor**
P = Marine 812 Top Coat
S = Rotary Limit Switch
T = Torque Limiter
Z = Sandblast/Carbozinc

Starter Options

M1 = Magnetic Reversing Starter, incl's 110V control transformer. (NEMA 1)
M4 = Magnetic Reversing Starter, incl's 110V control transformer. (NEMA 4)

Control Options

D1 = Drum Switch NEMA 1
D4 = Drum Switch NEMA 4
W1 = Wall Mounted Push Button Station (2 Button). (NEMA 1)
W4 = Wall Mounted Push Button Station (2 Button). (NEMA 4)
P1-XX = Hand Held Pendant Station. Specify length of Control Cord ft. (2 Button). (NEMA 1)
P4-XX = Hand Held Pendant Station. Specify length of Control Cord ft. (2 Button). (NEMA 4)

** Options not covered in this manual. For additional information contact your nearest **Ingersoll-Rand** Material Handling Office or Distributor.

Car Puller Winches

Designated by the letters "CP" preceding the model number. Use this manual in conjunction with Car Puller Manual Supplement form number MHD56072.

INSTALLATION

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

⚠ CAUTION

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

Mounting

Care must be taken when moving, positioning or mounting the winch. When lifting the winch ensure it is properly balanced. Determine the weight of your winch by referring to the "SPECIFICATIONS" section. Lift the winch 3 to 4 inches (75 to 100 mm) off the ground. Verify winch is balanced and secure before continuing lift.

1. Mount the winch on a rigid 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 wire rope as practical and allows an unimpeded flow of air to the motor and gear reducer.

⚠ WARNING

• The winch is not a balanced load. Use extreme care when lifting winch into position.

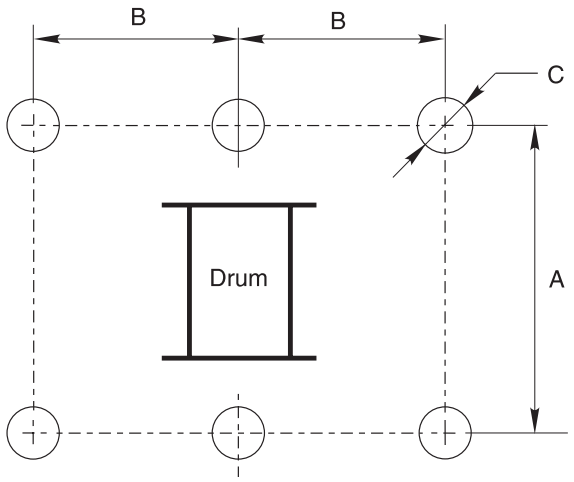
3. Mount winch in a position that allows accessibility to the gear reducer drain, level and breather plugs. Also ensure there is adequate space for removal of the brake motor fan guard for brake adjustment and maintenance.
4. When a lead sheave is used, it should be aligned with the center of the drum. The diameter of the lead sheave must be at least 18 times the diameter of the wire rope.
5. Maintain a fleet angle between the sheave and winch of no more than 1-1/2 degrees. For every inch of drum length, the lead sheave must be at least 1.6 feet (0.5 m) from the drum.
6. Make sure the mounting surface is flat to within 1/16 in. (1.6 mm). Shim winch if necessary.
7. Refer to chart for correct mounting bolt sizes. Mounting bolts must be Grade 8 or better. Use self-locking nuts or nuts with lockwashers.
8. Tighten mounting bolts evenly and torque to specifications provided in torque chart.
9. For transportation the winches are supplied non-vented. A standard socket head plug is installed in the gear reducer and is marked by a plastic cap in place of the breather plug. The breather plug accompanies the winch in a poly bag. After final installation, install the breather plug in place of the plastic capped plug. Always ensure vent is at highest location on the gear reducer. In addition, the oil level should be checked by removing the red painted oil level plug. The oil level is correct when the surface of the oil is level with the lowest point of the threaded hole.

Mounting Bolt Chart

Model	A		B		C	
	ins	mm	ins	mm	ins	mm
200A40	13-1/2	343	9	229	9/16	14.3
200B40						
250A20			4	102		
250B20						
500A20			9	229		
500B20						
500A40						
500B40						
700A40						
700B40						
800A20						
800B20						
1300A20	18-1/2	470	12-5/8	321	3/4	19
1300B20						
1400A40						
1400B40						
1600A90	18	457	14	356		
1600B90					11/16	17.5

Model	A		B		C	
	ins	mm	ins	mm	ins	mm
2000A20	18-1/2	470	12-5/8	321	3/4	19
2000B20						
2000A40						
2000B40						
2000A60	18	457	14	356		
2000B60					11/16	17.5
3000A40	20	508	15-1/2	394	3/4	19
3000B40						
3500B80			16	406		
4000A20			15-1/2	394		
4000B20						
4500B50						
6000B20	25	635	18	457	7/8	22.2
6000B40						
10000B20	28	711	22-1/2	572		
10000B40						
15000B20	34	864	3 @ 18			
25000B25	37	940	4 @ 17			

Bolt Pattern Dimensions



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Model	Bolt Size	
	in	mm
200A40 to 800B20	1/2	14
1300A20 to 4500B50	5/8	16
6000B20 to 25000B25	3/4	20

Refer to Torque Chart for mounting bolt torque specifications.

Safe Installation Procedures

1. Do not use wire rope as a ground (earth) for welding.
2. Do not attach a welding electrode to winch or wire rope.
3. Never run the wire rope over a sharp edge. Use a correctly sized sheave. Refer to instruction 4 under "MOUNTING".
4. Do not weld to any part of the winch.
5. 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 size provides adequate safety factor.

Recommended Wire Rope Size

Model	Wire Rope Size	
	in	mm
200A40 to 800B20	1/4	7
1300A20 to 1400B40	5/16	8
1600B90 to 2000B60	3/8	10
3000B40 to 3500B80	7/16	11
4000A20 to 4500B50	1/2	13
6000B20 to 6000B40	5/8	16
10000B20 to 10000B40	3/4	20
15000B20	1	26
25000B25	1-1/4	32

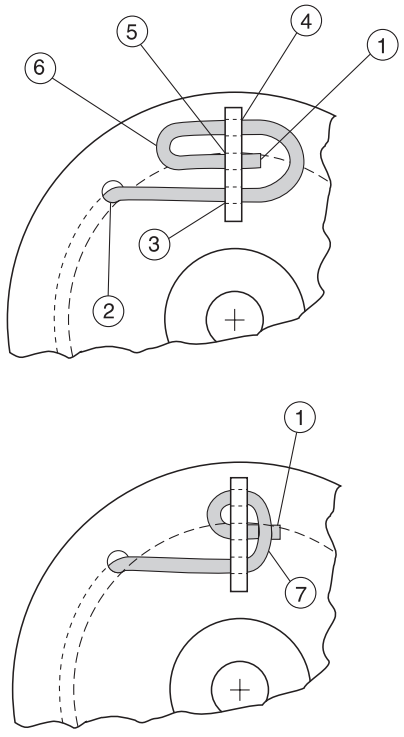
The maximum wire rope diameter is limited by the size of the wire rope anchor hole.

Installing Wire Rope (200 lb. - 10,000 lb. winches)

⚠ 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 (1) through the hole in the drum flange (2). Loosely weave the wire rope through the anchor block starting at the inner hole (3) then back through the outer hole (4) and then through the center hole (5). Refer to Dwg. MHP0280.



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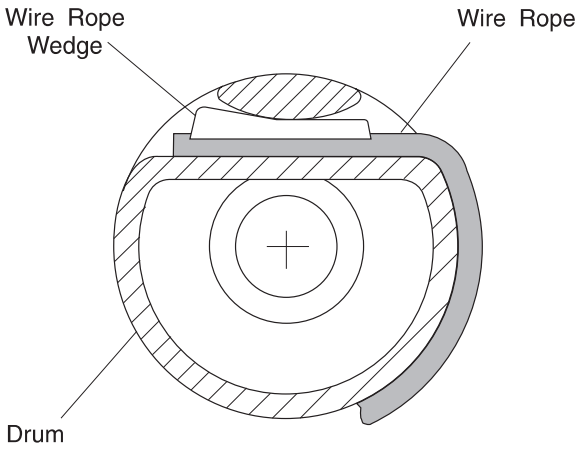
3. Allow the end of the wire rope (1) to extend about 2 in. (50 mm) through the center hole (5). Pull the smaller loop (6) tight.
4. Pull large loop (7) tight so it presses the wire rope end (1) against the drum flange.

Installing Wire Rope (15,000 lb. - 25,000 lb. winches)

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. Position the end of the wire rope just beneath the drum surface. Refer to Dwg. MHP0218.



(Dwg. MHP0218)

3. Make sure the wire rope wedge is the correct size for the wire rope.
4. Install the wire rope wedge into anchor hole. Install the wedge from the side of the hole with the wire rope end. Position the wedge so the serrated surface is on the wire rope. Insert the narrow end of the wedge first. The wedge must be positioned so it is nearer the surface of the drum.
5. Hammer the wedge into the wire rope anchor hole to secure the wire rope.
6. While keeping the wire rope under tension, wind the wire rope onto the drum.

⚠ 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 fasteners 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. Refer to instruction 5 under “MOUNTING” for allowable wire rope fleet angle.

Safe Wire Rope Handling Procedures

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

Torque Limiter (optional feature)

Ensure torque limiter is adjusted for required application. Refer to “MAINTENANCE” section for adjustment procedure.

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.

⚠ WARNING

• Never use a motor with a voltage power supply other than specified. The motor can be permanently damaged.
• Switches and starter enclosures must be grounded to electrical supply system.

Power supply voltage must be within 5%.

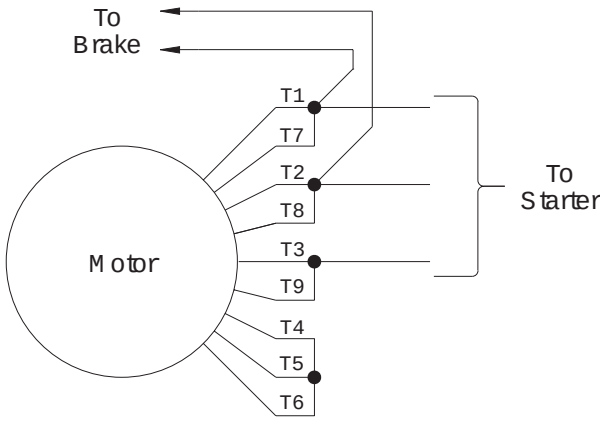
Voltage	Min Voltage	Max Voltage
115V	109	121
208V	198	218
230V	218	242
380V	361	399
460V	437	483
575V	546	604

Refer to “Recommended Copper Wire and Transformer Size” chart on page 49 for assistance in selecting the correct electrical wire size.

Brake Connections

Brake power connections depend on winch power voltage and brake operating voltage. Drawings MHP0247, MHP0248 and MHP0249 show the three possible combinations for 230/460V motors. Drawing MHP0307 shows brake connections for 380V and 575V motors. Refer to drawings MHP1087 and MHP1088 for location of brake power connection lines.

230V Motor and 230V Brake Electrical Connections



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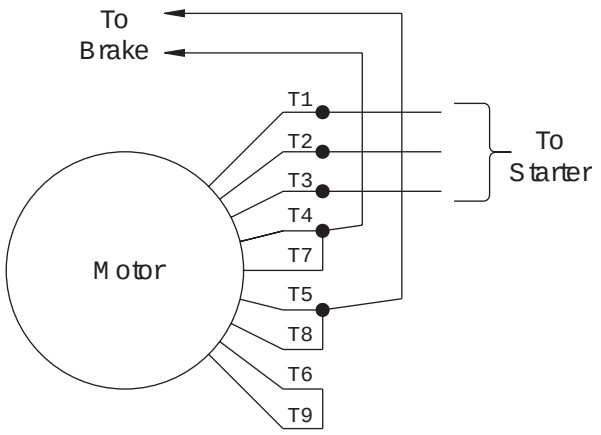
460V Motor and 230V Brake Electical Connections



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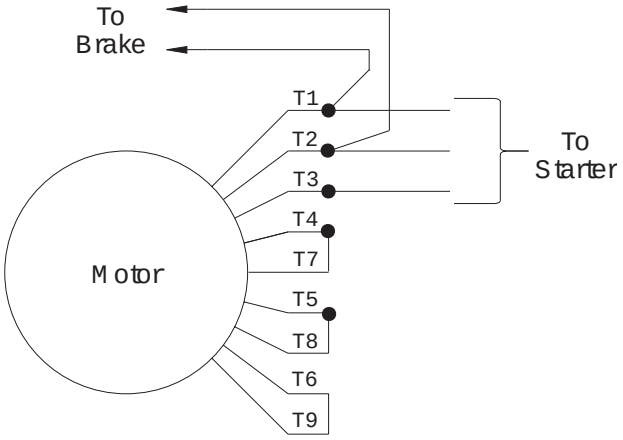
460V Motor and 460V Brake Electrical Connections



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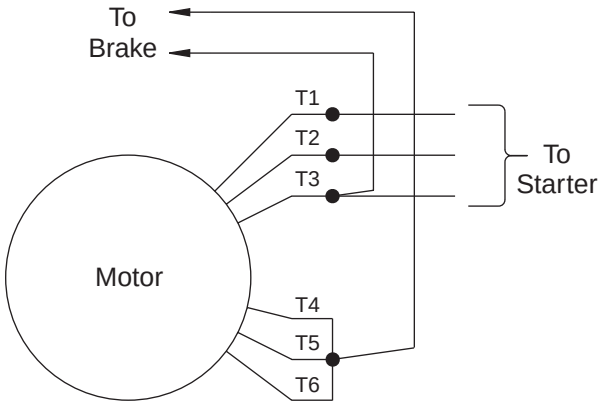
380V Motor and 220V Brake Electrical Connections
575V Motor and 330V Brake Electrical Connections

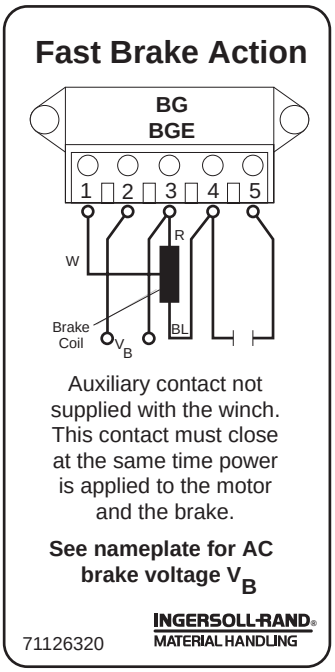


(Dwg. MHP0307)

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. Refer to Drum Switch Connection Diagrams Dwg. MHP0201 for 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 depends on application. Refer to wiring diagrams for winches using starters. For single phase motors refer to Dwg. MHP0271 and for three phase motors refer to Dwgs. MHP1087 or MHP1088. Contact your nearest distributor or the factory for recommendations on specific applications.



⚠WARNING

• Electrical installation must be performed by a licensed electrician who is knowledgeable with the NEC article 430 and any applicable local, state and national electrical codes and ordinances.

Ensure that mainline disconnect and short circuit protection are functioning prior to operating winch. Mainline disconnect must ensure that in the event of a power failure the motor cannot be restarted until the controller handle is brought to the ***off*** position, or a reset switch or button is operated.

Wiring Diagrams

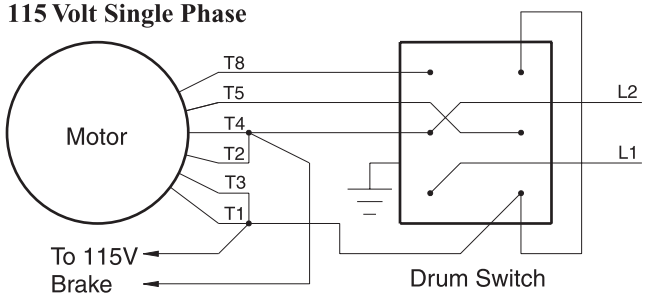
Always check electrical components prior to ordering replacement parts or making wiring connections.

Winches shipped prior to September 1996 contained Furnas brand Magnetic Reversing Starters. The gradual phase in of Allen-Bradley Magnetic Reversing Starters began in September 1996. Refer to appropriate wiring diagram for your winch.

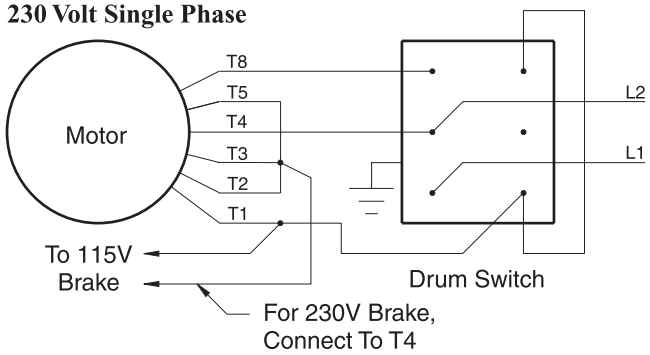
DRUM SWITCH CONNECTION DIAGRAMS

Top of Drum Switch Diagram is
Handle end, knob toward viewer

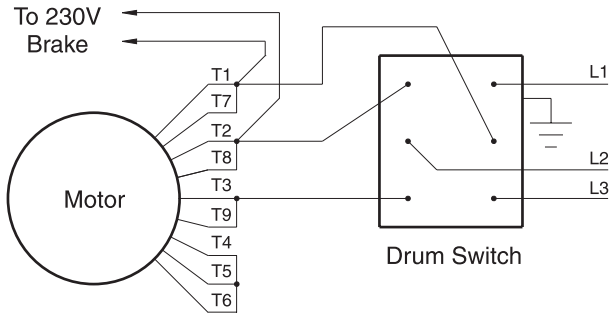
115 Volt Single Phase



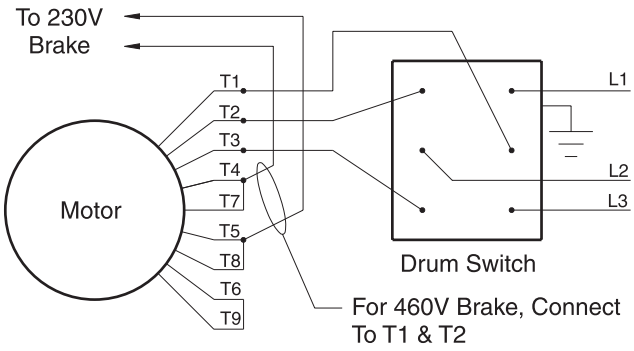
230 Volt Single Phase



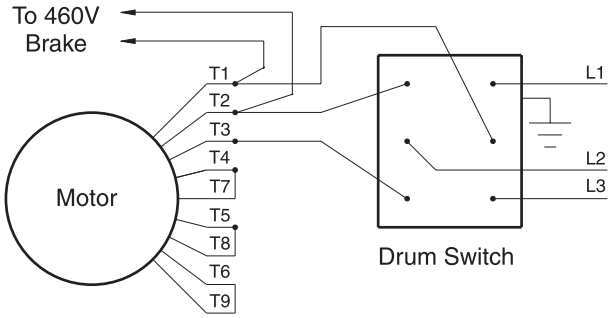
230 Volt Three Phase



460 Volt Three Phase



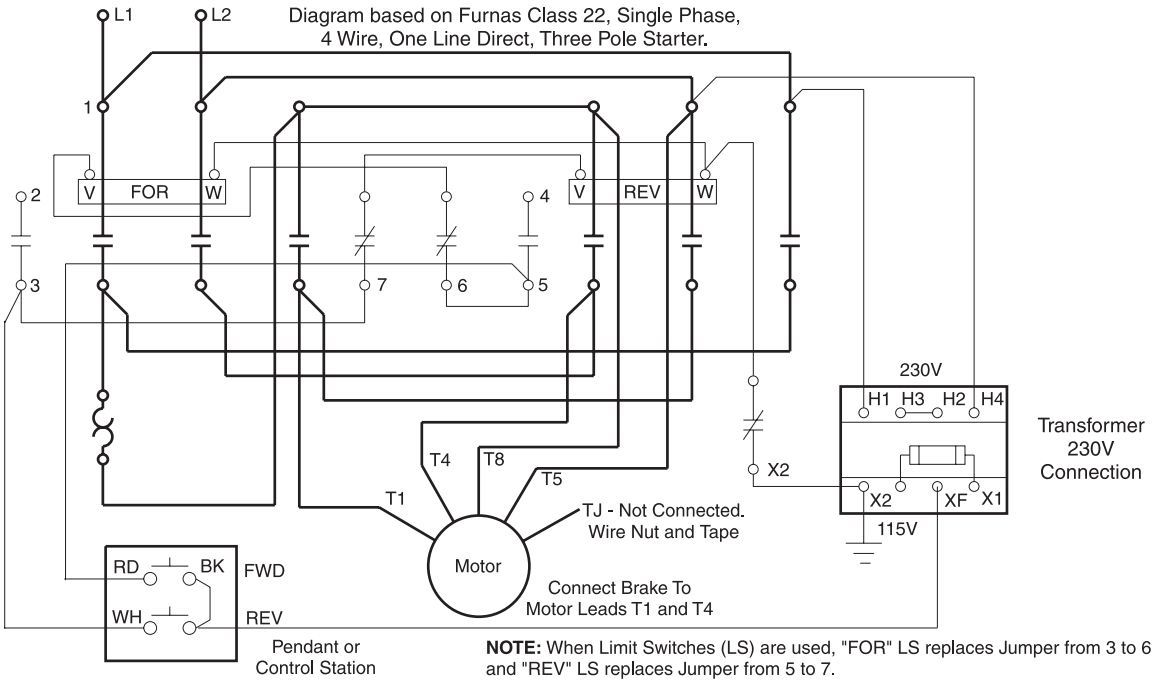
460 Volt Three Phase



(Dwg. MHP0201)

WIRING DIAGRAM

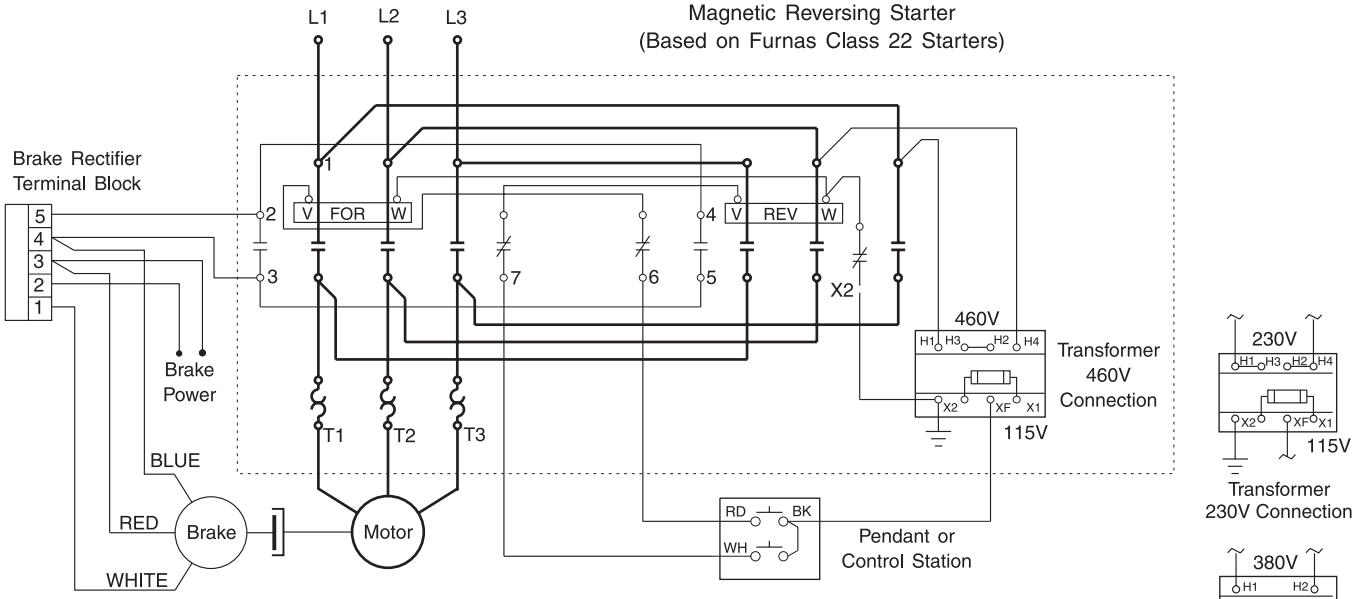
230 Volt Single Phase 60 Hz



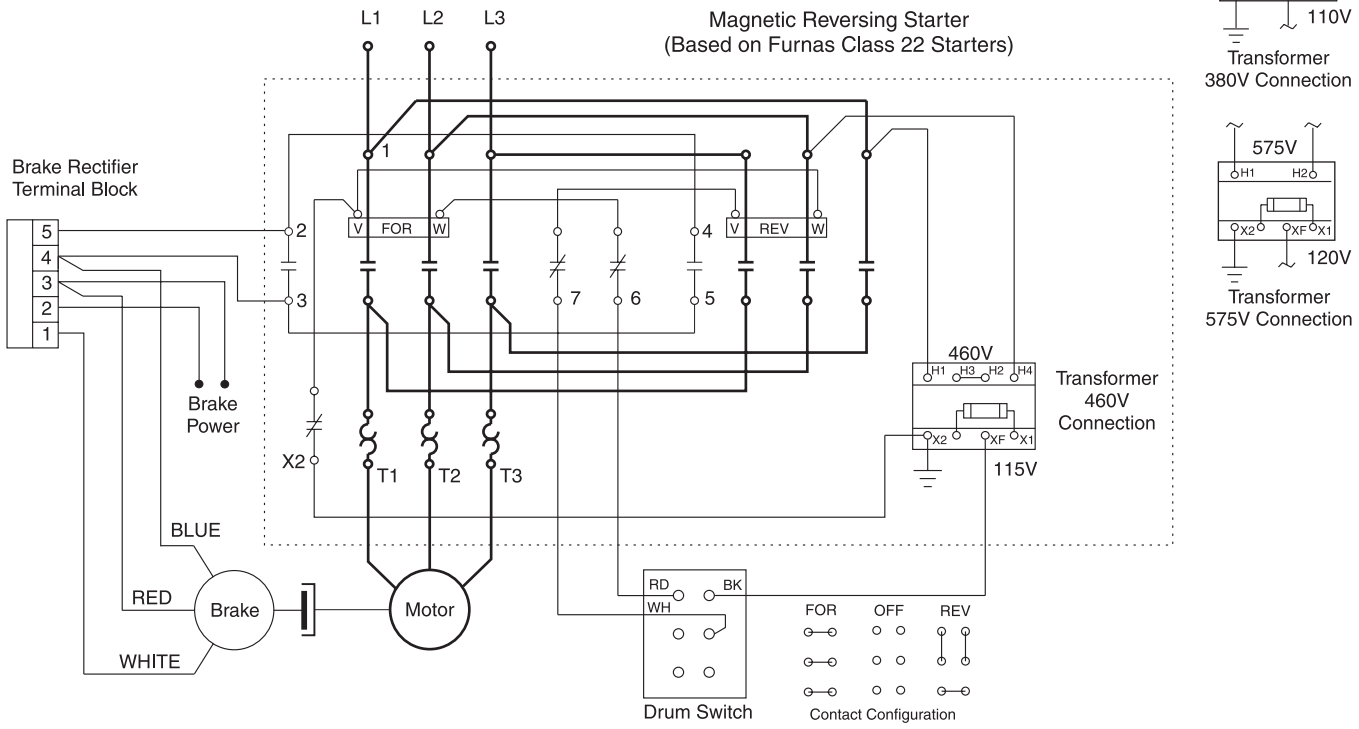
(Dwg. MHP0271)

WIRING DIAGRAMS

230-575 Volt Three Phase 50 or 60 Hz



230-575 Volt Three Phase 50 or 60 Hz with Drum Switch Control



Notes:

1. Factory wiring of starter is shown modified for fast brake response by removing the wire between terminals 5 and 7, by reconnecting the wire between terminals 3 and 6 so that it connects terminals 3 and 5, and by adding a connection between terminals 2 and 4.
2. Brake rectifier terminal block connections are modified for fast brake response by reconnecting blue wire to brake from terminal 5 to terminal 4 and by connecting terminals 4 and 5 to starter terminals 3 and 2.
3. Brake power is connected to brake terminal block terminals 2 and 3 from motor conduit box terminals as indicated in "Motor and Brake Voltage" table.
4. When limit switches are used, the forward limit switch replaces the wire from "FOR" terminal V to "REV" normally closed contact and reverse limit switch replaces wire from "REV" coil terminal V to "FWD" normally closed contact.

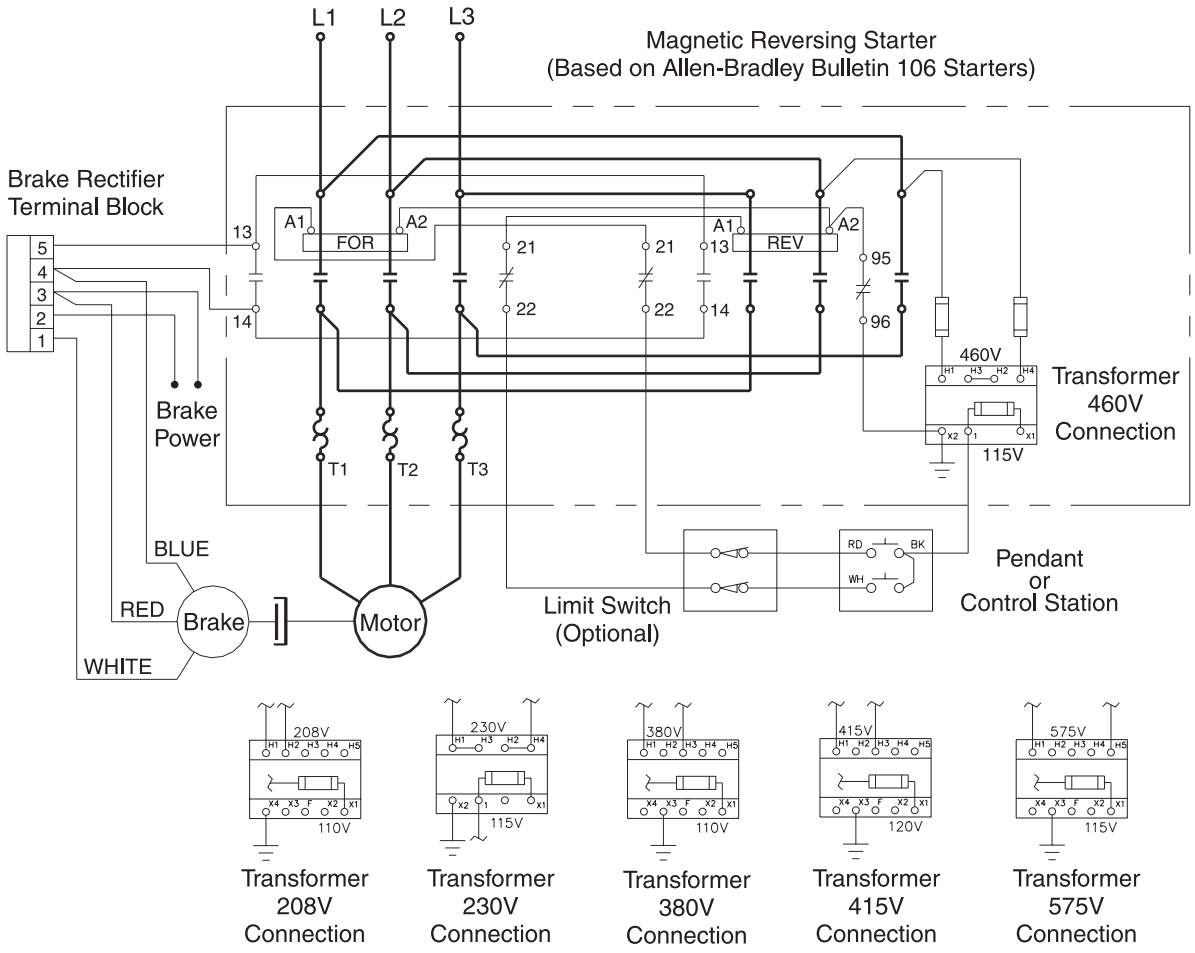
Motor and Brake Voltage (note 3)

Motor Voltage	Brake Voltage	Connect 2 and 3 to Motor Terminals
200V	200V	1 and 2
230V	230V	1 and 2
380V	220V	1 and 2
380V	380V	1 and 2
415V	220V	7 and 8
460V	230V	7 and 8
460V	460V	1 and 2
575V	330V	1 and 2
575V	575V	1 and 2

(Dwg. MHP1086)

WIRING DIAGRAM

208-575 Volt Three Phase 50 or 60 Hz - 22 Amp and smaller



Notes:

1. Factory wiring of starter is shown modified for fast brake response by moving the wire from terminal 22 on the "REV" auxiliary contactor to terminal 14 on the "REV" contactor and removing the wire from terminal 14 on the "REV" contactor terminal 22 on the "FWD" auxiliary contactor.
2. Brake rectifier terminal block connections are modified for fast brake response by reconnecting blue wire to brake from terminal 5 to terminal 4 and by connecting terminal 4 and terminal 5 to starter terminals 13 and 14.
3. Brake power is connected to brake terminal block terminals 2 and 3 from motor conduit box terminals as indicated in Motor and Brake Voltage table.

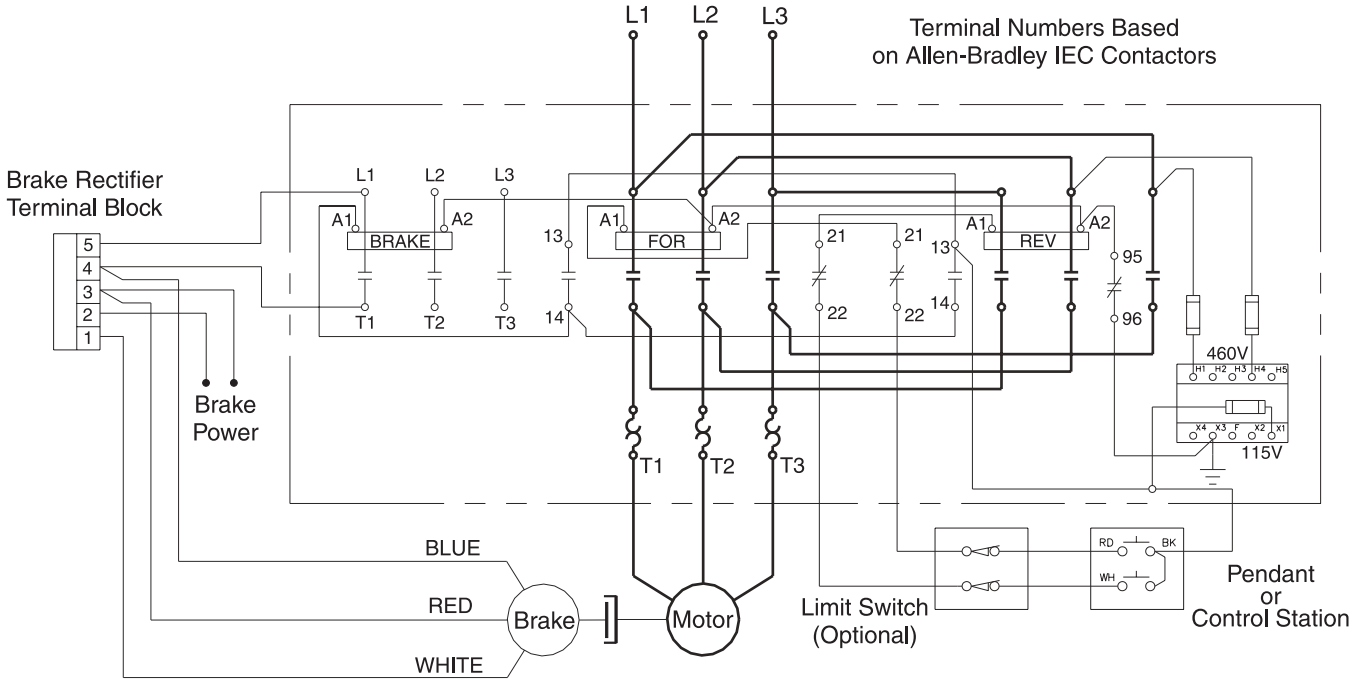
Motor and Brake Voltage (note 3)

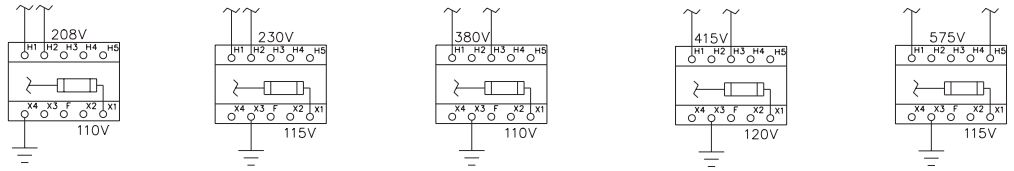
Motor Voltage	Brake Voltage	Connect 2 and 3 to Motor Terminals
200V	200V	1 and 2
230V	230V	1 and 2
380V	220V	1 and 2
415V	220V	7 and 8
460V	230V	7 and 8
460V	460V	1 and 2
575V	330V	1 and 2

(Dwg. MHP1087)

WIRING DIAGRAM

208-575 Volt Three Phase 50 or 60 Hz - 22 Amp and larger





Transformer 208V Connection | Transformer 230V Connection | Transformer 380V Connection | Transformer 415V Connection | Transformer 575V Connection

Notes:

1. Brake rectifier terminal block connections are modified for fast brake response by reconnecting blue wire to brake from terminal 5 to terminal 4 and by connecting terminal 4 and terminal 5 to starter terminals L1 and L2 of brake contactor.
2. Brake power is connected to brake terminal block terminals 2 and 3 from motor conduit box terminals as indicated in Motor and Brake Voltage table.

Motor and Brake Voltage (note 2)

Motor Voltage	Brake Voltage	Connect 2 and 3 to Motor Terminals
200V	200V	1 and 2
230V	230V	1 and 2
380V	220V	1 and 2
415V	220V	7 and 8
460V	230V	7 and 8
460V	460V	1 and 2
575V	330V	1 and 2

(Dwg. MHP1088)

OPERATION

The four most important aspects of winch operation are:

1. Follow all safety instructions when operating the winch.
2. Allow only personnel trained in safety and the operation of this product 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

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

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

Power Operation

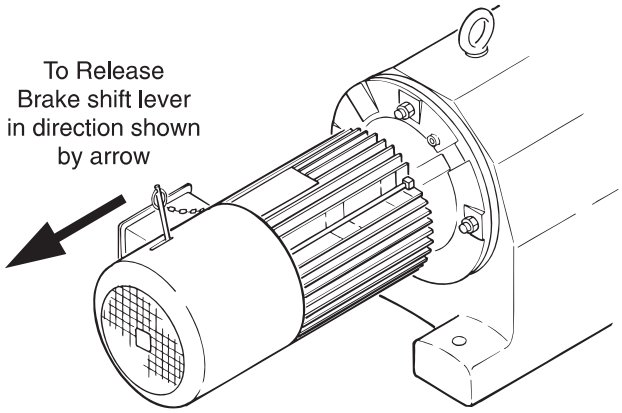
⚠ CAUTION

• Operating winch for time periods longer than suggested can cause motor damage. Refer to Motor and Reducer Charts.

When operating the winch avoid unnecessary jogging of the controls.

Brake Operation
Brakes are supplied with a hand-operated release mechanism. This allows opening of the brake without energizing the motor to facilitate adjustments on the winch.

The brake requires a lever to be inserted into the release arm. Pulling the lever away from the motor will open the brake. Refer to Dwg. MHP0281. The brake will reset automatically, once the lever is released. The lever, when not in use should be removed and stowed in the clips provided between the cooling fan fins of the motor.



(Dwg. MHP0281)

⚠WARNING

• To lower loads jog brake release lever to prevent motor and brake from over speeding the normal operating rpm.

Brake lever is not intended for use for rapid lowering. Power winch in and out. Use brake lever only selectively for pulling wire rope from winch.

Remote Control Pendant (optional feature)
Provides for remote winch control. The hand held remote control is a two button pendant which controls wire rope payout and haul-in. Direction of winch drum rotation is determined by which button is pressed.

INSPECTION

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

⚠WARNING

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

Frequent and periodic inspections should be performed on equipment in regular service. Frequent inspections are visual examinations performed by operators or personnel trained in safety and operation of this equipment and include observations made during routine equipment operation. Periodic inspections are thorough inspections conducted by personnel trained in the safety, operation and maintenance of this equipment. ASME B30.7 states inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.
Deficiencies revealed through inspection, or noted during operation, must be reported to designated personnel instructed in safety, operation and maintenance of this equipment. A determination as to whether a condition constitutes a safety hazard must be decided, and the correction of noted safety hazards accomplished and documented by written report before placing the equipment in service.

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

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

Frequent Inspection

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

1. WINCH. Prior to operation, visually inspect winch frame, bearings, guards and drum for indications of damage. Any discrepancies noted must be reviewed and inspected further by authorized personnel instructed in the operation, safety and maintenance of this winch.
2. WIRE ROPE. Visually inspect all wire rope which can be expected to be in use during the day's operations. Inspect for 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 familiar with wire rope maintenance. Lubricate if necessary. Refer to "LUBRICATION" section.

NOTICE

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

3. BRAKE. During winch operation test brake. Brake must hold load without slipping. Brake must release when winch motor is operated. If brake does not hold load, or does not release properly, the brake must be adjusted or repaired.
4. WIRE ROPE REEVING. Check reeving and ensure wire rope is properly secured to the drum. Do not operate the winch unless the wire rope feeds onto the drum smoothly.
5. LUBRICATION. Refer to the "LUBRICATION" section for recommended procedures and lubricants.
6. PENDANT (optional feature). Ensure operation of pendant buttons is smooth and that winch is responsive to pendant control. Pendant buttons must spring return to a position flush with the pendant housing when released.
7. LIMIT DEVICES (optional feature). Check that they are correctly adjusted and operate properly.

Periodic Inspection

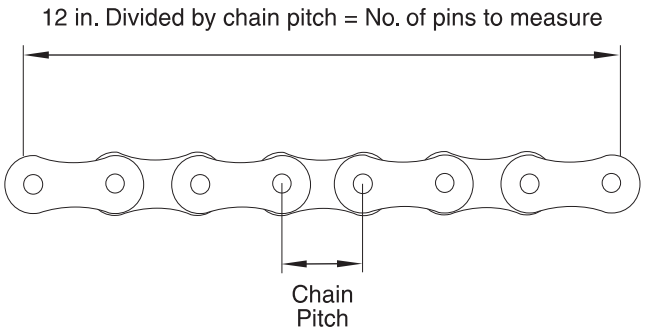
Periodic inspection intervals for winch use under various conditions are listed below:

NORMAL	HEAVY	SEVERE
yearly	semiannually	quarterly

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

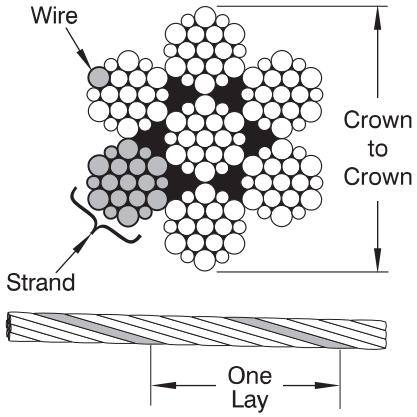
1. FRAME. Check for deformed, cracked or corroded main components. Replace damaged parts if necessary.
2. FASTENERS. Check rivets, cotter pins, capscrews and nuts on winch, including mounting bolts. Replace if missing and tighten if loose.
3. DRUM. Check for cracks, wear or damage. Replace if necessary.
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 motor operates properly and conforms to applicable specifications. Check wiring connections are clean, dry and secure.
6. BRAKE. Check brake functions correctly. Only minimum maintenance is required. Refer to "MAINTENANCE" section for brake adjustment and repair.

7. SUPPORTING STRUCTURE. Check for distortion, wear and continued ability to support the winch and rated load.
8. LABELS AND TAGS. Check for presence and legibility. Replace if damaged or missing.
9. ELECTRICAL COMPONENTS. Check for loose wires, corrosion or other signs of deterioration.
10. DRIVE CHAIN. Check for excessive wear of chain drive sprockets and for chain stretch. Refer to Roller Chain Chart and Dwg. MHP0264.



(Dwg. MHP0264)

11. WIRE ROPE. In addition to the items in a frequent inspection, inspect for the following:
    a. Buildup of dirt and corrosion. Clean if necessary.
    b. Loose or damaged end connection. Replace if loose or damaged.
    c. Check wire rope anchor is secure.
    d. Changes in the size of the wire rope diameter. Periodically measure the diameter of the wire rope from crown-to-crown throughout the life of the wire rope. The actual diameter should be recorded when the wire rope is under equivalent loading and in the same operating section. If the actual diameter of the wire rope has decreased more than 1/64 in. (0.4 mm) a through examination of the wire rope should be conducted by an experienced inspector to determine the suitability of the wire rope to remain in service. Refer to Dwg. MHP0056.



(Dwg. MHP0056)

12. TORQUE LIMITER (optional feature). Inspect torque limiter for presence of oil, grease, moisture, or corrosion on the driving surfaces and for proper setting of the spring load. Clean and adjust as required.
13. GUARD. Verify fasteners are tight and in good condition. Ensure guard is not damaged and is in good condition. Repair or replace if guard does not provide protection from drive chain movement.

Winches Not in Regular Use

1. 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. Also, activate the manual brake release lever while briefly operating the winch to make sure the brake fully releases.
2. 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".
3. Standby winches shall be inspected at least semiannually in accordance with the requirements of "Frequent Inspection". If abnormal operating conditions apply winches may require a more frequent inspection.

Testing

Prior to initial use, all new, altered or repaired winches shall be tested to ensure proper operation. Refer to "MAINTENANCE" section for additional information.

Roller Chain Chart

Chain Part Number	Chain Pitch		ASA Chain Number	Number of Rollers to Measure over	Chain Length				Chain Roller Diameter	
					New		Discard			
	in	mm			in	mm	in	mm	in	mm
51313	0.75	19	60	16	12.469	317	12.594	320	0.468	11.9
50288	1.25	31.7	100	10	13.25	337	13.375	340	0.75	19
50397	1.5	38	120	8	12.875	327	13	330	0.875	22.2
50289	2	203	160	6	13.125	333	13.25	336	1.125	31.7
51550 (Double)			160-2							

INSPECTION AND MAINTENANCE REPORT
Ingersoll-Rand Electric Winches

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

Reason for Inspection: (Check Applicable Box)

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

Refer to the Parts, Operation and Maintenance Manual "INSPECTION" section for general inspection criteria. Also refer to appropriate National Standards and Codes of practice. If in doubt about an existing condition contact the nearest **Ingersoll-Rand** Distributor or the factory for technical assistance.

COMPONENT	CONDITION		CORRECTIVE ACTION		NOTES
	Pass	Fail	Repair	Replace	
Base and Support Frames					
Motor Brake (125% Load Test)					
Motor Brake (Visual Inspection)					
Electric Motor					
Controls					
Electrical System					
Fasteners					
Reducer Assembly					
Labels and Tags			- - -		
Chain and Sprockets					
Shafts					
Wire Rope Anchor Wedge			- - -		
Guards					
Torque Limiter (optional feature)					
Limit Switch (optional feature)					
Other Components (list in NOTES section)					

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

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

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

LUBRICATION

General
Thread lubricant or an antiseize compound use is recommended for threaded shafts, capscrews and nuts. Unless otherwise stated, remove old lubricant, clean the part with an acid free solvent and apply a new coating of lubricant to the part before assembly. Lubricate grease fittings, chain and wire rope monthly. The lubrication intervals 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 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.

Bearings and Pivot Points
Lubricate all grease fittings monthly with 2 or 3 pumps from a grease gun, or more frequently, depending on severity of service. Rotate components slowly as grease is applied.
If the winch is disassembled, clean all parts thoroughly and coat bearings and shafts 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.

Drive Chain
Roller chains must be kept clean and free from rust. Excessively dirty chains should be soaked in a clean acid-free solvent. Chains must be agitated in the solvent to ensure that all joints are free from grit and foreign matter. Lubricate roller chain with **Ingersoll-Rand** LUBRI-LINK-GREEN® or a good quality automotive motor oil SAE grade 20 or 30. **DO NOT USE GREASE.** Oil should be applied liberally with a brush or oil can at least once every eight hours of operation.

⚠WARNING

• Do not lubricate chain while winch is running. Shut off power to the winch during all lubrication and maintenance operations.

Motor
No lubrication required.

Reducer Assembly
The reducer assembly is shipped with the correct grade and quantity of lubricating oil from the factory. Check oil level before initial operation. If the winch is used at a normal frequency replace the oil in the reducer assembly once every two years. To ensure correct performance, highest efficiency and long life, it is essential that the lubricating oil be maintained at the correct level. The oil level can be checked by removing the oil level plug. The oil level must be even with the bottom of the threaded hole.

Helical Gear Reducers
Type 'R' and 'K' refer to Reducer Assembly Section.

Ambient Air Temperature Range	kin viscosity at 40° C (cSt) approx.	Oil Types or equivilant
104° to 32° F	210	Mobil Mobilgear 630
40° to 0° C		Texaco Meropa 220
77° to 5° F	145	Mobil Mobilgear 629
25° to -15° C		Texaco Meropa 150

Worm Gear Reducers
Type 'S' refer to Reducer Assembly Section.

Ambient Air Temperature Range	kin viscosity at 40° C (cSt) approx.	Oil Types or equivilant
104° to 32° F	630	Mobil Mobilgear 636
40° to 0° C		Texaco Meropa 680
77° to 5° F	210	Mobil Mobilgear 630
25° to -15° C		Texaco Meropa 220

Contact your local distributor or the **Ingersoll-Rand** office for information on the use of other oils or temperature ranges.

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

⚠CAUTION

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

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

TROUBLESHOOTING

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

SYMPTOM	CAUSE	REMEDY
Motor overheats.	Motor not connected for the proper voltage.	Check power supply, connection diagram and correct wiring.
	Supply voltage varies outside the allowable tolerance.	Assure correct supply voltage.
	Ambient temperature is too high.	Ensure cool air gets to the motor.
	Motors allowable duty cycle is exceeded. Too many starts per hour.	Reduce the duty cycle to allowable limits.
	Winch is overloaded.	Reduce load to within winch capacity.
Motor does not run.	Blown fuse.	Determine and correct cause of failure and replace fuse.
	Motor protection device faulty.	Check protection device for faults.
Motor hums and draws high current.	Faulty or damaged winding.	Have motor repaired by authorized Service Repair shop.
Motor will not start or starts sluggishly.	Motor is not connected for correct voltage.	Check wiring diagrams and correct wiring.
	Large voltage and/or frequency fluctuation at starting.	Ensure stable power supply is available.
Motor runs in wrong direction.	Motor supply leads misconnected.	Switch the two electrical supply leads.
Chain jumps on sprockets or is making a snapping sound.	Sprockets may be out of alignment.	Align sprockets as described in the "MAINTENANCE" section, under chain adjustment.
	Chain requires lubrication.	Lubricate chain as described in "LUBRICATION" section.
	Chain may be stretched or worn.	Refer to "INSPECTION" section for chain inspection information.
Brake does not release.	Maximum air gap exceeded because of worn brake pad.	Readjust brake. If brake pad is totally worn, replace brake disc.
	Rectifier failed.	Replace brake coil and rectifier.
	Incorrect supply voltage to rectifier.	Correct the supply voltage.
Winch does not brake.	Brake pad worn or air gap is too large.	Replace brake pad and adjust brake.
Winch will not pull load.	Torque Limiter (optional feature) may be damaged or adjusted incorrectly.	Check Torque Limiter for presence of oil, grease or corrosion on the driving surfaces. Clean and adjust as required.
	Winch is overloaded.	Reduce load to within winch capacity.

⚠WARNING

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

Brake Adjustment (for motors manufactured by Eurodrive only)
Refer to Drawings MHP0283 and MHP0284.
The following brake adjustment procedures are suitable for Eurodrive motor brakes. Consult the factory for brake adjustment procedures on other models.
If the brake lining and brake coil are satisfactory, then check brake adjustment. A properly adjusted brake air gap is critical for correct operation. The following table indicates the required air gap measurement.

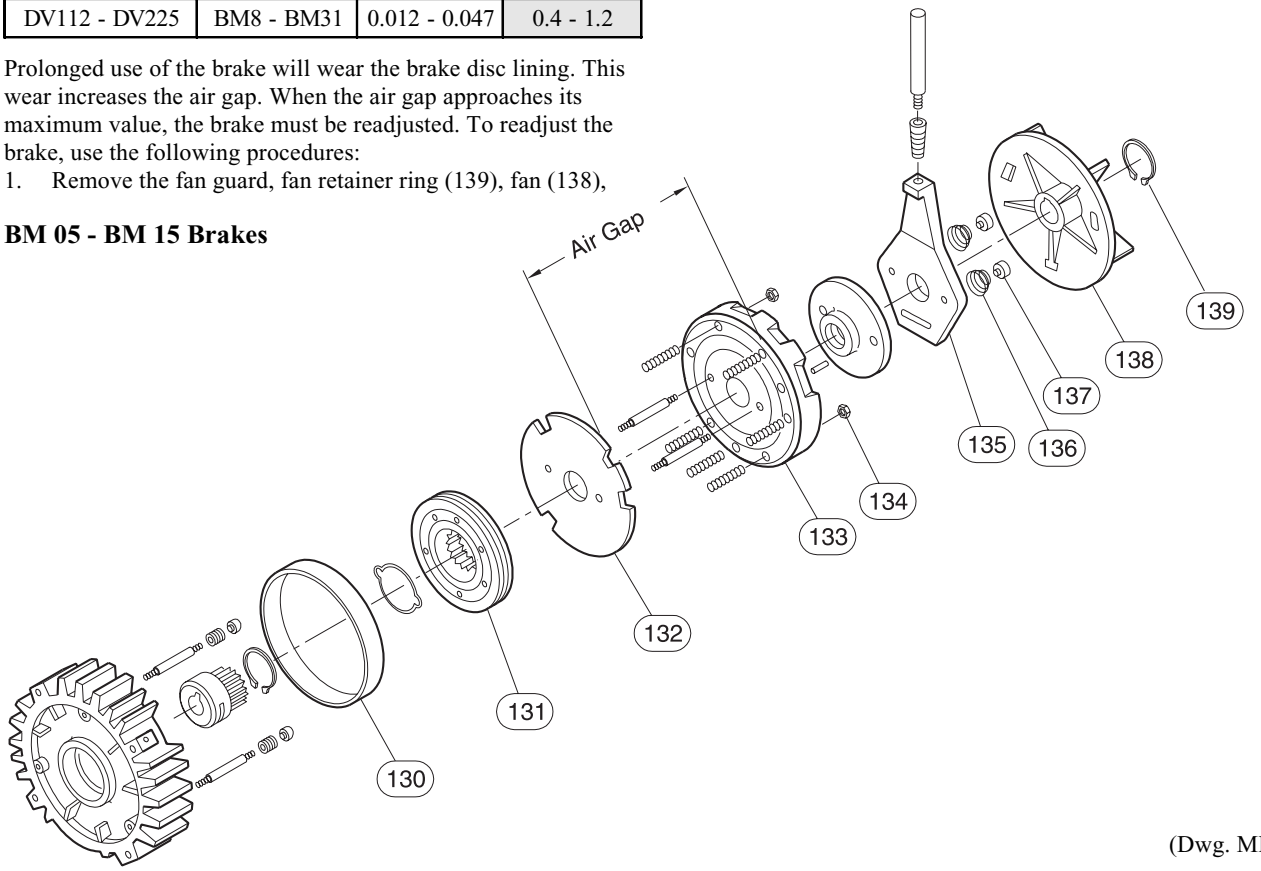
Motor Size	Brake Size	Air Gap	
		in	mm
DT71 - DT100	BM05 - BM4	0.010 - 0.024	0.25 - 0.6
DV112 - DV225	BM8 - BM31	0.012 - 0.047	0.4 - 1.2

Prolonged use of the brake will wear the brake disc lining. This wear increases the air gap. When the air gap approaches its maximum value, the brake must be readjusted. To readjust the brake, use the following procedures:
1. Remove the fan guard, fan retainer ring (139), fan (138), rubber seal (130) and any accessories mounted on the motor at the fan end.
2. Insert a feeler gauge between the brake coil body (133) and the stationary disc (132), tighten the three brake adjustment nuts (134) until the minimum value for the air gap is reached equally around the brake.
3. If correct air gap adjustment cannot be achieved the brake disc (131) may be worn beyond acceptable limits. Measure the thickness of the brake disc to determine if this has occurred. If the brake disc (131) is worn below the measurement given, it must be replaced.

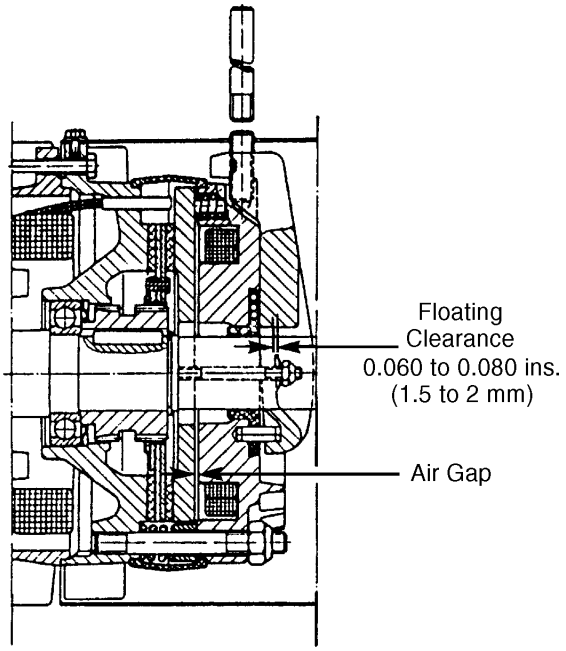
Motor Size	Brake Size	Min. Brake Disc (131) Thickness	
		in	mm
DT71 - DT100	BM05 - BM4	0.354	9.0
DV112 - DV225	BM8 - BM31	0.394	10.0

4. Reinstall accessories, rubber seal (130), fan (138), fan retainer ring (139) and fan guard.
5. Since the stationary disc (132) will move away from the coil body (133) during the brake's operation it is important there is free play (floating clearance) in the release arm (135). Ensure a play of 0.06 to 0.08 in. (1.5 to 2 mm) in the release arm (135). Refer to Dwg. MHP0284. The springs (136) should be placed between the release arm (135) and nuts (137) to eliminate noise.

BM 05 - BM 15 Brakes



(Dwg. MHP0283)



(Dwg. MHP0284)

Chain Adjustment
Check the condition of the chain per instructions in the "INSPECTION" section. Check the chain adjustment as follows:

1. Place a straight edge on top of the chain (6) bridging the two chain sprockets.
2. Place a measuring rule on the top of the chain midpoint between the two chain sprockets. Apply an inward force perpendicular to the chain. Proper chain tension is 3/8 in. (10 mm) on the rule.
3. To increase chain tension, loosen screws (11) and nuts (20) which are located in the frame, on the side furthest from the motor. Loosen nuts (20) and tighten screws (11) which are located in the frame on the side nearest from the motor. When correct chain tension has been achieved retighten nuts (20). Repeat if necessary until proper chain tension is attained.

Torque Limiter Adjustment (optional feature)
Load test torque limiter and adjust to maximum rated load or customer specified load if lower.
1,300 lb to 4,500 lb winches
Refer to Drawing MHP0854.
Maximum Rated Torque
Back the three capscrews (113) out until the points are flush or below the surface of nut (115). Rotate nut (115) until finger tight or slightly less than finger tight and alternately tighten the capscrews (113) no more than half turn at a time until the capscrew heads bottom. Do not overtighten the capscrews or completely flatten the disc spring (110).

Less than Maximum Rated Torque
To check torque limiter setting operate the winch with a representative maximum rated load. If the slip torque is too high or too low, readjust torque limiter. Always back off the capscrews until the spring force is relieved before tightening or loosening the adjusting nut. For best results the torque limiter should be adjusted under conditions similar to those in which it will be used.

6,000 lb to 2,5000 lb winches
Refer to Drawing MHP0583.
Tighten the capscrews (113) equally no more than half turn at a time until the winch holds the load required without slipping. Do not overtighten the capscrews or completely flatten the disc springs (110).
To check torque limiter setting operate the winch with a maximum rated load. If the slip torque is too high or too low, readjust torque limiter. For best results the torque limiter should be adjusted under conditions similar to those in which it will be used. When correct adjustment is achieved install soft steel wire (114) through capscrew head holes and twist ends together.

Running-In
Torque Limiters should be run-in for the most consistent results. To run-in, adjust the Torque Limiter to 70-80% of the maximum single spring capacity and slip the center member approximately 60 RPM for 3 to 4 minutes. (Refer to steps 2 and 3 for setting and checking instructions.)

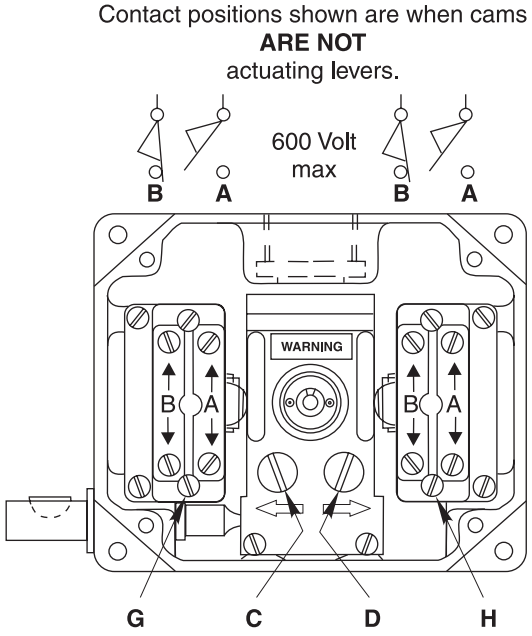
Limit Switch Adjustment (optional feature)
Refer to Drawing MHP1085.
When the cam rotates and actuates the switch, the "B" (closed) contact opens and the "A" (open) contact closes. Each precision switch has (1) one independent adjustable cam.

⚠WARNING

• Loosen cam setscrew before adjusting or damage of cams will occur.

To adjust switch "G":
1. Loosen red setscrew.
2. Turn screw "C" until cam roller trips "G".
3. Tighten red setscrew.

To adjust switch "H":
1. Loosen blue setscrew.
2. Turn screw "D" until cam roller trips "H".
3. Tighten blue setscrew.



(Dwg. MHP1085)

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 identification. If a winch is being completely disassembled for any reason, follow the order of the topics as they are presented. It is recommended that all maintenance work on the winch be performed in a clean dust free work area.
In the process of disassembling the winch, observe the following:

1. Never disassemble the winch any further than is necessary to accomplish the needed repair. A good part can be damaged during the course of disassembly.
2. Never use excessive force when removing parts. Tapping gently around the perimeter of a 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.

Winch Disassembly (chain driven winches)

Refer to Drawing MHP0255.
Disconnect all power to the winch before starting disassembly. Remove wire rope and limit switches if equipped.

1. Remove capscrews (15), screws (16), washers (18) and nuts (24) and lift off guard (3).
2. Remove chain (6).
3. Loosen setscrews (32) and remove sprocket (5) and key (31) from motor and reducer assembly output shaft.
4. Remove capscrews (17), lockwashers (21), washers (12) and nuts (22). Using an overhead hoist with sufficient capacity to adequately support the weight of the motor and reducer assembly remove the motor and reducer assembly from frame (1).
5. Remove capscrews (9) and lockwashers (25) and lift off caps (8).
6. Remove adjusting screws (11) and nuts (20) from frame (1).
7. Support the drum (2) using an overhead hoist with sufficient capacity to adequately handle the weight of the drum. Remove nuts (19) and lockwashers (13). Pull bearings (7) from drum spigots.
8. Lift drum (2) from frame (1) and carefully set in an area which will not cause damage to the sprocket teeth.
9. Remove bolt locks (4) and capscrews (14) from frame (1).

Winch Disassembly

15,000 - 25,000 lb winches

Refer to Drawings MHP0255 and MHP0278.

1. Remove capscrews (15), screws (16), washers (18) and nuts (24) and lift off guard (3).
2. Remove chain (6).
3. Loosen setscrews (32) and remove sprocket (5) and key (31) from motor and reducer assembly output shaft.
4. Remove capscrews (45), lockwashers (46) and nuts (47) from bearing (40).
5. Remove capscrews (17), lockwashers (21), washers (12) and nuts (22). Using an overhead hoist with sufficient capacity to adequately support the weight of the motor and reducer assembly remove the motor and reducer assembly from frame (1). Slide bearing (40) from motor and reducer assembly.
6. Remove adjusting screws (11) and nuts (20) from frame (1).
7. Remove capscrews (41), washers (42), lockwashers (48) and nuts (43) from bearings (39).
8. Lift drum (2) from frame (1) and carefully set in an area which will not cause damage to the sprocket teeth. Pull bearings (39) from drum spigots.

Winch Disassembly (direct drive winches)

Refer to Drawing MHP0260.

1. Remove nuts (60) and lockwashers (59). Pull bearing (58) from drum hub.
2. Remove nuts (53), lockwashers (54) and capscrews (56) from motor and frame (50).
3. Slide the motor and drum assembly away from bearing (58) until drum spigot is clear of the frame (50).
4. Remove drum (51) from reducer assembly drive shaft.

Limit Switch Disassembly (optional feature)
Refer to Drawings MHP0263 and MHP0579.

1. Remove screws (74) and lockwashers (73). Lift limit switch (72) from bracket (71).
2. Remove nuts (19) and lockwashers (13) from extension studs (70). Remove bracket (71) and extension studs (70).
3. Tap pin (75) out of drum only if it requires replacement.

On 15000B20 and 25000B25 winches, bracket (71) can only be removed after capscrews (41), washers (42), lockwashers (48) and nuts (43), that retain bearing (39), have been removed.

Cleaning, Inspection and Repair

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

Cleaning

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 sprockets, frame and drum. Dry each part using low pressure, filtered compressed air.

Inspection

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

1. Inspect sprockets for worn, cracked, or broken teeth.
2. Inspect all bearings for wear, scoring, or galling. Check for freeness of rotation. Replace bearings if rotation is rough or bearings are excessively worn.
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. Check guard for damage and that it provides suitable protection from the roller chain and sprockets.
6. Inspect chain to ensure it is clean and free from rust. Refer to “LUBRICATION” section for information on cleaning and lubricating chain.

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

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

Winch Assembly (chain driven winches)

Refer to Drawing MHP0255.

1. Position frame (1) on a flat and sturdy surface or workbench.
2. Wipe clean and lightly lubricate bearing spigots on the drum (2). Install one bearing (7) on each drum spigot. The flat mounting surface of each bearing (7) must be toward the drum (2).
3. Loosely install the bolt locks (4) in frame (1) so they are in a vertical position and are located on the chain side of the frame (1). Bolt locks (4) must be positioned with the narrower edge located closest to the 'U' shaped cutout in the frame (1).
4. Loosely install capscrews (14) in frame (1) on the side opposite the chain.
5. Using an overhead hoist with sufficient capacity to adequately support the weight of the drum (2) position the drum in frame (1). Ensure that bearings (7) are located on the outside of the frame drum support uprights and that the bearing grease fittings are positioned at the bottom.
6. Align the bearing mounting holes with bolts (14) or bolt locks (4) and press into position.
7. Install nuts (19) and lockwashers (13). Torque to specifications recommended in torque chart.
8. Loosely install adjusting screws (11) with nuts (20) in frame (1).
9. Install caps (8) on top of each frame (1) support. Check threaded hole in cap is positioned nearest the drum (2).
10. Install capscrews (9) and lockwashers (25) to clamp caps into position. Torque to specifications recommended in torque chart.
11. Loosely install adjusting capscrews (10) with nuts (20) in caps (8).
12. Using an overhead hoist with sufficient capacity to adequately support the weight of the motor and reducer assembly position the motor and reducer assembly on frame (1). Install capscrews (17), washers (12), lockwashers (21) and nuts (22). Install capscrews (17) from underneath the frame (1). Torque to specifications recommended in torque chart.
13. Install key (31) and sprocket (5) on output shaft of motor and reducer assembly (26) or (27).

NOTICE

• Do not force sprocket onto output shaft by hammering. Doing so may cause premature bearing failure.

14. Using a straight edge, position sprocket (5) so it aligns with the sprocket on drum (2). Install setscrews (32) with Loctite® 609 or equivalent and tighten.
15. Install chain (6) and adjust to obtain the correct chain tension. It may be necessary to use a chain half link (37).
16. Install guard (3) on frame (1) and secure with capscrews (15). Also install screws (16), washers (18) and nuts (24) which clamp the guard mesh to the inside of the frame (1).
17. Check all warning labels and tags are present and clearly visible.

Winch Assembly

15,000 - 25,000 lb winches

Refer to Drawings MHP0255 and MHP0278.

1. Position frame (1) on a flat and sturdy surface.
2. Wipe clean and lightly lubricate bearing spigots on the drum (2). Install one bearing (39) on each drum spigot.
3. Using an overhead hoist with sufficient capacity to adequately support the weight of the drum (2) position the drum in frame (1). Ensure bearings (39) are located on the bearing pads of the frame (1).
4. Align the bearing (39) mounting holes with the bolt holes in frame (1). Loosely install capscrews (41), washers (42), lockwashers (48) and nuts (43).
5. Loosely install adjusting screws (11) with nuts (20) in frame (1).
6. Install bearing (40) on reducer assembly output shaft. Using an overhead hoist with sufficient capacity to adequately support the weight of the motor and reducer assembly position the motor and reducer assembly on frame (1). Install capscrews (17), washers (12), lockwashers (21) and nuts (22). Install capscrews (17) from underneath the frame (1). Torque to specifications recommended in torque chart.
7. Align holes in bearing (40) and frame (1) and install capscrews (45), lockwashers (46) and nuts (47). Torque to specifications recommended in torque chart.
8. Install key (31) and sprocket (5) on output shaft of motor and reducer assembly (26) or (27).

NOTICE

• Do not force sprocket onto output shaft by hammering. Doing so may cause premature bearing failure.

9. Using a straight edge, position sprocket (5) so it aligns with the sprocket on drum (2). Install setscrews (32) with Loctite® 609 or equivalent and tighten.
10. Install chain (6) with master link (37) to obtain the correct chain tension it may be necessary to use a chain half link (37).
11. Install guard (3) on frame (1) and secure with capscrews (15). Also install screws (16), washers (18) and nuts (24) which clamp the guard mesh to the inside of the frame (1).
12. Check all warning labels and tags are clearly visible.

Winch Assembly (direct drive winches)

Refer to Drawing MHP0260.

1. Wipe clean and lightly lubricate spigots on the drum (51). Install key (55) on reducer assembly drive shaft and assemble drum (51).
2. Install capscrews (57) and washers (61) in frame (50). Slide motor and reducer assembly with drum into position. Spigot of drum must pass through the frame upright.
3. Install bearing (58) and secure in position with lockwashers (59) and nuts (60).
4. Install capscrews (56) from underneath frame (50). Install nuts (53) and washers (54) on capscrews (56) and torque to specifications.

Limit Switch Assembly (optional feature)
Refer to Drawings MHP0263 and MHP0579.
Limit Switch Assemblies are custom mounted at the factory to ensure proper alignment. Contact your local service center, distributor or the factory before attempting to install a limit switch kit on an existing winch. Request a copy of Dwg. 25308 for detailed installation instructions.

1,300 lb to 10,000 lb winches

1. Install extension studs (70) on capscrews (14) on the side of the frame opposite the roller chain.
2. Install bracket (71) on extension studs (70) and secure in position with lockwashers (13) and nuts (19).
3. Tap pin (75) into the hole in the end of the drum until flush. Install limit switch (72). The slot in the limit switch drive shaft must be in line and engage with pin (75).
4. Secure limit switch (72) to bracket (71) with screws (74) and lockwashers (73).

15,000 lb to 25,000 lb winches

1. Remove capscrews (41) and washers (42) from bearing assembly. Install bracket (71) and reinstall capscrews and washers. Do not tighten.
2. Tap pin (75) into the hole in the end of the drum until flush. Install limit switch (72). The slot in the limit switch drive shaft must be in line and engage with pin (75).
3. Secure limit switch (72) to bracket (71) with screws (74) and lockwashers (73).
4. Tighten capscrews (41).

Torque Limiter Assembly
Refer to Drawings MHP0583 and MHP0854.
Ensure the clutch plate, motor sprocket, driving plate and friction plates are free of oil, grease, dirt and rust prior to assembly. The clutch plate should have a 125 micro-inch finish in the bore and a 63 micro-inch finish on the area where the friction plates rub in order to obtain maximum rated capacity and optimum life from the Torque Limiter. Assemble the following parts on the torque limiter clutch hub: friction plates (107), bushing (109), clutch plate (102), driving plate (106), spring(s) (110), load plate (112) and adjusting nut (115).

Testing

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

1. Operate winch for several minutes in both directions with no load.
2. Check operation of brake.
3. Check operation of limit switches, and locking or safety devices when provided.
4. Check winch is firmly secured before beginning operation. Refer to “INSTALLATION” section.
5. Install guards and ensure warning labels are present and legable.

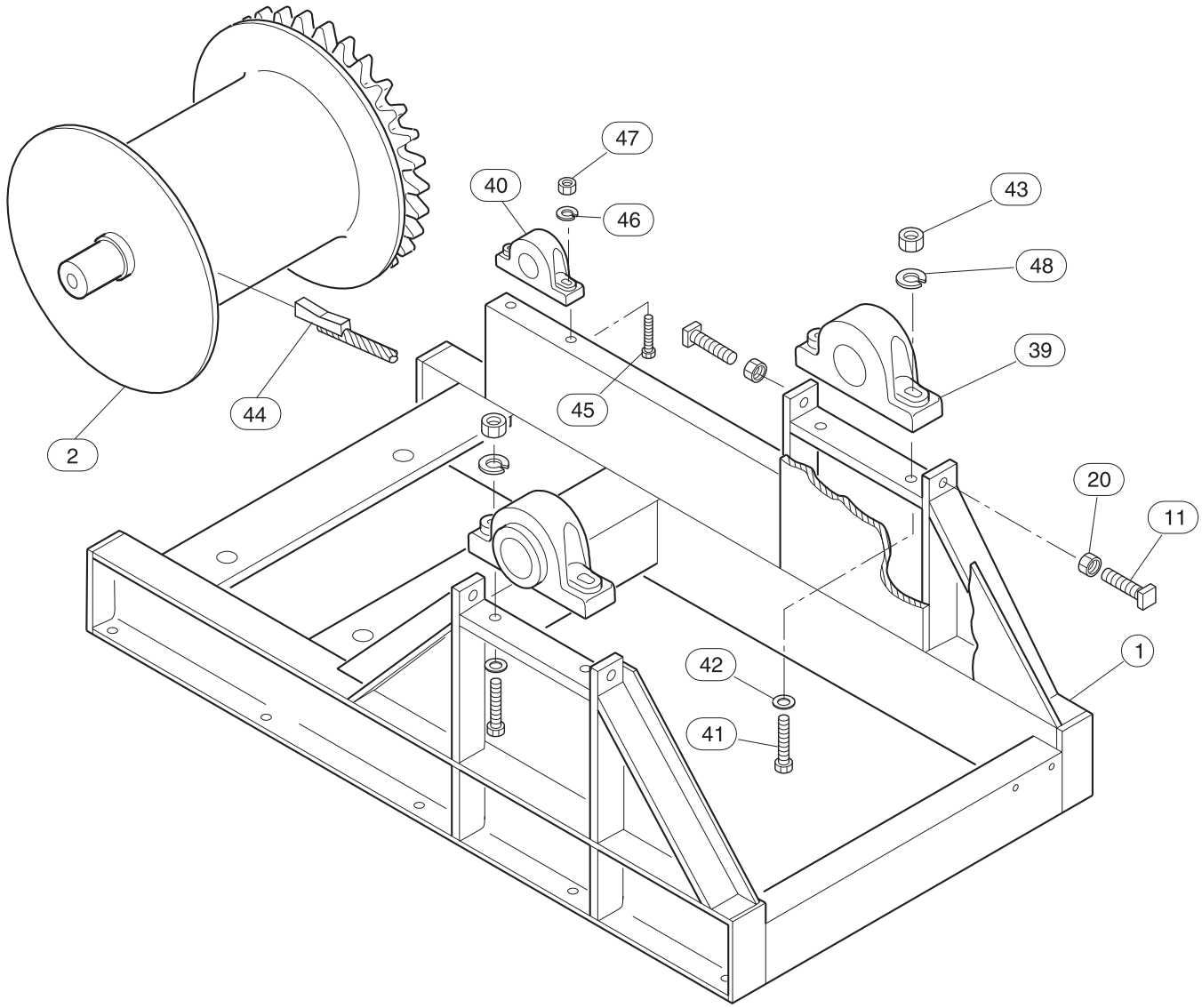
Load Test
Prior to initial use, all new, extensively repaired, or altered winches shall be load tested by or under the direction of a person knowledgeable in test procedures and operation of the winch, and a written report furnished confirming the rating of the winch. Test winch to 110% of the rated line pull.

Capscrew (Bolt) Torque Chart

Bolt Diameter in inches	Grade 5 Tightening Torque				Grade 8 Tightening Torque			
	Dry		Lubricated		Dry		Lubricated	
	lb. ft	N m	lb. ft	N m	lb. ft	N m	lb. ft	N m
No. 10-24	3.5	5	3	4	5	7	4	5
No. 10-32	4	5	3	4	7	9	4	5
1/4-20	8	11	6	8	12	16	9	12
1/4-28	10	13	7	9	14	19	10	13
5/16-18	17	23	13	18	25	34	18	24
5/16-24	19	26	14	19	25	34	20	27
3/8-16	30	40	23	31	45	61	35	47
3/8-24	35	47	25	34	50	68	35	47
7/16-14	50	68	35	47	70	95	55	74
7/16-20	55	74	40	54	80	108	60	81
1/2-13	75	101	55	74	110	150	80	108
1/2-20	90	122	65	88	120	160	90	122
9/16-12	110	150	80	108	150	203	110	150
9/16-18	120	160	90	122	170	230	130	176
5/8-11	150	203	110	150	220	298	170	230
5/8-18	180	244	130	176	240	325	180	244
3/4-10	260	352	200	271	380	515	280	380
3/4-16	300	406	220	298	420	569	320	434
7/8-9	400	542	300	406	600	813	450	610
7/8-14	440	596	320	434	660	895	500	678
1-8	580	786	440	596	900	1220	680	922
1-12	640	867	480	651	1000	1355	740	1003
1-1/8-7	800	1084	600	813	1280	1735	960	1301
1-1/8-12	880	1193	660	895	1440	1952	1080	1464
1-1/4-7	1120	1518	840	1139	1820	2467	1360	1844
1-1/4-12	1240	1681	920	1247	2000	2711	1500	2034
1-1/2-6	1940	2630	1460	1980	3160	4284	2360	3200
1-1/2-12	2200	2982	1640	2223	3560	4826	2660	3606

ELECTRIC WINCH ASSEMBLY PARTS DRAWING

15,000 lb and 25,000 lb winches only

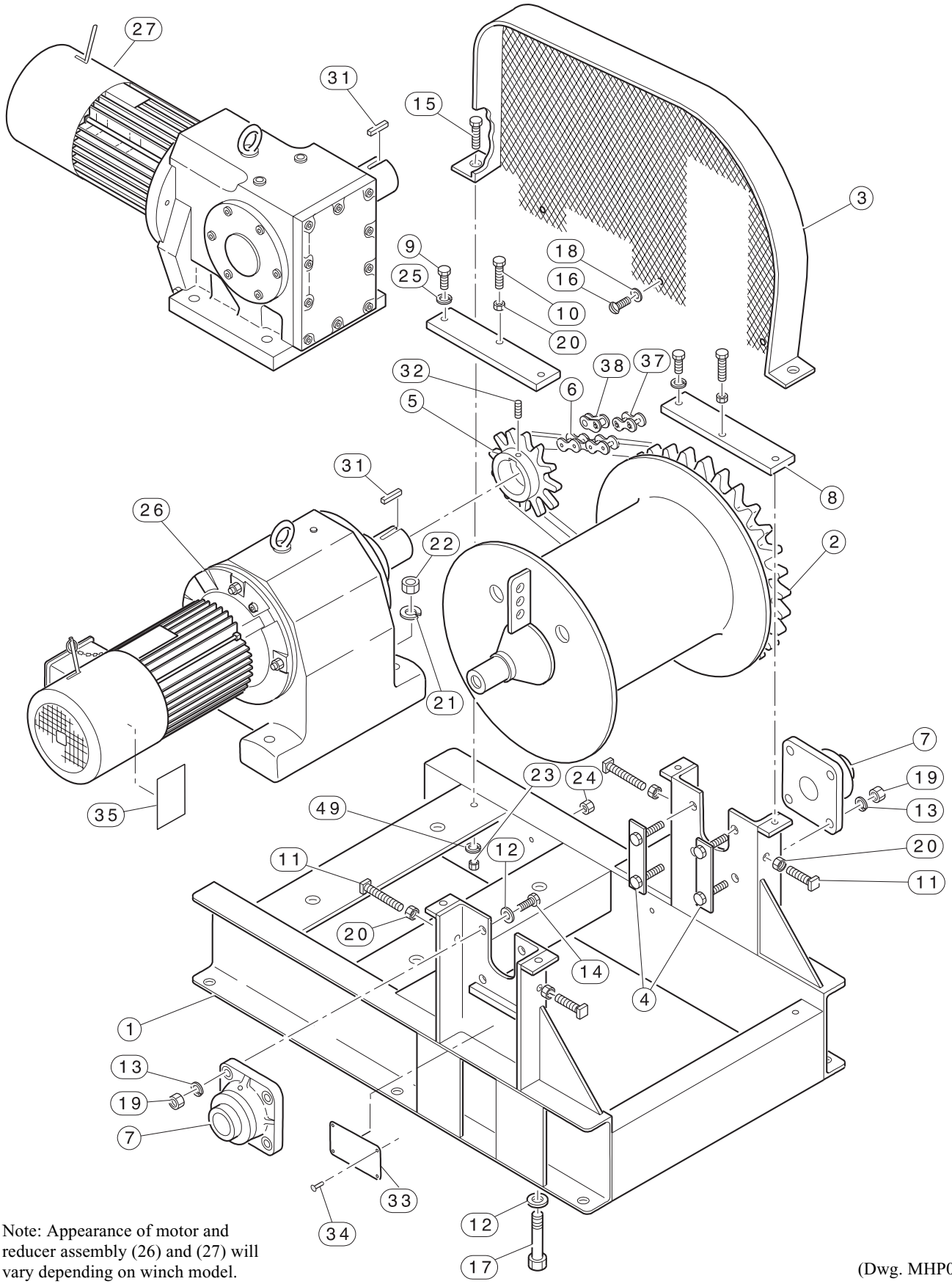


Frame (1) shown is for a 25,000 lb winch.

(Dwg. MHP0278)

ELECTRIC WINCH ASSEMBLY PARTS DRAWING

1,300 lb to 10,000 lb winches



Note: Appearance of motor and reducer assembly (26) and (27) will vary depending on winch model.

(Dwg. MHP0255)

ELECTRIC WINCH ASSEMBLY PARTS LIST

1,300 lb to 2,000 lb Capacity Winches

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.				
			1300A20 1300B20	1400A40	1400B40	2000A20 2000B20	2000A40 2000B40
1	Frame (Parallel Motor)	1	9491-*	3291-*	9491-*		
	Frame (with Torque Limiter)				9666-*		
	Frame (Right Angle Motor)		---				3787-*
2	Drum	1	21624-*			21259-*	
3	Guard	1	2007				
	Guard (with Torque Limiter)		9667				
4	Bolt Lock	2	1072-1				
5	Sprocket	1	7028-5	7028-4	7028-5		
6	Roller Chain	Specify Length	51313				
7	Bearing	2	50444				
8	Cap	2	1936				
9	Capscrew	4	51780				
10	Capscrew	2	51712				
11	Screw	4	53545				
12	Flat Washer	8	71293005				
13	Lockwasher	8	50200				
14	Capscrew	4	71109862				
15	Capscrew	2	50919				
16	Screw	3	51818				
17	Capscrew	4	71126742	52008	50892		
18	Washer	3	51676				
19	Nut	8	51982				
20	Nut	6	50176				
21	Lockwasher	4	51008	50181	51008		
22	Nut	4	50812	51750	50812		
23	Nut	2	52265				
24	Nut	3	53548				
25	Lockwasher	4	50200				
26	Motor (Parallel Drive)	1	Refer to Motor Chart				
27	Motor (Right Angle Drive)						
31	Key	1	Not Sold Separately				
32	Setscrew	2	53455	53154			
33	Nameplate	1	71106967-R				
34	Drive Screw	4	50915				
35	Warning Label	1	71060529				
37	Chain Master Link	1	71099857				
38	Chain Half Link	1	---				

* Insert drum length in inches (distance between drum flanges). Refer to Model Code Explanation for drum options and lengths.

ELECTRIC WINCH ASSEMBLY PARTS LIST

3,000 lb to 6,000 lb Capacity Winches

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.				
			3000B40	4000A20 4000B20	4500B50	6000B20	6000B40
1	Frame (Parallel Motor)	1	13254-*		8491-*	7661-*	
	Frame (with Torque Limiter)						
	Frame (Right Angle Motor)		14256-*		---		
2	Drum	1	949-*			2044-*	950-*
3	Guard (Parallel Drive)	1	14257		8489	7648	7663
	Guard (Right Angle Drive)		---				
	Guard (with Torque Limiter)		12889			7363	
4	Bolt Lock	2	1072-2			1072-3	
5	Sprocket (Parallel Drive)	1	7028-6		8482-5	9645-5	7650-5
	Sprocket (Right Angle Drive)		19766		---		
6	Roller Chain	1	53543		50288	50397	
7	Bearing	2	50343			50446	
8	Cap	2	1933			1929	
9	Capscrew	4	51780			50183	50973
10	Capscrew	2	51712			50973	
11	Screw	4	53545			54099	52146
12	Flat Washer	8	71064844			71293005	
13	Lockwasher	8	50181			51008	
14	Capscrew	4	52008			50892	54894
15	Capscrew	2	53972			54101	51014
16	Screw	3	51818			71061675	51818
17	Capscrew (Parallel Drive)	4	51010		54961	54104	
	Capscrew (Right Angle Drive)		---				
18	Washer	3	51676			51831	51676
19	Nut	8	52929			50211	
20	Nut	6	50176			50205	
21	Lockwasher	4	51008			71028732	51012
22	Nut	4	50812			54105	50209
23	Nut	2	52265			51682	54860
24	Nut	3	53548			54106	53548
25	Lockwasher	4	50200			50181	
26	Motor (Parallel Drive)	1	Refer to Motor Chart				
27	Motor (Right Angle Drive)						
31	Key	1	Not Sold Separately				
32	Setscrew	2	53505				
33	Nameplate	1	71106967-R				
34	Drive Screw	4	50915				
35	Warning Label	1	71060529				
37	Chain Master Link	1	54893			54892	
38	Chain Half Link	1	Contact Factory				
67	Setscrew**	2	50980			---	

* Insert drum length in inches (distance between drum flanges). Refer to Model Code Explanation for drum options and lengths.

** Not Shown

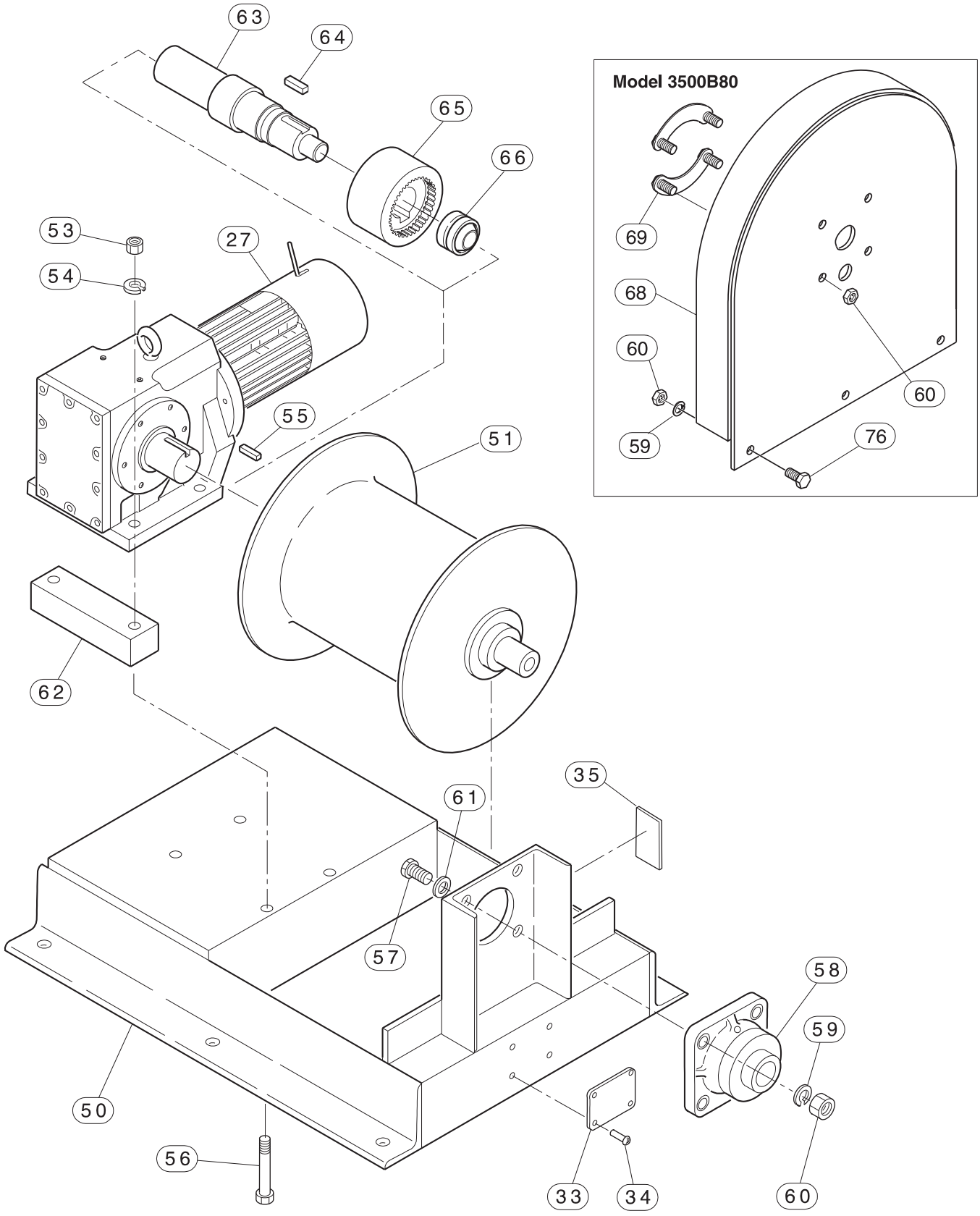
ELECTRIC WINCH ASSEMBLY PARTS LIST

10,000 lb to 25,000 lb Capacity Winches

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.			
			10000B20	10000B40	15000B20	25000B25
1	Frame	1	7392-*		7837-*	19437-*
	Frame (with Torque Limiter)		Contact Factory			
2	Drum	1	4015-*		3210-*	3855-*
3	Guard	1	7567		3198	3852
	Guard (with Torque Limiter)		7940		Contact Factory	
4	Bolt Lock	2	1072-4		---	
5	Sprocket	1	7818-5	7393-5	7865-5	8023
6	Roller Chain	1	50289			51550
7	Bearing	2	50445		---	
8	Cap	2	1932		---	
9	Capscrew	4	50973		---	
10	Capscrew	2	50183		---	
11	Screw	4	52146		54424	52254
12	Flat Washer	See ( )	71293005 (8)		52017 (4)	52251 (4)
13	Lockwasher	8	51008		---	
14	Capscrew	4	50892		---	
15	Capscrew	4	53972		51014	51712
16	Screw	3	51818		52856	52264
17	Capscrew	4	53812		54420	52249
18	Washer	3	51676		51831	54843
19	Nut	8	54661		---	
20	Nut	See ( )	50205 (6)		50159 (4)	52255 (4)
21	Lockwasher	4	54953		71086722	52251
22	Nut	4	53366		51492	54841
23	Nut	4	52265			71061584
24	Nut	3	53548		50852	51682
25	Lockwasher	4	50181		---	
26	Motor (Parallel Drive)	1	Refer to Motor Chart			
31	Key	1	Not Sold Separately			
32	Setscrew	1	54910		54578	
33	Nameplate	1	71106967-R			
34	Drive Screw	4	50915			
35	Warning Label	1	71060529			
37	Chain Master Link	1	Contact Factory			54887
38	Chain Half Link	1	51689		---	
39	Bearing	2	---		50484	52246
40	Bearing	1	---			52247
41	Capscrew	4	---		54422	52248
42	Washer	4	---		71028732	52253
43	Nut	4	---		50152	52252
44	Wire Rope Wedge (3/4 in.)	1	529		---	---
	Wire Rope Wedge (7/8 in.)		---		334	---
	Wire Rope Wedge (1 in.)		---		333	---
	Wire Rope Wedge (1-1/8 in.)		---			332
	Wire Rope Wedge (1-1/4 in.)		---			331
45	Capscrew	2	---			52256
46	Lockwasher	2	---			51008
47	Nut	2	---			50913
48	Lockwasher	4	---		51012	52837
49	Lockwasher	4	---		51013	---

* Insert drum length in inches (distance between drum flanges). Refer to Model Code Explanation for drum options and lengths.

DIRECT DRIVE ELECTRIC WINCH ASSEMBLY PARTS DRAWING



Note: Appearance of motor and reducer assembly (27) will vary depending on winch model.

(Dwg. MHP0260)

DIRECT DRIVE ELECTRIC WINCH ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.					
			200A40 200B40	250A20 250B20	500A20 500B20	500A40 500B40	700A40 700B40	800A20 800B20
27	Motor	1	Refer to Motor Chart					
33	Nameplate	1	71106967-R					
34	Drive Screw	4	50915					
35	Warning Label	1	71060529					
50	Frame	1	16989-*	2518-EU				
51	Drum	1	16990-*	4832				
53	Nut	4	51682	50170				
54	Lockwasher	4	51013	50200				
55	Key	1	Not Sold Separately					
56	Capscrew	4	53844	71126742				
57	Capscrew	4	71190862					
58	Bearing	1	51312					
59	Lockwasher	4	50200					
60	Nut	4	51982					
61	Flat Washer	4	50177					
62	Shim Block	2	17002	---				
63	Shaft	1	---					
64	Key	2	---					
65	Hub	1	---					
66	Bushing	1	---					

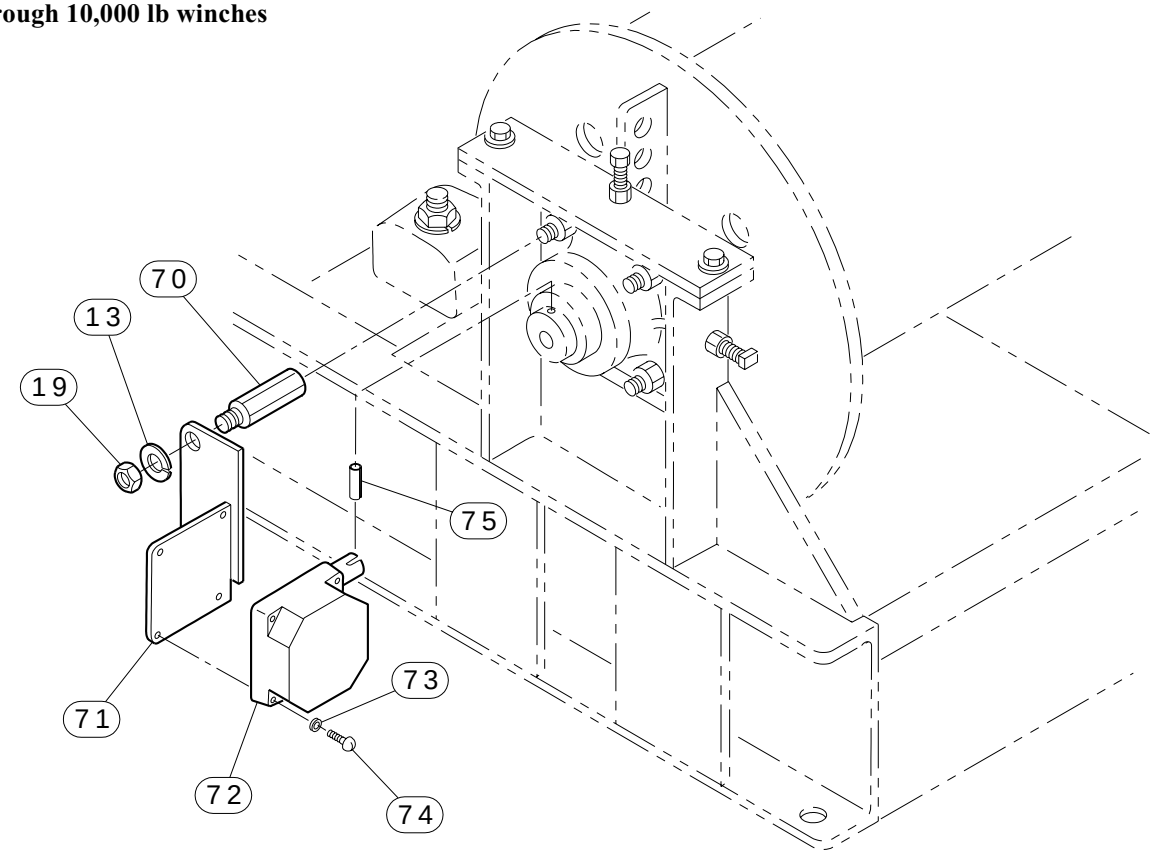
ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.		
			1600A90 and 1600B90	2000A60 and 2000B60	3500B80
27	Motor	1	Refer to Motor Chart		
33	Nameplate	1	71106967-R		
34	Drive Screw	4	50915		
35	Warning Label	1	71060529		
50	Frame	1	7473-12	11564-12	7566-*
51	Drum	1	21952	4632-12	2523-*
53	Nut	4	71059844		71125579
54	Lockwasher	4	51012		52837
55	Key	1	Not Sold Separately		
56	Capscrew	4	54232		71125561
57	Capscrew	4	54573		---
58	Bearing	1	50444		51743
59	Lockwasher	See ( )	50893 (4)		50181 (9)
60	Nut	See ( )	50894 (4)		50171 (9)
61	Flat Washer	4	54574		---
62	Shim Block	2	---		
63	Shaft	1	* *		7588
64	Key	2	19465-206		
65	Hub	1	2342		7589
66	Bushing	1	4625-12		4635-15
68	Drum Support	1	---		2143
69	Bearing Bracket	2	---		2270
76	Capscrew	5	---		50183

* Insert drum length in inches (distance between drum flanges). Refer to Model Code Explanation for drum options and lengths.

* * Shaft is supplied as part of the reducer assembly. Contact the factory for replacement parts information.

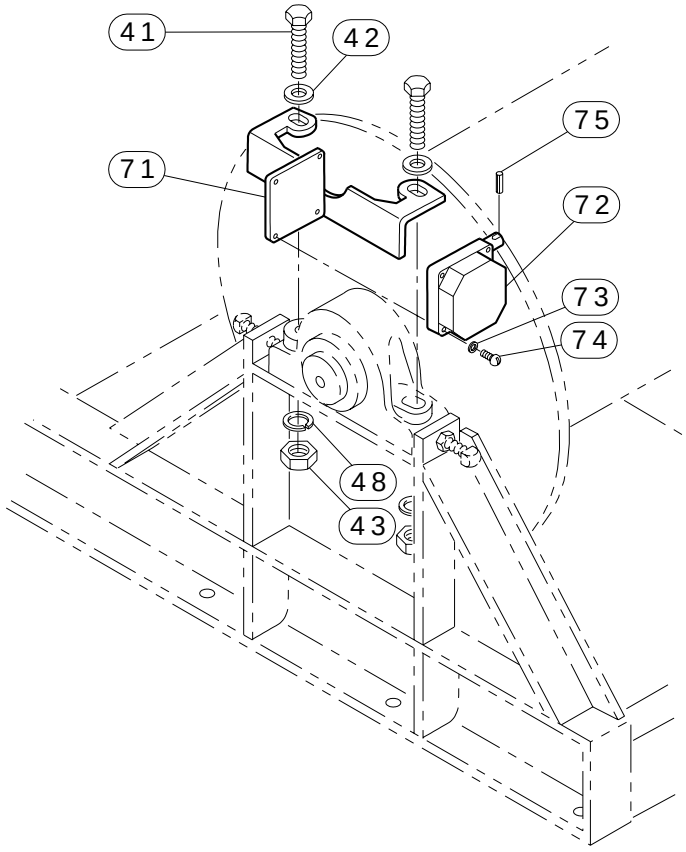
LIMIT SWITCH ASSEMBLY PARTS DRAWING (OPTIONAL FEATURE)

200 lb through 10,000 lb winches



(Dwg. MHP0263)

15,000 lb and 25,000 lb winches only



(Dwg. MHP0579)

LIMIT SWITCH ASSEMBLY PARTS LIST (OPTIONAL FEATURE)

All Limit Switch Assemblies shown provide a ratio of 120:1. Contact your local distributor or the factory for other ratios.

Direct Drive Winches

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.						
			200A40 200B40	250A20 250B20	700A40 700B40	800A20 800B20	1600B90	2000B60	3500B80
---	Limit Switch Assembly (incl's items 13, 19 and 70 thru 75)	1	19279				19262		Contact Factory
59	Lockwasher*	2	50200				50893		
60	Nut*	2	51982				50894		
70	Extension Stud	2	3654-1						
71	Bracket	1	3739-1				3739-2		
72	Limit Switch	1	4253						
73	Lockwasher	4	52909						
74	Screw	4	54108						
75	Pin	1	53907						

* Used in place of items 13 and 19.

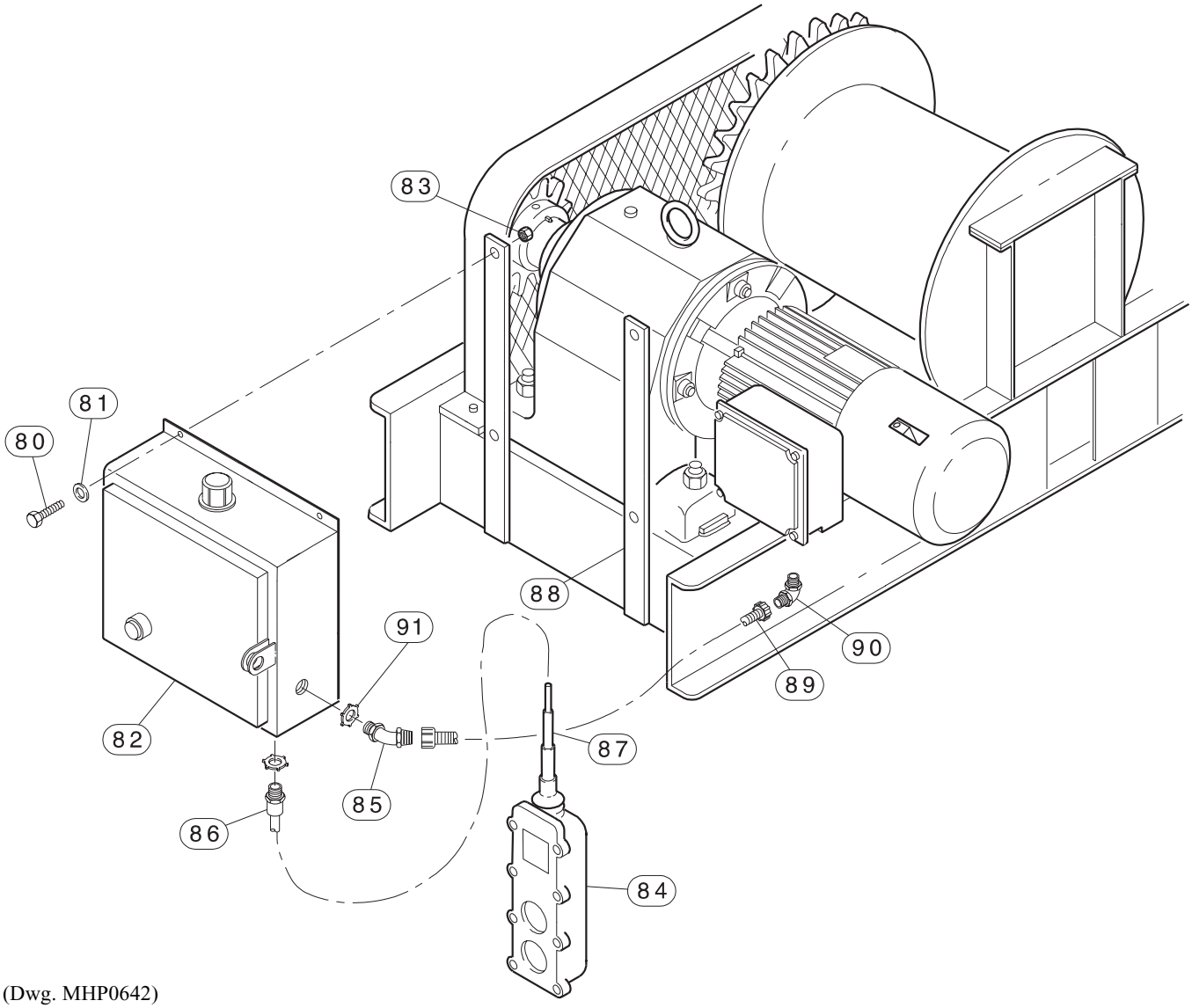
Chain Drive Winches

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.						
			1300A20 1300B20	1400*40	2000A20 2000B20	2000A40 2000B40	3000B40	4000A20 4000B20	4500B50
---	Limit Switch Assembly (incl's items 13, 19 and 70 thru 75)	1	19262				19917		
13	Lockwasher	2	51581				50181		
19	Nut	2	51982				52929		
70	Extension Stud	2	3654-1				3654-2		
71	Bracket	1	3739-2				3739-3		
72	Limit Switch	1	4253						
73	Lockwasher	4	52909						
74	Screw	4	54108						
75	Pin	1	53907						

Chain Drive Winches

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.					
			6000B20	6000B40	10000B20	10000B40	15000B20	25000B25
---	Limit Switch Assembly (incl's items 13, 19 and 70 thru 75)	1	16757		18663		Contact Factory	19275
13	Lockwasher	2	51008				---	
19	Nut	2	50913					
70	Extension Stud	2	3654-3					
71	Bracket	1	3739-4		3739-5		7303	
72	Limit Switch	1	4253					
73	Lockwasher	4	52909					
74	Screw	4	54108					
75	Pin	1	53907					

REMOTE CONTROL ASSEMBLY PARTS DRAWING AND LIST (OPTIONAL FEATURE)

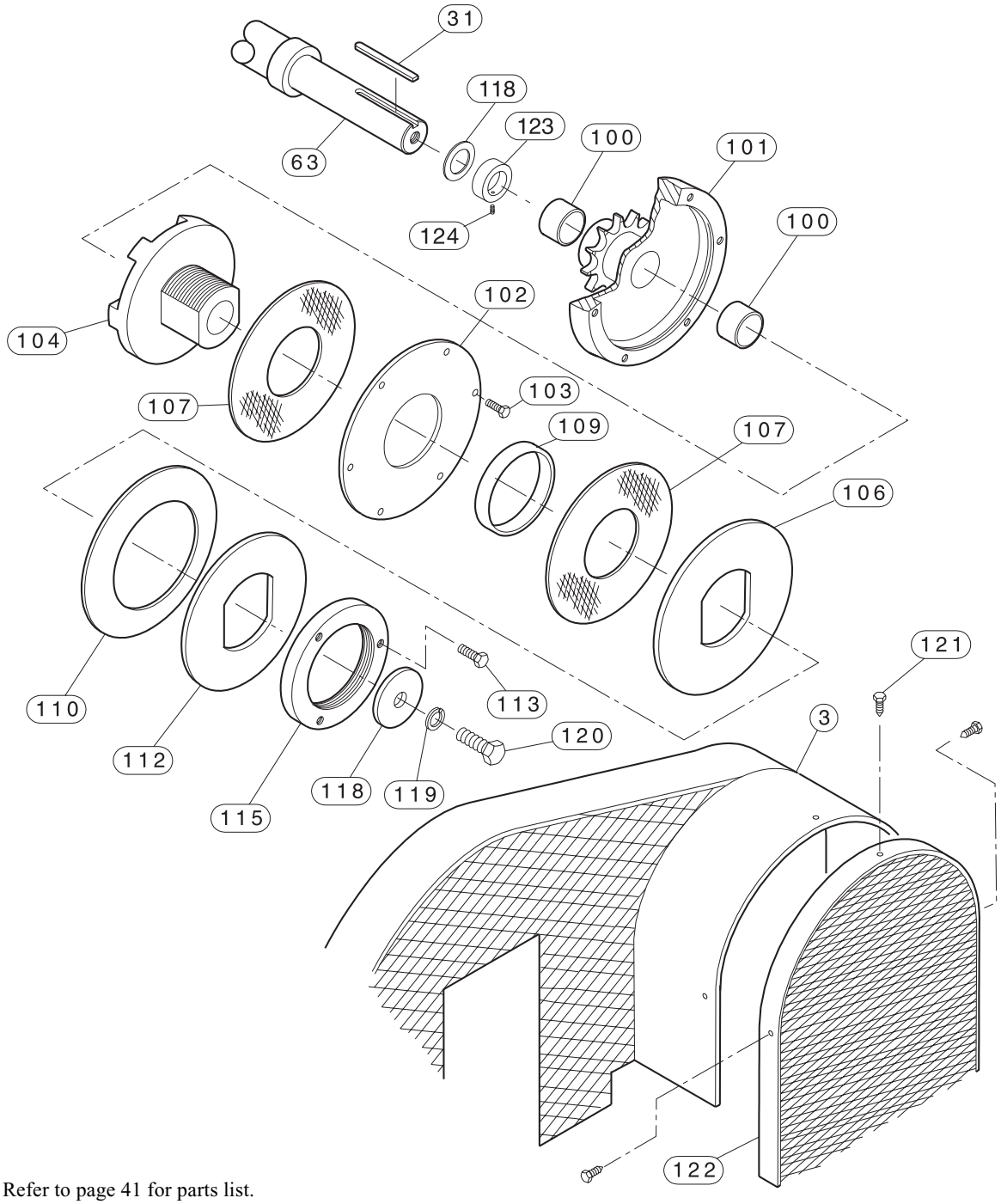


(Dwg. MHP0642)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO. (All Models)
80	Capscrew	4	52856
81	Lockwasher	4	51801
82	Starter Assembly	1	Refer to "Winch Controls" Section
83	Nut	4	53039
84	Remote Control	1	Refer to "Winch Controls" Section
85	Connector 45°	1	71149983
86	Connector	1	53816
87	Cord	Specify length in feet	71032312
88	Bracket	2	21336
89	Conduit	1	71113328
90	Connector 90°	1	53500
91	Locknut	1	71062954
92	Cable Reducer Fitting	1	71150122

TORQUE LIMITER ASSEMBLY PARTS DRAWING (OPTIONAL FEATURE)

1,300 lb to 4,500 lb winches

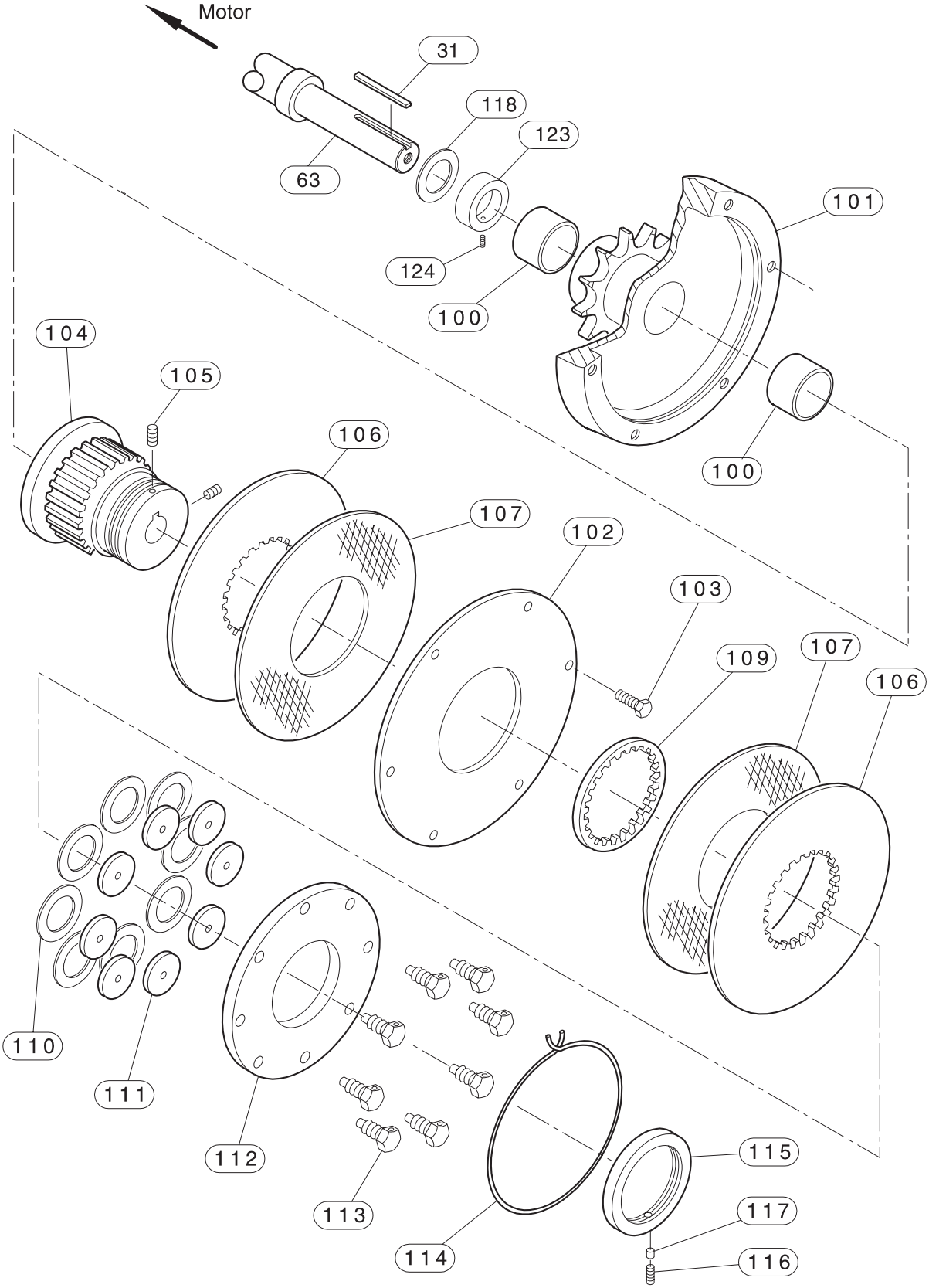


Refer to page 41 for parts list.

(Dwg. MHP0854)

TORQUE LIMITER ASSEMBLY PARTS DRAWING (OPTIONAL FEATURE)

6,000 lb to 25,000 lb winches



(Dwg. MHP0583)

TORQUE LIMITER ASSEMBLY PARTS LIST (OPTIONAL FEATURE)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.				
			1300A20, 1300B20,1400A40, 1400B40, 2000B20, 2000A40 and 2000B40	3000B40, 4000A20, 4000B20 and 45000B50	6000B20 and 6000B40	10000B20 and 10000B40	15000B20 and 25000B25
- - -	Torque Limiter Assembly (incl's items 100 thru 122)	1	50778	25196	Contact Factory	52220	Contact Factory
3	Guard	1	Refer to winch assembly Parts List				
31	Key	1		19866-375			
63	Shaft	1		23821		20001	
100	Bushing	2		50510	51242	52221	51295
101	Motor Sprocket	1		6029	6147	7941	11118
102	Clutch Plate	1	---	4433	6148		3366
103	Capscrew	6	---	50973			51086
104	Clutch Hub	1		See Note 1	108757		108920
105	Setscrew	2	---				
106	Driving Plate	2		See Note 1	108662		108856
107	Friction Plate	2			187715		187716
109	Bushing	1		See Note 1			151201
110	Spring	See ( )			145501 (8)	(16)	145475 (10)
111	Spring Plate	See ( )	---		106873 (8)	(8)	106799 (10)
112	Load Plate	1		See Note 1	108661		108853
113	Adjusting Bolt	See ( )	---		106884 (8)	(8)	106798 (10)
114	Wire	1	---		106903		106908
115	Nut	1		See Note 1	108660		108854
116	Setscrew	1	---		274505		274507
117	Plug	1	---		80613		80613
118	Washer	1	---	23822	3631-*		4408A
119	Lockwasher	1	---	50181	---		
120	Capscrew	1	---	51086	---		
121	Capscrew	3		53864			
122	Guard	1		24691			
123	Collar	1	---	1987			
124	Setscrew	1		52912		54092	

Torque Limiter option is not available on direct drive winches.

Note 1. Order complete Torque Limiter assembly part number 52023 if individual parts require replacement.

Note 2. Always check Torque Limiter components prior to ordering replacement parts.

Drawings MHP0583 and MHP0854 show typical Torque Limiter assemblies. Torque Limiters have occasionally been provided with minor variations to the typical assemblies.

Contact the factory for additional information if the Torque Limiter on your winch varies from the assemblies shown.

MOTOR AND REDUCER ASSEMBLY CHART

Direct Drive Winches (item 27)

Winch Model Number	Motor HP	Motor Mount Position	Reducer Gear Ratio	Amps at Full Load 460V 15 min Duty	115V Standard Single Phase	230V	460V	575V
						Three Phase (60 cycle unless noted)		
200A40	1/3	RA					---	
200B40	3/4	RA			---	54632 (230/460V)		
250A20	1/4	RA				---		
250B20	3/4	RA				52722(M)		
500A20	1/2	RA				---		
500B20	3/4	RA	102:1	1.7		52169		
500A40	3/4	RA	50:1		71060669 (Single Phase) (1)		---	
500B40	3/4	RA	50:1	2.33		54734	71263651	
700A40	1	RA			54050 (2)	---		
700B40	1	RA	50:1	3.0			51948	71262000
800A20	2	RA				---		
800B20	3/4	RA	102:1	2.33		54315	55002 71112577(M)	
1600A90	5	RA					---	
1600B90	5	RA	40:1	8.35		71125769 / 71113104(M)		
2000A60	5	RA			---	71062426 (Single Phase) (3)	---	
2000B60	5	RA	65.9:1	8.35		51860 / 71127419 (M)		71282826
3500B80	12	RA		20		71125553		

(1) Motor only (Leeson) requires reducer assembly 71060651 (2) Motor only (Baldor) requires reducer assembly 52764

(3) Motor only (Baldor) requires reducer assembly 71061956

Contact your nearest distributor or **Ingersoll-Rand** Material Handling Office for part number information.

Chain Drive Winches (item 26 - with Torque Limiter Option)

Winch Model Number	Motor HP	Motor Mount Position	Reducer Gear Ratio	Amps at Full Load 460V 15 min Duty	Amps at Full Load 460V Continuous Duty	230V	230V/460V	460V	575V
						Three Phase (60 cycle unless noted)			
1300B20	1	P	53:1	3.0	1.95				
1400B40	2	P	27:1	4.8	3.0			71050918	
2000B20	1.5	P	53:1	3.85	2.4				
2000B40	3	P	26.8:1	6.05	4.3				
3000B40	5	P	40:1	8.35	7.3	71287932(M)	71144281(M)		
4000B20	3	P	73.1:1	6.05	4.3				71044135(M)
4500B50	7.5	P	28.8:1	14.2	9.6				
6000B20	5	P	70:1	8.35	7.3				
6000B40	7.5	P	52:1	14.2	9.6		71110118(M)		
10000B20	7.5	P	99:1	14.2	9.6				
10000B40	15	P	40.6:1	25.5	18				
			48:1				71308951		
15000B20	12	P	103:1	20	15.8				
25000B25	20	P	95:1	34					
	25	P	80:1						

Unless otherwise specified motor and reducer assemblies are manufactured for **Ingersoll-Rand** by Eurodrive.

P = Motor mounted parallel to drum (M) Marine Option

Contact your nearest distributor or **Ingersoll-Rand** Material Handling Office for part number information.

MOTOR AND REDUCER ASSEMBLY CHART

Chain Drive Winches (item 26 - without Torque Limiter option)

Winch Model Number	Motor HP	Motor Mount Position	Reducer Gear Ratio	Amps at Full Load 460V 15 min Duty	Amps at Full Load 460V Continuous Duty	115V	230V	230V/460V	460V
						Single Phase (60 cycle)	Three Phase (60 cycle unless noted)		
1300A20	1	P	43:1			54050 (60 cycle) (1) (SP) 54048 (50 cycle) (1) (SP)		---	
1300B20	1	P	53:1	3.0	1.95		54873		51927
1400A40	2	P				71051825 (SP) (2)		---	
1400A40	2	RA	30:1			71051825			
1400B40	2	P	27:1	4.8	3.0		71080857 (M)	71127799 (M)	71050918 52510 (M)
2000A20	1.5	P	45:1			71037261 (115/230V) (SP)		---	
2000B20	1.5	P	53:1	3.85	2.4		52619	71112585 (M)	52342
2000A40	3	P	25:1				71043004 (SP)	---	
2000B40	3	P	26.8:1	6.05	4.3		51620		52422 71044283 (M)
3000A40	5	P					---		
3000B40	5	P	40:1	8.35	7.3		71044002 71044010 (M)	71311724 71144281 (M)	71044028 71044036 (M)
4000A20	3	P				71304125	71000970 (SP) (2)	---	
4000B20	3	P	73.1:1	6.05	4.3		71044085 71044093 (M)	71044119 (M)	71044101
		RA	85.6:1				53549		54958
		P	96:1						
4500B50	7.5	P	28.8:1	14.2	9.6	---	54968 71044176 (M)	52218 71111579 (M)	71044184 71044192 (M)
6000B20	5	P	70:1	8.35	7.3	---		54107 71037162 (M)	
6000B40	7.5	P	52:1	14.2	9.6	---	51983	71127823 71090559(M)	51327
10000B20	7.5	P	99:1	14.2	9.6	---		71288104 (M)	54999
10000B40	15	P	40.6:1	25.5	18	---	52977		53049
			48:1		---	---		71308951	
15000B20	12	P	103:1	20	15.8	---		54418 71110928 (M)	
22000B30	25	P	80.36:1	---	33	---			
25000B25	20	P	95:1	34	---	---		17453 71111587 (M)	71074199
	25	P	80:1			---	71054597		

Unless otherwise specified motor and reducer assemblies are manufactured for **Ingersoll-Rand** by Eurodrive

(SP) Single Phase Motor P = Motor mounted parallel to drum RA = Motor mounted at right angles to drum

(1) Motor only (Baldor) requires reducer assembly 54047 (2) Leeson motor

(M) Marine Option

Contact your nearest distributor or **Ingersoll-Rand** Material Handling Office for part number information.

MOTOR AND REDUCER ASSEMBLY CHART

Chain Drive Winches (item 26 - without Torque Limiter option)

Winch Model Number	Motor HP	Motor Mount Position	*Reducer Gear Ratio	Amps at Full Load 380V Continuous Duty	380V (50 cycle) Three Phase		Amps at Full Load 575V Continuous Duty	575V (60 cycle) Three Phase	
					Standard	Marine		Standard	Marine
1300A20	1	P	43:1		---				
1300B20	1	P	53:1	2.2			1.55		
1400A40	2	P			---				
1400B40	2	P	27:1	3.65	71084511	71109326	2.4		
2000A20	1.5	P	40:1		---				
2000B20	1.5	P	53:1	2.85	71109326		1.9		
2000A40	3	P	25:1		---				
2000B40	3	P	26.8:1	5.2			3.45	71079693	
3000A40	5	P			---				
3000B40	5	P	40:1	9.2	71044069	71044077	5.8	71044044	71044051
4000A20	3	P			---				
4000B20	3	P	73.1:1	5.2			3.45	71044127	71044135
		RA	85.6:1						
		P	96:1		71044143	71044150			
4500B50	7.5	P	28.8:1	11.6	71044226	71044234	7.7	71044200	71044218
6000B20	5	P	70:1	9.2	54482		5.8	54684	
			58:1		71300768				
6000B40	7.5	P	52:1	11.6			7.7	52013	
10000B20	7.5	P	99:1	11.6	71312995		7.7	71314801	
10000B40	15	P	40.6:1	22	71288112	71115406	14.5		
15000B20	12	P	103:1	19			12.6		
22000B30	25	P	95:1	39			26.5		

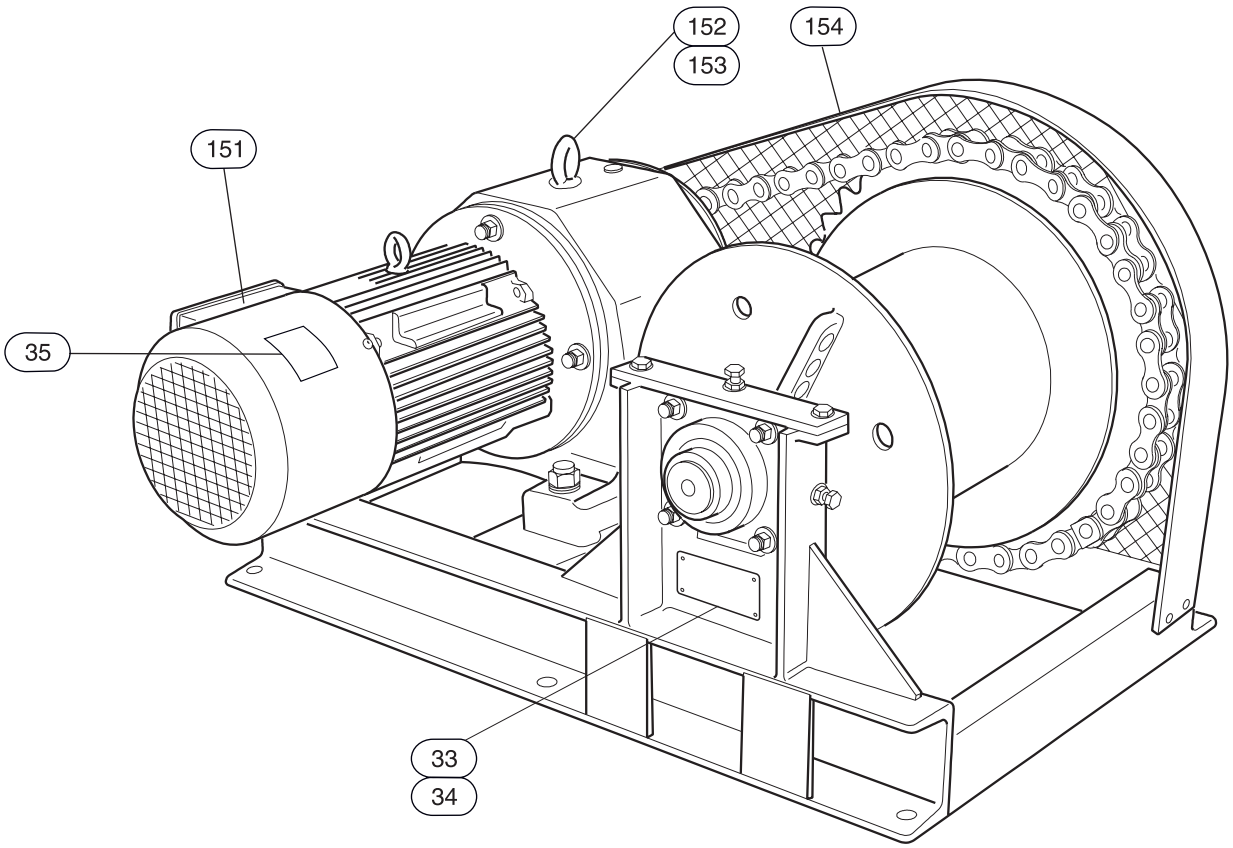
Unless otherwise specified motor and reducer assemblies are manufactured for **Ingersoll-Rand** by Eurodrive

* For 575V (60 cycle) only. Slightly modified ratios are used for 380V (50 cycle) motors

P = Motor mounted parallel to drum RA = Motor mounted at right angles to drum

Contact your nearest distributor or **Ingersoll-Rand** Material Handling Office for part number information.

LABELS AND TAGS PARTS DRAWING AND LIST



(Dwg. MHP0918)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY.	PART NO.	
			Models 1300A20 to 4500B50	Models 6000B20 to 25000B25
33	Nameplate	1	71106967-R	
34	Drive Screw	4	50915	
35	Warning Label	1	71060529	
151	Warning Label	1	71107130	
152	Caution Tag	1	71107148	
153	Notice Tag	1	71107155	
154	**Ingersoll-Rand** Logo Label	1	71106272	71109508

Refer to "Labels and Tags" section on page 5 for additional information.

WINCH CONTROLS AND WIRING COMPONENTS

Reversing Drum Switch	Part No.	Option
NEMA 1 (General Purpose)	50249*	D1
NEMA 4 (Watertight)	51626	D4

Push Button Control

A magnetic reversing starter is required for push button control.

Wall Mounted	Part No.	Option
NEMA 1 (General Purpose)	50235*	W1
NEMA 4 (Watertight)	71274427	W4
Hand Held Pendant		
NEMA 3R (Weatherproof)	70555	P1
NEMA 4 (Watertight) Duct-o-wire	52761	P4
NEMA 4X (Watertight) A-B	71274427	
Push Button Control Cord		
Per ft.	71032312	

Magnetic Reversing Starters

with internal 110V control transformer and overload relays installed.

	Motor Voltage	Part No.
115/230V Single Phase-NEMA 1	(General Purpose) (M1)	
1/4, 1/3 hp	115	71028088*
1/4 - 3/4 hp	230	71029243*
1/2 - 1 hp	115	71028088*
1 - 2 hp	230	71029243*
1-1/2 - 2 hp	115	52588*
3 hp	115	71063317*
	230	71029250*
5 hp	230	71029268*
230/460V Three Phase-NEMA 1	(General Purpose) (M1)	
1/4 - 1-1/2 hp	230	52596*
1/4 - 2 hp	460	52596*
2, 3 hp	230	51683*
3, 5 hp	460	
5, 7-1/2 hp	230	51356*
7-1/2, 10 hp	460	
10 hp	230	52592*
15 hp	230	52594*
	460	52593*
20 hp	230	52594*
	460	52593*
115/230V Single Phase-NEMA 4	(Watertight) (M4)	
1/4 to 3 hp	115	71063333
1/4 to 3 hp	230	71029292
5 hp	230	71029300

Magnetic Reversing Starters	Motor Voltage	Part No.
230/460V Three Phase-NEMA 4	(Watertight) (M4)	
3/4 - 1 hp	230	71274393
2 - 3 hp		71274419
5 - 7-1/2 hp		71274401
12 - 25 hp		24639
3/4 - 3 hp	460	71274393
5 - 7-1/2 hp		71274419
12 - 15 hp		71274401
25 hp		24639
380V Three Phase-NEMA 1	(General Purpose) (M1)	
3/4 - 2 hp	380	71080162*
3 - 5 hp		71080170*
7-1/2, 10 hp		71080188*
15 hp		71080196*
20 hp		71080204*
380V Three Phase-NEMA 4	(Watertight) (M4)	
3/4 - 2 hp	380	24759
3 - 5 hp		24760
7-1/2 - 15 hp		24761
25 hp		24639
575V Three Phase-NEMA 1	(General Purpose) (M1)	
1 - 3 hp	575	71080063*
5 hp		71080071*
7-1/2, 10 hp		71080089*
15 hp		71080097*
20 hp		71080105*
415V Three Phase-NEMA 4	(Watertight) (M4)	
3/4 - 2 hp	415	24759
3 - 5 hp		24760
7-1/2 - 15 hp		24761
25 hp		24639
575V Three Phase-NEMA 4	(Watertight) (M4)	
3/4 - 3 hp	575	24759
5 - 7-1/2 hp		24760
12 - 15 hp		24761
25 hp		24639

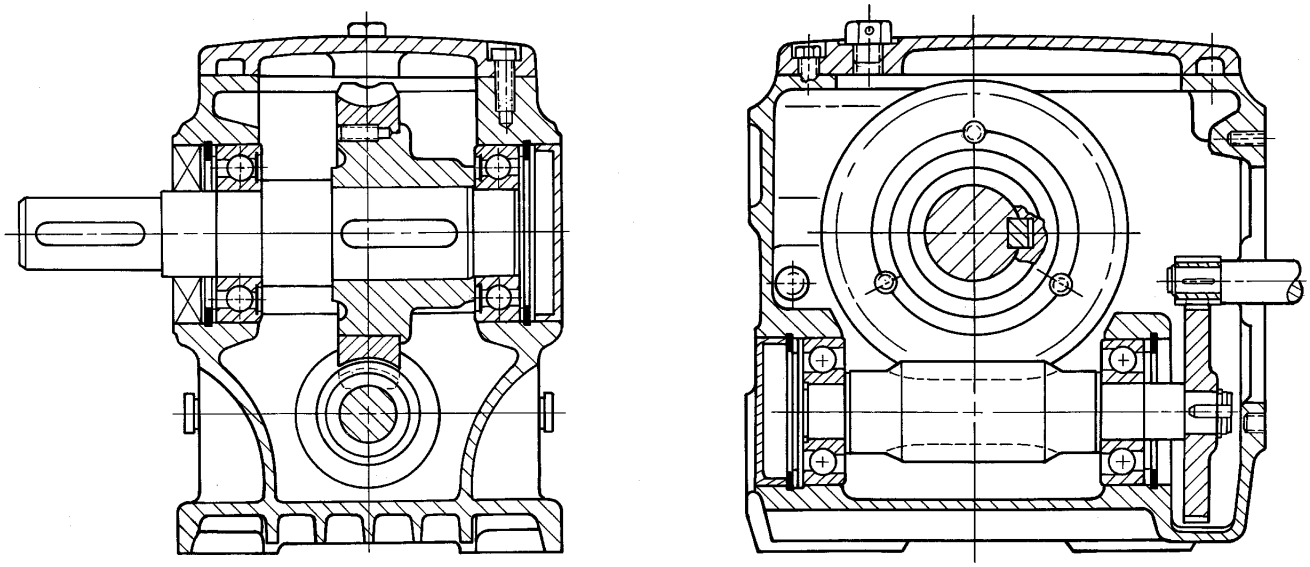
Transformer	71262125

* These Furnas components are no longer used in **Ingersoll-Rand** winches. They are physically larger and are therefore not interchangable with the new Allen-Bradley parts. Verify manufacturer prior to ordering replacement parts.
Use NEMA 4 equivalant parts or contact factory for additional information.

REDUCER ASSEMBLIES

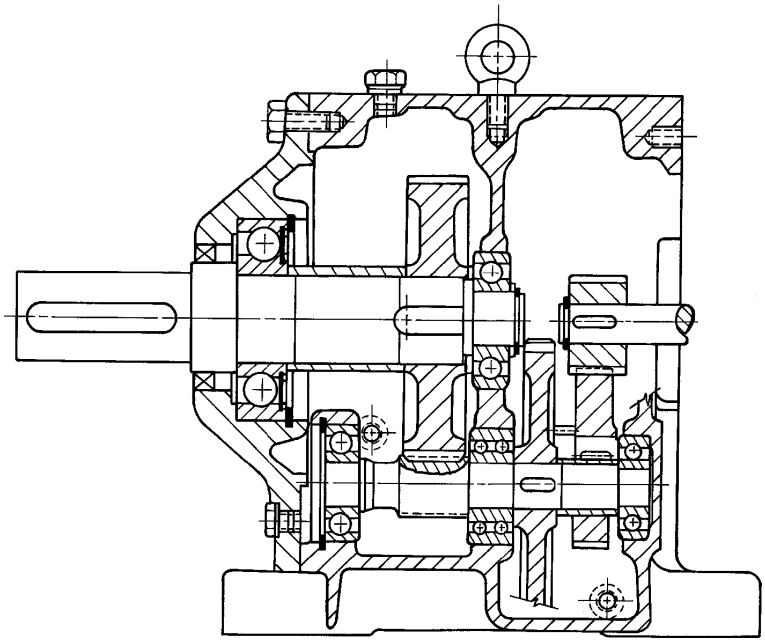
The following Reducer Assembly drawings are provided for reference only. The drawings are intended as a guide to the general internal construction of the Reducer assemblies. Check the nameplate attached to the motor for appropriate Reducer assembly type. A typical part number may be similar to R70DT90L4BMHR where the first letter represents the reducer type. For additional information and parts contact your nearest distributor or **Ingersoll-Rand** Material Handling Office.

'S' Type Reducer



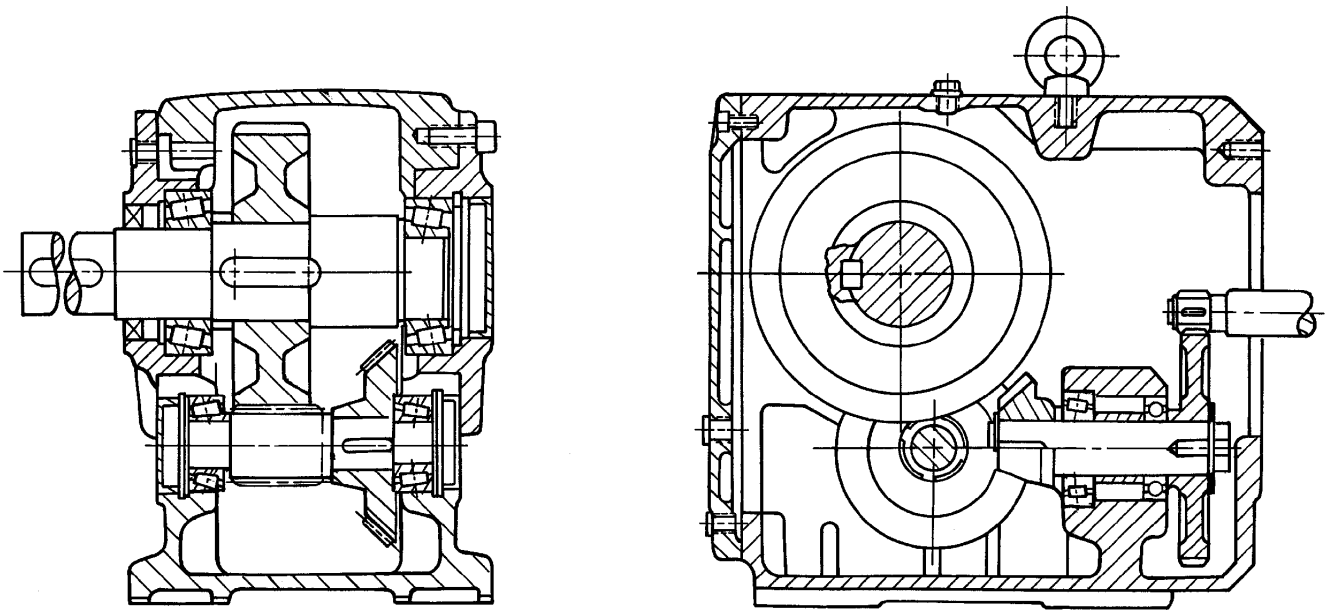
(Dwg. MHP0309)

'R' Type Reducer



(Dwg. MHP0288)

'K' Type Reducer



(Dwg. MHP0308)

BRAKE COIL AND BRAKE DISC PARTS LIST

Check nameplate attached to motor and reducer assembly for the correct voltage and motor frame size. Select replacement parts from the following chart. Parts are for current production Eurodrive BM series brakes. The last four letters of the motor nameplate for this series are BMHR.

	Volts	Motor Frame Size			
		71BM05 80BM1	**90BM2 100BM4**	**112-132S BM8**	**132M-160M BM15**
Brake Coils	220	543324X	5433681	5433908	5434122
	346	5433282	543372X	5433940	5434165
	440	5433304	5433746	5433967	5434181

Brake Disc	1818007	1820249	71063820	1832824

Brake Rectifier	Black 8253846	Black/Red 8253854

WIRING INFORMATION

Recommended Copper Wire and Transformer Size

HP	Single Phase Motors - 230 volts					
	Transformer	Distance Motor to Transformer in feet				
	KVA	100	150	200	300	500
1-1/2	3	10	8	8	6	4
2	3	10	8	8	6	4
3	5	8	8	6	4	2
5	7-1/2	6	4	4	2	0
7-1/2	10	6	4	3	1	0

For other voltages contact the factory or a licensed electrician.

HP	VOLTS	Three Phase Motors - 230 and 460 volts					
		Trans-former	Distance Motor to Transformer in feet				
		KVA	100	150	200	300	500
1-1/2	230	3	12	12	12	12	10
1-1/2	460	3	12	12	12	12	12
2	230	3	12	12	12	10	8
2	460	3	12	12	12	12	12
3	230	5	12	10	10	8	6
3	460	5	12	12	12	12	10
5	230	7-1/2	10	8	8	6	4
5	460	7-1/2	12	12	12	10	8
7-1/2	230	10	8	6	6	4	2
7-1/2	460	10	12	12	12	10	8
10	230	15	6	4	4	4	1
10	460	15	12	12	12	10	8
12-1/2	230	20	4	4	4	2	0
12-1/2	460	20	12	10	10	8	6
15	230	20	4	4	4	2	0
15	460	20	12	10	10	8	6
20	230	Consult Local Power Co.	4	2	2	1	0
20	460		10	8	8	6	4
25	230		2	2	2	0	0
25	460		8	8	6	6	4

ACCESSORIES

Description of Part	Part Number
Yellow Touch-Up Paint	FAP-237Y
Chain Lubricant	LUBRI-LINK-GREEN

PARTS ORDERING INFORMATION

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

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

The winch nameplate is located on the frame, below the bearing, on direct drive winches and below the bearing, on the chain side, on chain driven winches.

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

Winch Model Number _____

Winch Serial Number _____

Date Purchased _____

Motor and Reducer Model Number _____

Motor and Reducer Serial Number _____

Return Goods Policy
Ingersoll-Rand will not accept any returned goods for warranty or service work unless prior arrangements have been made and written authorization has been provided from the location where the goods were purchased.

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.
• Using other than genuine Ingersoll-Rand Material Handling parts may void the warranty.
• Ingersoll-Rand is not responsible for customer modification of winch for applications on which Ingersoll-Rand are not consulted.

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

For information on the distributor nearest you contact the **Ingersoll-Rand** Distribution Center at (615) 672-0321.

For additional information contact:

Ingersoll-Rand Material Handling
2724 Sixth Avenue South
Seattle, WA 98124 USA
Phone: (206) 624-0466
Fax: (206) 624-6265
or

Ingersoll-Rand Material Handling
Douai Operations
111, avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 3-27-93-08-08
Fax: (33) 3-27-93-08-00

NOTICE

• Mineral based oils are recyclable, however, some oils such as glycols may be extremely toxic and must be identified and disposed of at an approved waste or disposal site in accordance with all local, state and federal laws and regulations.

WARRANTY

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, Order Status and Technical Support

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

Regional Sales Offices

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

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

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

Los Angeles, CA
11909 E. Telegraph Road
Santa Fe Springs, CA 90670
Phone: (310) 948-4189
Fax: (310) 948-1828

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

International Office Locations

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

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

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

Regional Sales Offices

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

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

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

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

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

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

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

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

Printed in USA