

HOIST OPERATING AND MAINTENANCE **MANUAL**

This manual provides operating and maintenance information for the hoist serial number referenced on the cover. Reference the serial number of the hoist when ordering spare parts.

Warning: It is the responsibility of the user to maintain and use the hoist in a safe manner. Failure to do so can be dangerous and result in severe bodily injury, fatality or property damage. All use and maintenance shall conform to OSHA, ANSI, ASME, Local, State, Federal, Manufacturer and any other regulatory agency requirements. An inspection and maintenance log shall be kept and complied with.

Warranty

We warrant that our equipment is free from defect. Our liability is limited to the repair, or, at our option, supply of a replacement, f.o.b. our factory, of any parts which proved to be defective due to faulty material or workmanship within twelve months after shipment of the equipment from our factory at Clifton, New Jersey. Normal wear and the consequence of improper use or application are not covered by this warranty.

This warranty is expressly in lieu of any other express or implied warranties including any implied warranty of merchantability or fitness and or any other obligation on the part of the seller

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*Note: Information is included on these items only if applicable to this hoist.

Section I. Installation of Hoist

A. Mounting of Hoist

1. Hoists with Trolleys

Hoists with Trolleys are defined as hoists supplied within a frame with trolleys attached. Note the trolleys must be located as shown in the Outline Drawing supplied in this service manual.

This hoist has been designed to fit only the track designated on the customer's order to Electro Lift. This track size is noted on the Outline Drawing included in this manual. Do not attempt to install this hoist on any other size track. Contact Electro Lift if you find your track size is different than indicated on the Outline Drawing.

Your hoist has been shipped with the trolleys attached to the hoist frame with the proper size mounting bolts and nuts. The trolleys are correctly located according to the Outline Drawing to support the hoist load. The mounting bolts are sized also to support the hoist load and should not be replaced with any other fastener.

The hoist may be installed on the track in one of two manners:

a. At end of track:

Raise the hoist with trolleys attached to the height of the track. Slide trolley wheels horizontally into the track so the trolley wheels rest on the inside of the bottom track flange.

b. In the middle of the track:

Remove the trolley side plates at the point where the bolts join the bottom of the side plate to the trolley yoke. Note the trolley wheels will remain attached to the side plates. Raise the hoist and position the hoist under the track. Place the wheels inside the track flanges. Reattach the side plates to the trolley yokes. Note the trolley yokes are attached to the hoist with the Mounting Bolts.

2. Stationary Hoists without Trolleys

Stationary Hoists without Trolleys are defined as hoists within a frame without trolleys attached. They may also be overhead or floor mounted hoists supported without a frame on either brackets or steel base plates.

Refer to the Outline Drawing supplied in this manual for the number and size of mounting holes. The customer is responsible for determining and providing all attachment fasteners.

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B. Electrical

All Wiring must conform to National Electric Code Standards, in addition to any state and local requirements.

1. Requirements:

The voltage supplied to this hoist must match the specification on the customer's order to Electro Lift. If Electro Lift has supplied any controls on this hoist, a Wiring Diagram has been supplied in this service manual. The horsepower and full load amps are stamped on the hoist motor. If you suspect any problems with the electrical supply, have a qualified electrician conduct an evaluation.

2. Connection:

a. Hoists without circuit breakers:

At the closest upstream breaker box, disconnect power lines L1, L2, and L3. Attach L1, L2, and L3 to the corresponding terminal strips located in the control box. Reattach L1, L2 and L3 in the breaker box. This sequence must be followed to ensure a safe installation.

b. Hoists with Trolleys:

Electrification for Hoists with trolleys is supplied through either festooning or a collector electrification system. Note that Electro Lift can provide mounting for the bottom entry collectors.

c. Stationary Hoists:

Stationary Hoists can be wired with multi-conductor electrical cable or individual wire within conduit.

3. Testing Electrical Connections for Correct Directional Control:

First identify your type of motor from one of the three types listed below. This information can be found stamped on the side of the motor. Proceed as indicated to test for proper electrical connection

a. 3-Phase AC Motor:

Push the DOWN button on the push button station. The hook block should move down and the wire rope unwrap from the drum. Push the UP button and the hook block should move up and the wire rope wrap around the grooving in the drum. If the hoist moves in the wrong direction shut off incoming power to the hoist. Switch any (2) of the incoming power lines, L1, L2, or L3.

b. Single-Phase AC Motor:

Test to see if the hoist moves up or down when pressing the corresponding buttons on the push button station. If the hoist moves in the wrong direction shut off incoming power to the hoist. Switch wires connected to terminals 5 and 8 in the control box.

c. DC Motor:

Test to see if the hoist moves up or down when pressing the corresponding buttons on the push button station. If the hoist moves in the wrong direction shut off incoming power to the hoist. Switch the two wires at the main power connection or the two wires at the motor terminal box.

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C. Wire Rope Dead Ending

1. One Part Single Reeved Hoists:
Hoists reeved single-line do not require the wire rope to be dead-ended.
2. Hoists with Frames:
Hoists provided from Electro Lift within a frame with hook block(s) are dead-ended at our factory. The forged wire rope clips at the dead-ending must be re-tightened to the recommended torque as shown in Table 1, Forged Clip Information Table.
3. OverHead or FloorMounted Hoists (supported on brackets or a single plate):
These hoists are not provided within a steel frame and therefore the wire rope cannot be dead-ended by our factory.

The following must be performed after these hoists have been secured in their fixed location.

Wire Rope: Important: The Wire Rope must be secured to the dead ending of the system in the field. The length of the wire rope must be trimmed when the hoist is in the full “UP” position, the drums are completely filled with cable, and there is no over-wrapping. If the drum grooves are not filled to the greatest capacity with cable, the wire rope angle created may result in an unsafe condition. It is pertinent this procedure is precisely followed.

To dead end the wire rope:

First review Table 1: Forged Clip Information on the next page. Your hoist has been shipped with a Clamp and Thimble Kit. It will have the proper size and number of clamps for your hoist’s dead-ending and the correct size thimbles as well. Identify your wire rope size and match it to the clip size the table

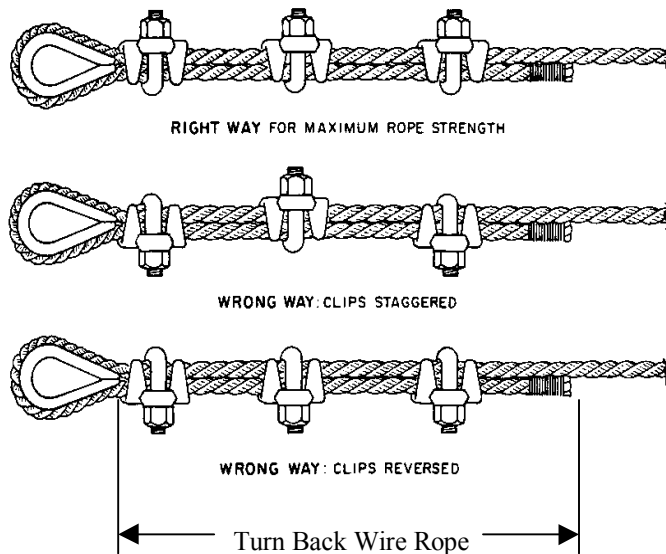
- a. Insert the proper sized thimble at the dead-ending location. Turn back the specified amount of rope from the thimble or loop. Reference Table 1 on the next page to determine the amount of wire rope to turn back. Apply the first forged clip one base width from the dead end of the rope. Apply U-Bolt over the dead end of wire rope. The live end will rest in the saddle of the U-Bolt. Tighten all nuts evenly; alternate from one nut to the other until reaching the recommended torque.
- b. Apply the second clip as near to the loop or thimble as possible. Tighten all nuts evenly, alternating until the recommended torque.
- c. Apply the third clip (if applicable) spaced evenly between the first and the second clip. Take up rope slack & tighten all nuts evenly, alternating until the recommended torque.

Section I

Table 1: Forged Clip Information

Clip Size (inches)	Minimum No. of Clips	Amount of Wire Rope To turn back (inches)	Torque (ft./lbs.)
1/4	2	4-3/4	15
5/16	2	5-1/4	30
3/8	2	6-1/2	45
7/16	2	7	65
1/2	3	11-1/2	65
9/16	3	12	95
5/8	3	12	95
3/4	4	18	130
7/8	4	19	225
1	5	26	225

- d. Note: Below is a typical depiction of cable clip configuration and the number of clips may or may not be correct for this hoist. Hoists with greater or smaller cable diameters may require more or less clips.



Section I

D. Paddle Limit Switches:

The Paddle Limit Switch is considered standard equipment on all Electro Lift Hoists. This switch prevents the hoist from lifting the load up too far. It is set to activate after achieving a preset degree of rotation. Instructions to adjust the point of activation are included in this section. Twin Hook Hoists can be supplied with either (1) or (2) paddle limit switches.

How the Switches Work:

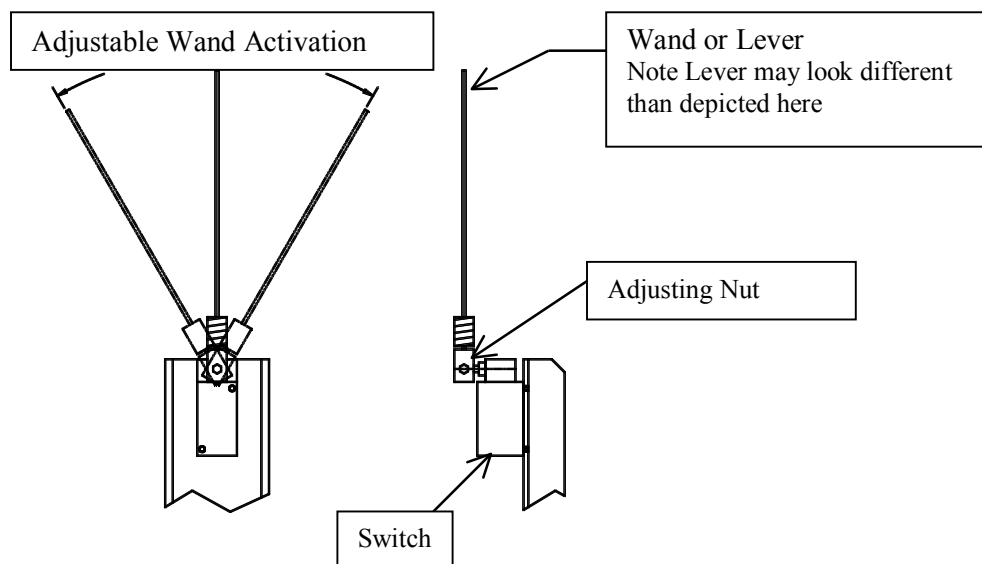
Most hoists are fitted with hook block(s). The wire rope pays off the drum down to the hook block(s) that is attached to the load. When the load is raised to its highest point, the hook block will hit the paddle limit switch lever and activate the switch. The hoist will then stop.

1. Hoists with Frames:

The paddle limit switch on hoists within steel frames are set at the factory and no further attention is required at installation

2. OverHead or FloorMounted Hoists:

A paddle limit switch will be provided with your hoist unless otherwise indicated on your order. The switch must be located and mounted at installation to prevent the load from ascending too far. The Limit Switches are adjustable; the point where the switch is activated may be set and altered as necessary. There is an adjusting nut perpendicular to the rotating axis of the wand. Loosen this nut and rotate the wand to find the desired point of actuation. A “click” will be felt where the switch will stop the hoist from moving. Tighten the nut to lock this position.



If the paddle limit switch has been activated, the hoist will stop. Press the DOWN button on the push button station to lower the hook block or load. During this descent, the wand or lever will resume its normal position and the switch will automatically reset. No further action is required and normal operation may continue.

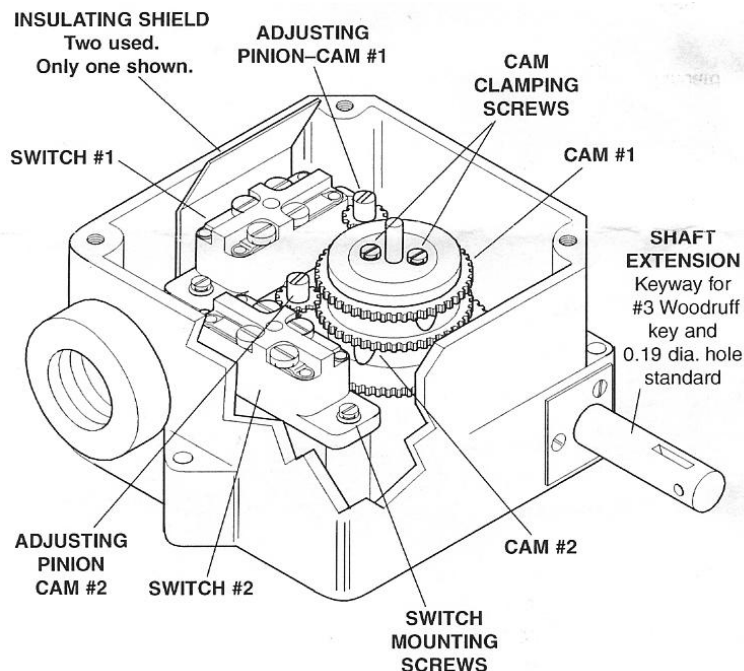
Section I

F. Geared Limit Switch

Refer to the Outline Drawing in this manual to determine if a Geared Limit Switch has been provided with this hoist. Geared Limit Switches are factory set, but may need adjustment at installation. When the switch is set at its lowest level, the drum MUST have at LEAST 2 turns of wire rope on the drum from the cable's anchoring hole. Hot Metal Applications must have 3 turns of wire rope on the drum. The following instructions apply to Gleason Geared Limit Switches only. Other Manufacturer's geared limit switches have different instructions

How to set a Gleason Geared Limit Switch

1. On most hoists there are (2) positions to be set, Maximum Up Level and Furthest Down Level. This is called a (2) element switch
2. Move the hoist to the Furthest Down Level
3. Turn the Power to the hoist OFF at the push button station
4. Remove the enclosure cover.
5. Loosen the two Cam Clamping Screws $\frac{1}{2}$ turn each. The Cam Clamping Screws are on top of the cam assembly at the center of the switch.
6. Identify adjusting pinion #1 as noted on the inside cover of the switch. This is the pinion that corresponds to Furthest Down Level.
7. Depress the pinion with a screwdriver and rotate it so the gears mesh with the cam assembly, and the cam assembly continues to rotate in same direction as it did when the hoist position was determined. Note that if the pinion is rotated in the wrong direction, the stopping position may be off and need re-adjustment.
8. Note the white marker on the gear teeth is directly over the cam lobe that trips the switch. Rotate the pinion until the switch trips. A click will be heard and felt. The adjustment is now complete.
9. Retighten the (2) clamping screw at the center of the switch
10. Test the hoist to see if the hoist stops in the desired location. Re-adjust if necessary.
11. Next raise the hoist to the Maximum Up Level and adjust pinion #2 the same way.
12. Replace the cover when done.



Section I

G. Power Paddle Limit Switch

You hoist may have been provided with a Power Paddle Limit Switch instead of a standard Paddle Limit Switch. Power Paddle Limit Switches are line-voltage operated and typically an option for hoists in a frame. They are set at the factory to prevent the hook block from ascending too far up.

If the power paddle is activated, the hoist will stop and the following procedure must be followed:

1. Shut off the incoming power to the hoist.
2. Jumper both legs from inside the power paddle housing.
3. Turn on the incoming power to the hoist.
4. Press the DOWN button on the push button station so the Hook Block descends. Keep pressing the DOWN button until the lever arm on the power paddle is free.
5. Shut off the incoming power to the hoist.
6. Remove the jumper wires.
7. Turn on the incoming power to the hoist and resume normal operation.

H. Other Switches:

Slack Cable Limit Switches and Overload Switches are also optional switches that may be on your hoist. They are typically factory set and do not need to be re-adjusted at installation.

Section II

Operation of Hoist

Electro Lift, Inc. recommends following the guidelines listed in Section II to properly operate your hoist. These items are only a guide presented by Electro Lift. The Hoist Operator MUST be instructed in the safe and proper operation of hoists and should cross-reference ANSI B30.16-1998, OSHA 1910.179, and the Hoist Operator's Manual published by the Hoist Manufacturers Institute. The Hoist Operator must follow comply with all OSHA, ANSI, ASME, local, state, federal, and any other regulatory agency requirements. Please review the following Safe Hoisting Practices before using any Electro Lift Hoist. These practices MUST be employed during operation of the hoist.

A. Safe Hoist Practices

Hand operated and electric hoists and trolleys of all types are designed with the safety of the operating personnel first in mind. Your own safety and that of your fellow workers will be assured when overhead materials handling equipment is used as recommended by the manufacturer. Disregarding such recommendations endangers life and property. Following are the basic safety rules worthy of your careful consideration and attention.

1. *Do not load beyond the rated capacity.*
2. *Do not use any overhead materials handling equipment for personnel.*
3. *Conduct a periodic visual inspection for signs of damage or wear.* Particular attention should be paid to the cable and hook. If the cable shows signs of wear or damage, or if the hook is distorted or opened, call this to the attention of the safety engineers before loading the hoist.
4. *Do not use hoisting cables as a substitute for slings -- Use slings only.* Cable or chain slings should be of proper size and type for load handling -- never use slings showing physical damage of any degree.
5. *Whenever the hoist is lowered in such a manner as to take the load off the wire rope, the operator should determine, before again making a lift, if the wire rope is properly reeved, on the drum.*
6. *Stand Clear of all loads* – If you must travel a load over the heads of other personnel, give ample warning of your intention before you move.
7. *Always “inch” the hoist into the load.* Running into the load at full hoist speed imposes excessive overloads on the hoist and could result in failure of parts and/or supporting structures. This is particularly true with high hoisting speeds.
8. *Limit Switches are for emergency use only and should not be tripped during normal operation.* If it is necessary to travel to the limit, use extreme caution and approach the limit in slow speed or by “inching.” Do not leave the hook block in contact with the limit switch at the end of the hoist operation.
9. *Be sure the hoist raises and lowers properly when the corresponding push buttons or control ropes are operated.* A reversal of direction indicates a phase reversal in the current conductor, the reversal of the rope on the drum, or an interchange of wires on a push button – any of which would cause the limit switch to be inoperative. Do not under any circumstances operate the equipment until the trouble has been found and corrected.
10. *Center the hoist over the load before lifting.* Do not side-pull or end-pull.
11. *Know the hand signals for hoisting, cross travel, and crane travel if working with cab operated hoists or cranes.* Operators should accept the signals of only those persons authorized to give them.

Section II

12. *Do not leave the load suspended in the air unattended.*
13. *Do not jog controls unnecessarily.* Hoist motors are general high torque, high slip types. Each start causes an inrush of current greater than the running current and leads to overheating and heat failure, or burn-out, if continues to excess.

B. Push Button Station

The hoist's motions are controlled at the push button station. Push Button Stations are configured specific to your hoist. There are always hoist UP and DOWN buttons. Other options can include:

1. ON and OFF buttons
2. FORWARD and REVERSE buttons for Trolleys and/or Bridges
3. Emergency STOP Buttons
4. Key-lock Switches.
5. START/STOP for Maintained Push Button Stations Only.

Refer to the Wiring Diagram in this manual to determine the particular configuration for you hoist.

Electro Lift hoists are provided with “momentary” push buttons for motion control. The buttons must be pressed in and held down to continue hoist motion.

Refer to the Wiring Diagram in this manual to determine the particular configuration for you hoist.

This is a sample Push Button Station.

The Push Button Station on your hoist may look different.



Section III.

Maintenance of Hoists

Electro Lift, Inc. recommends following the guidelines listed in Section III to properly maintain your hoist. These items are only a guide presented by Electro Lift. The end-user should cross-reference ANSI B30.16-1998 and OSHA 1910.179. and must comply with all OSHA, ANSI, ASME, local, state, federal and any other regulatory agency requirements. General service and maintenance must be done by qualified person(s) in accordance to ANSI B30.16-1998. Maintenance logs must be kept and all updated mandatory standards supercede the following information.

A. **Gear Cases, Hoist & Trolley:**

The Gear Case is filled with the correct amount of oil at the factory.

1. Lubrication

- a. Type: Electro Lift has used MOBIL SHC 634 Synthetic, Electro Lift Part No. DM7381. Only this type oil, or an equivalent, must be used.
DO NOT use and Extreme Pressure (EP) oil. EP oils will damage the bronze worm wheel and create an unsafe condition.
- b. The oil does need to be replaced after 5000 hours of operation or once per year, whichever occurs first.
- c. Initial Volume: The initial volume of gear case oil, as supplied from our factory, is indicated in the note section of Section VII of this manual.
- d. For further gearbox information, see the attached documentation in Sections VII.

Section III

B. Lubrication:

Reference Table 2: Lubrication Chart on the next page for appropriate lubricants

1. BALL BEARINGS: These are lubricated for life and require no further maintenance. These bearings are located at:
 - a. End(s) of drum shaft
 - b. Trolley Wheels
2. HOOK BLOCKS:
 - a. Bearings pressed in Hook Blocks are pre-lubricated
 - b. If your Hook block has a grease fitting (i.e. high capacity hoists), pump with general-purpose grease whenever regular maintenance is performed.
3. INNER SHAFT SUPPORT BEARINGS and MISCELLANEOUS GREASE FITTINGS:
 - a. If your hoist has inner shaft support bearings, (located between gear reducer and cable drums) or parts with Grease Fittings, pump with general-purpose grease whenever regular maintenance is performed.

Table 2: Lubrication Chart

Part	Lubricant	Quantity
Hoist Gear Cases: Side Driven Trolleys	Electro Lift Part No. DM7381 Exxon Cyclesstic TK680 Oil or equivalent DM7146 Note: Do not use Extreme Pressure Lubricants; these will damage the bronze worm wheel and create an unsafe condition.	for Trolley, Type "L" & "M": 8 oz
Wire Rope	Exxon Surett Fluid	As required

Section III

C. INSPECTIONS:

The following parts should be inspected in intervals according to the service duty of the hoist. Refer to Table 3: Hoist Duty Service Classification to first determine the class of the hoist. Worn parts must be replaced as needed. Contact Electro Lift for a recommended spare parts list and keep on hand spare parts for heavily used hoists. Provide the serial number of your hoist when contacting Electro Lift to ensure you receive the proper components.

- H-3, Standard Service - Conduct Inspections: Monthly
- H-4, Heavy Service: - Conduct Inspections: Weekly
- H-5, Sever Service: - Conduct Inspections: Daily

Table 3: Hoist Duty Service Classification

Hoist Class	Service Class	Typical Areas of Application
H1	Infrequent or Standby	Powerhouses and utilities, infrequent handling. Hoists used primarily to install & service heavy equipment, where loads frequently approach hoist capacity, with infrequent and widely scattered periods of utilization
H2	Light	Light machine shop and fabrication industries; service and maintenance work, where loads and utilization are randomly distributed with capacity loads infrequently handled, and where total running time of equipment does not exceed 10-15% of the work period.
H3	Standard	General machine shop, fabrication, assembly, storage and warehousing, where loads and utilization are randomly distributed, with total running time of equipment not exceeding 15-25% of the work period.
H4	Heavy	High volume handling in steel warehousing, machine shops, fabrication plants, mills, and foundries. Manual or automatic cycling operations in heat treating and plating operations. Total running time of equipment normally approaches 25-50% of work period, with loads at or near rated capacity frequently handled.
H5	Severe	Bulk handling of material in combination with buckets, magnets, or other heavy attachments, equipment often cab operated. Duty cycles approaching continuous operation are frequently necessary. User must specify exact details of operation, including weight of attachments.

Section III

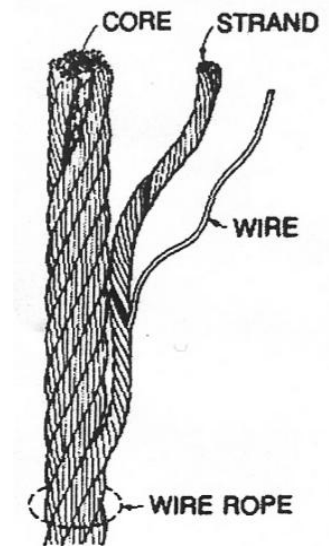
1. WIRE ROPE:

a. Wire Rope Inspection:

Check for any damaged, rusted, and broken strands in accordance to the information that follows. Damaged wire rope reduces the load capacity of the hoist and must be replaced as soon as possible. Wire rope must be purchased from Electro Lift to ensure the proper size and type is used on your hoist. Although typically Electro Lift can promptly ship wire rope from our stock, we recommend you keep a supply for immediate availability when required. Electro Lift is not responsible for, nor will our warranty cover, failed components not provided by Electro Lift.

Check for the following:

- (1) Rope Distortion such as kinking, crushing, unstranding, birdcaging, main strand displacement, or core protrusion.
- (2) General corrosion.
- (3) Broken or cut strands.
- (4) Number, distribution, and type of visible broken or cut wires.
- (5) Reduction of rope diameter due to loss of core support, internal or external corrosion, or wear of outer wires.
- (6) Damage from heat.
- (7) Corroded or broken wire at end connections.
- (8) Corroded, cracked, bent, worn, damaged, or improperly applied end connections.
- (9) Wire rope pulls through of end connection.
- (10) Tightening of clamping-type end connections. Checking torque of bolts of end connections for clamps that recommended a specified torque on the clamp bolts.
- (11) Rope lubrication. (Rope lubrication will extend the service life of the wire rope).



During wire rope inspection, special attention should be directed to sections of rope subject to rapid deterioration such as the following:

- Rope sections in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited.
- Rope sections at or near terminal ends where corroded or broken wires may protrude.
- Rope sections subject to reverse bends
- Rope sections that are normally hidden during visual inspection, such as sections passing over sheave.

Rope conditions found during the inspection should be recorded in a written report. Amount and type of rope deterioration from one inspection report until the next inspection report should be evaluated for determination if rope replacement is required.

Section III

- b. Wire Rope Replacement: Rope conditions found during an inspection, in addition to review of previous inspection reports, should be the basis for determination as to whether that hoist use should be discontinued and rope replacement is required. Rope conditions requiring replacement of the rope include the following:
 - (1) One broken strand.
 - (2) Twelve randomly distributed broken wires in one rope lay.
 - (3) Four broken wires in one strand in one rope lay.
 - (4) One outer wire broken at the contact point with the core of the rope that has worked its way out of the rope structure and protrudes or loops out from the rope structure.
 - (5) Wear of one-third of the original diameter of outside individual wires.
 - (6) Kinking, crushing, unstranding, birdcaging, main strand displacement, core protrusion, or any other damage resulting in deformation or distortion of the rope structure.
 - (7) Evidence of heat damage from any cause.
 - (8) Corroded or two broken wires at a socketed or swaged end fitting.
 - (9) Corroded, cracked, bent, damaged, or worn end fitting.
 - (10) Reduction of rope nominal diameter greater than:
 - 1/64 inch (0.4mm) for rope diameters up to and including 5/16 inch (8 mm)
 - 1/32 inch (0.8 mm) for rope diameters over 5/16 inch up to and including 1/2 inch (13 mm).
 - 3/64 inch (1.2mm) for rope diameters over 1/2 inch up to and including 3/4 inch (19 mm).
 - 1/16 inch (1.6mm) for rope diameters over 3/4 inch up to and including 1-1/8 inch (29mm).
 - 3/32 inch (2.4 mm) for rope diameters over 1-1/8 inch up to and including 1-1/2 inch (38 mm).
- 2. WIRE ROPE CLIPS & THIMBLE:
 - a. All clip nuts must be present and tightened to proper torque.
 - b. Thimble must be in place.
- 3. LIMIT SWITCHES
 - a. Check all limit and gear switches for proper function.
- 4. BRAKE:
 - a. Check for proper operation & air gap adjustment.
 - b. Check internal parts (linings, armature plate, coils, etc.).
 - c. Note as the brake linings wear, the hoist will not stop as quickly as when it was new. Adjust the brake according to additional Brake information supplied in this manual.
- 5. HOOK AND HOOK LATCH:
 - a. Check hook for surface cracks or damage.
 - b. Hook latch must be in place and function normally.
- 6. SHEAVES (HOOK BLOCK AND HOIST FRAME):
 - a. Check for uneven wear.
- 7. DRUMS:
 - a. Check for damage or excessive wear.

Section III

8. GEAR CASE:
 - a. Inspect around gear case for oil leakage.
 - b. Check oil seals, check for proper amount of lubricant. Refer to Part A of this Section for instructions on how to check the oil level.
9. TROLLEYS:
 - a. Check Trolley Wheels, Suspension Bolts, and the (2) hex nuts under each side of the frame. Ensure that the cotter pin is located through these hex nuts.
10. PUSH BUTTON STATION:
 - a. Check for proper operation.
 - b. Check function labels for legibility.
 - c. Check push button cable for damage.
11. CONTACTORS:
 - a. Check the contact elements for damage.
 - b. Check coils for fast/smooth operation.
12. CAPACITY LABELS:
 - a. All capacity markings must be present and legible.
13. OVERALL:
 - a. Check all screws/bolts for tightness.

Section III

D. HOW TO CHANGE THE WIRE ROPE CABLE.

1. Remove any load from the hoist. Note the path of the cable, especially on Hoists reeved 4 Part Single
2. Remove cable where anchored, and remove the hook block.
3. Rotate the drum until the cable is completely removed from the drum and the cable clip is visible through a hole in the drum guard.
4. Seize the cable clip and pull the cable in through the drum until only several feet of cable extend from inside the drum.
5. Butt the end of new cable against old cable and cover this joint with cloth electric tape or equivalent substitute.
6. Ease the cable through the drum until several feet of new cable extend from the outboard end.
7. Fold over last four (4) inches of cable and apply the cable clip. Keep clip as close to the end as possible.
 - a. Malleable clips are used only for anchoring cable in drum.
 - b. Malleable clips are not intended to be load bearing.
 - c. Malleable clips have a smooth silver metallic appearance; forged clips have a dull gray color with a red "U" bolt.
 - d. Malleable clips are to be torqued to values less than indicated on the following table:

MALLEABLE CLIPS TORQUE CHART

<u>Cable Size</u>	<u>Torque to less than:</u>
1/4 "	15 Ft-Lbs.
5/16"	15 Ft-Lbs.
3/8 "	30 Ft-Lbs.
7/16"	40 Ft-Lbs.
1/2"	45 Ft-Lbs.
9/16"	50 Ft-Lbs.

8. Pull the cable back through the drum until the clip is firmly seated in the outboard hub of the drum. The Cable and clip should not extend beyond end of drum and strike drum guard.
9. Wind the cable on the drum. Make sure the first two wraps are tight.
10. Reeve the cables around the sheaves and anchor at the dead ending. Relieve all twist from the cable before anchoring.
 - a. NOTE: Forged clips must be used in all wire rope terminations that are load bearing.
11. Turn back the specified amount of rope from the thimble or loop. Apply the first forged clip one base width from the dead end of the rope. Apply U-Bolt over the dead end of wire rope. The live end will rest in the saddle of the U-Bolt. Tighten all nuts evenly; alternate from one nut to the other until reaching the recommended torque as noted in Table 1: Forge Clip Information on the next page.
12. Apply the second clip as near to the loop or thimble as possible. Tighten all nuts evenly, alternating until the recommended torque.
13. Apply the third clip (if applicable) spaced evenly between the first and the second clip. Take up rope slack & tighten all nuts evenly, alternating until the recommended torque.
14. If the old cable is broken and it is impossible to butt the new cable against it, install cable from the outboard end of drum, using this same principle as described above.

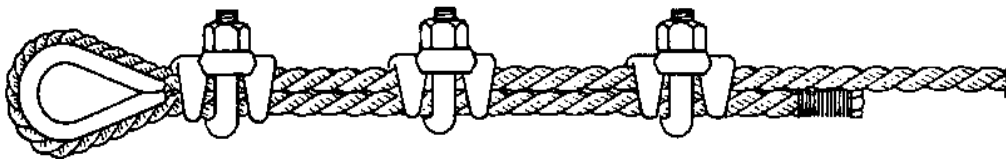
Section III

Table 1: Forged Clip Information

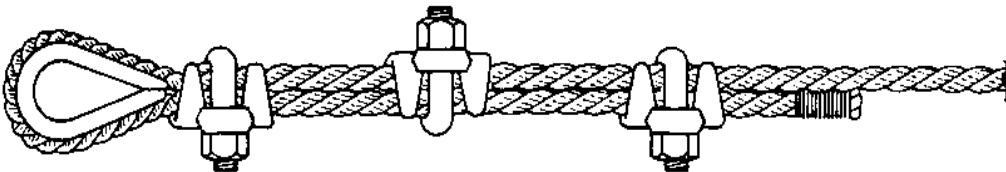
Clip Size (inches)	Minimum No. of Clips	Amount of Wire Rope To turn back (inches)	Torque (ft./lbs.)
1/4	2	4-3/4	15
5/16	2	5-1/4	30
3/8	2	6-1/2	45
7/16	2	7	65
1/2	3	11-1/2	65
9/16	3	12	95
5/8	3	12	95
3/4	4	18	130
7/8	4	19	225
1	5	26	225

Wire Rope Dead-Ending

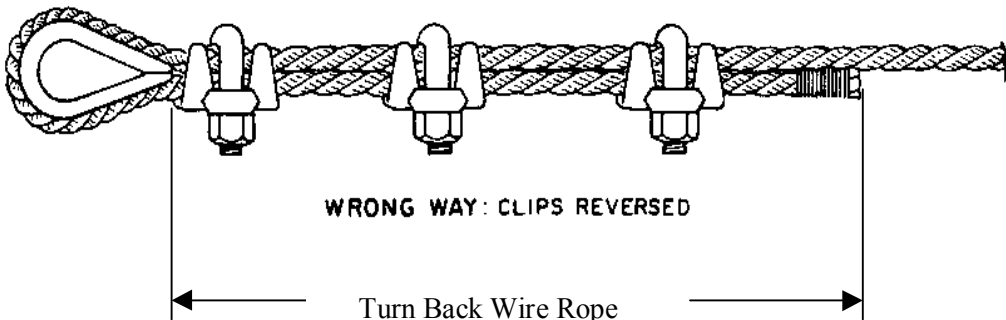
Note: This is a typical depiction of cable clip configuration and the number of clips may or may not be correct for your hoist. Hoists with greater or smaller cable diameters may require more or less clips.



RIGHT WAY FOR MAXIMUM ROPE STRENGTH



WRONG WAY: CLIPS STAGGERED

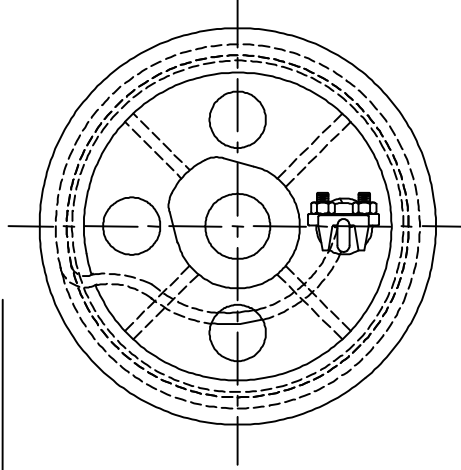
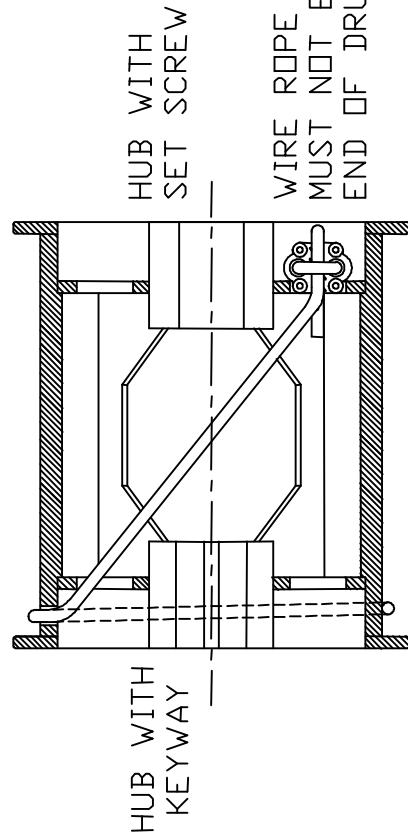


WRONG WAY: CLIPS REVERSED

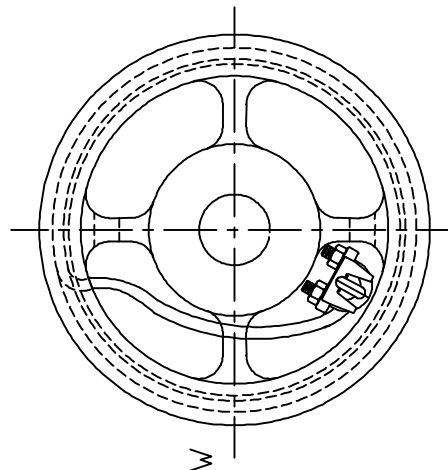
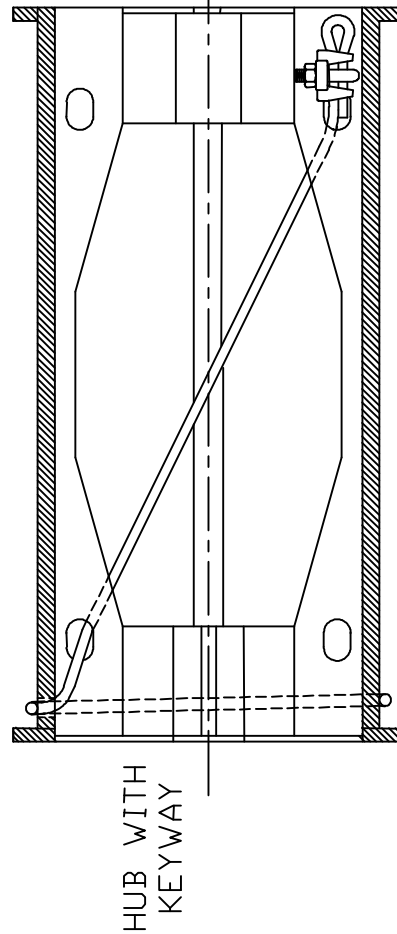
Turn Back Wire Rope

Section III

DEAD ENDING OF WIRE ROPE INSIDE ELECTRO LIFT DRUMS.



TYPE 1 DRUM - HOLES AT FLANGED ENDS.



TYPE 2 DRUM - SPOKES AT FLANGED ENDS.

REV. 2, 1/22/04

Lubrication, Installation, Operation & Maintenance

Instructions For Cone Drive Speed Reducers

Cone Drive double enveloping worm gear speed reducers are used throughout industry to provide smooth and quiet speed

reduction. When properly selected, applied and maintained, they will provide optimum performance.

IMPORTANT: In any applications of Cone Drive Products where breakage, damage, disconnection, any other malfunction of any drive train component, or excessive wear could

result in personal injury or property damage, a fail safe device capable of stopping and holding the load in the event of such an occurrence must be incorporated after the drive train.

THE FOLLOWING INFORMATION IS FOR YOUR PROTECTION. PLEASE READ CAREFULLY.

1. Do not attempt to install or operate this reducer until all of these instructions are read and thoroughly understood. If you have any questions, please contact Cone Drive.
2. The horsepower or output torque capacity of this reducer and the service factor (maximum allowable operating cycle) are stamped on the reducer nameplate. **These values are not to be exceeded as overloading can result in reducer failure.**
Exceeding the rating and duty cycle will void the warranty. Please contact Cone Drive with any questions regarding rating and service factors.
3. Each reducer is specifically arranged to operate at the input speed specified on the nameplate. If the input speed is not specified by the customer, it is set up for 1750 RPM and service factor 1.0. Do not operate the reducer at speeds or under service other than specified on the nameplate without contacting Cone Drive for specific instructions on oil level location and bearing settings.
4. Do not alter the reducer in any way without approval from Cone Drive.
5. This reducer has moving mechanical components and connected electrical devices, operating under high voltage to achieve its intended purpose. Operation and repair should only be done by qualified personnel.
6. Before servicing a speed reducer, the main electrical disconnect must be moved to and **locked** in the off-position. The person performing the work should **post on that disconnect a warning to others not to turn on the power.**
7. It is normal for the reducer to operate at a housing temperature of up to 200° F. To prevent burns, proper guards or shields must be provided by the purchaser or user to prevent personnel from touching the reducer.
8. Cone Drive products are furnished without guard covers. It is the responsibility of the purchaser or user to provide guards for all exposed shafting, couplings, sprockets, sheaves, belts, chains, clutches, and any other moving parts in accordance with current local, state and federal requirements.
9. Failure to follow the instructions contained in this bulletin may result in unit failure, property damage or personal injury.

Finish Coat Painting

Cone Drive speed reducers are furnished with a prime coat of paint on exterior housing surfaces. The reducer should be painted with a finish coat to protect the housing exterior, particularly if subjected to outdoor service, periodic washdown or harsh environments.

Mask all shafts, oil seals, tags, name plates, oil level stickers, breathers, gauges etc. before painting. (Painting seal lips can result in oil leakage.)

Installation

IMPORTANT: Unless otherwise specified on the reducer or in accompanying documentation, all Cone Drive speed reducers are shipped without oil and must be filled to the oil level gage or plug with the **proper** oil before start-up. See the following section on lubrication.

1. The speed reducer must be securely mounted to a rigid flat foundation or base plate. If necessary, shim under the reducer feet to provide a flat mounting surface.
2. Bolt the reducer to the foundation or mounting base using the largest diameter bolt that will fit through the foot holes of the reducer. **Be sure to use a bolt in all available mounting foot holes.** If the reducer will be subjected to heavy chain pull or thrust loading, **heat treated** mounting bolts must be used to prevent stretching and loosening of the bolts.
3. The input and output shafts of the reducer should be coupled to the motor and driven shafts with flexible couplings and the reducer aligned with these shafts within $\pm .001"$. Solid or rigid couplings should be avoided. Failure to properly align shafts and the use of solid couplings can result in excessive coupling and bearing wear, shaft deflection and eventual failure of one (1) or more of the components.
4. Couplings, sheaves and sprockets should be mounted on the reducer shafts carefully. Do not pound or hammer them onto the shafts as this will damage bearings and oil seals.
5. Sprockets and sheaves should be mounted as close to the reducer as possible and "V" belts and chains adjusted to the proper tension to keep bearing loading and shaft deflection to a minimum. Too much tension in belts and improper location of sheaves and sprockets will lead to excessive chain pull, bearing wear and shaft deflection. For specific information on chain pull capacity, shaft stress and bearing life please contact Cone Drive.
6. **NOTE:** Exposed metal parts are coated with a commercial rust inhibitor. This rust inhibitor must be removed prior to installation. Failure to do so may result in difficulty in assembling close tolerance mating components.

6. **Before starting motor** review motor rotation, reducer rotation and required direction of driven machine to insure that the motor is wired for proper direction of rotation. In many instances a machine must run in one direction and failure to wire the motor properly can result in damage to the driven machine.

7. **IMPORTANT:** Fill unit to proper level with recommended oil. Grease all fittings with recommended grease (see section on lubrication). In the case of double or triple reduction reducers, be sure to fill each reduction stage to the proper oil level. Note: Some reducers may have been factory filled. Read all tags.

NOTE: All reducers are built for **one** mounting position, i.e.; floor mounted or wall mounted with worm vertical up or ceiling mounted, etc. If the reducer is to be mounted in any position other than the position for which it was furnished, contact Cone Drive for information on relocating oil level, grease packing bearings, etc., before start-up. If a reducer is operated in a mounting position other than the position for which it was assembled, reducer failure may occur from improper oil level or grease fitting location resulting in lack of lubrication to the gearset and bearings.

Start-Up

1. After the reducer has been properly mounted, aligned and **lubricated**, it is ready for start-up.
2. Make sure driven machine is clear of all obstructions and all safety guards and covers are in place, according to appropriate local, state and federal requirements. If possible, turn motor shaft by hand to confirm drive system is operating freely and in correct direction of rotation.
3. Jog motor to confirm proper rotation.
4. Operate reducer with minimum load for approximately 15 minutes (in both directions if applicable) to seat gears, bearings, and oil seals.

Operation

1. All reducers require a few hours of "run-in" under load to achieve optimum efficiency. During this initial run-in the reducer will probably run warmer than normal and draw more current than after the run-in period. Reducers operating at a very low load or speed will take much longer to run-in and even if operated continuously at low load or speed may never achieve the efficiency that they would if operated at or near their catalog rating.

2. **IMPORTANT:** Normal reducer operating temperature measured on the oil sump area of the housing should not exceed 100° F above ambient temperature or 200° F. If the reducer operating temperature exceeds 200° F, shut down the unit and contact Cone Drive. Excessive oil sump temperature is indicative of overloading, misalignment, or improper or marginal lubrication. Continuous operation of the reducer with the oil sump temperature above 200° F will result in breakdown of the oil and failure of the reducer.

Maintenance

1. The reducer oil level should be checked weekly and the recommended oil added as required to maintain the proper oil level.
2. Oil should be changed as outlined in the lubrication section.
3. All grease fittings should be lubricated with the recommended grease once per month.
4. The reducer, particularly finned areas and fan covers, should be kept clean to allow maximum heat dissipation.
5. All reducer and foundation bolts should be checked for tightness after three (3) months of service and annually thereafter.
6. If a reducer has to be repaired, contact Cone Drive for detailed instructions, blueprints, parts lists, etc. If it is necessary field service is available.
7. If a reducer is to be returned, contact Cone Drive for instructions and a returned material authorization (RMA) number.

Storage Recommendations For Cone-Drive Speed Reducers

If a reducer is to be stored or shut down for more than 30 days, it should be protected from water condensation and corrosion as follows:

Any enclosed system of gearing is subject to water condensation on the inside of the reducer caused by fluctuating ambient temperatures. This condensation can cause severe rusting of

the worm and bearings which could lead to premature failure of the reducer. However, this condition can be easily prevented by following the recommendations outlined for various storage conditions. If the reducer is furnished with a motor, follow the motor manufacturers recommendations for motor preservation.

1. **Standard Shipping Procedure - Protection for Maximum Storage Duration of 30 Days.**

Cone Drive speed reducers are treated inside using a rust inhibitor, the exterior is painted with one coat of primer, and all exposed shafting coated with a rust preventative prior to shipment. This procedure is intended to protect the reducers during shipment and short term inside storage for a maximum period of thirty (30) days after shipment.

2. **Long Term Storage (Indoors) for Periods up to One Year.** (a) Fill the reducer completely full with one of the lubricants shown on our approved list of lubricants. A copy of this lubricant list is shipped with each unit. (b) Rotate the wormshaft and gearshaft at least once per month to keep the seals from sticking to the wear rings and/or shafts. (c) If it is not practical to rotate the wormshaft periodically we recommend purchasing a spare set of oil seals to have on hand in the event of seal leakage at start-up. (d) Before putting the reducer into service, lower the oil in the reducer to the proper operating oil level.

3. **Long Term Storage (Outdoors) for Periods Up to One Year.** Proceed as in (2) with the following additions. (a) After filling the unit with oil, plug the breather hole with a pipe plug and wire the breather to the unit. (b) Paint the outside of the unit with a finish coat of paint. (Reducer from the factory is prime coated only.) (c) Coat all exposed shafting with a long term rust preventative.

4. **Extended Storage Periods Exceeding One Year.** (a) Immediately after receipt of the reducer treat the inside of the reducer with "Olin Chemicals Corp. - Dichan® 100 Vapor-Phase Corrosion Inhibitor for Ferrous Metals" by adding an amount specified by Olin Chemical, through the breather. Observe all Olin Chemicals Corp. cautions and warnings when handling this material. Plug the reducer and wire the breather to the unit. (b) Paint the exterior of the unit with a finish coat of paint. (c) Coat all exposed shafting with a long term rust preventative. (d) Place the unit in a heavy plastic bag treated with Dichan® 100 powder. Seal the bag air tight. (e) Crate the unit and cover the crate to keep out water. (f) Purchase a spare set of oil seals to have on hand at start-up

Lubrication Data

Lubrication is very important for successful operation of Cone Drive gearsets and speed reducers. Inadequate lubrication can result in increased power consumption, added maintenance and gearset failure. Please review the following recommendations and the "Approved List of Lubricants" shipped with all Cone Drive gearsets and speed reducers. Cone Drive recommends only those lubricants listed or any lubricant which meets all the requirements of AGMA (American Gear Manufacturers Association) 9004-D94 "Lubrication of Industrial Enclosed Gear Drives" as it applies to double enveloping worm gearing. Use of other lubricants can result in gearset failure which will not be covered under warranty. See reducers nameplate for the recommended lubricant.

Type of Oil

Performance is based on synthetic lubricants. Using a mineral oil will reduce the mechanical power and output torque ratings by 25%.

Ambient Temperature

The oils shown in the table on the following page are for use in an ambient temperature range of approximately 15° to 125°F with the low end of the range depending on the pour point of the specific oil used. If the ambient temperature will be below or above this range please contact Cone Drive for specific recommendations on proper lubricant as well as proper oil seal and shim materials.

Oil Sump Temperatures

The maximum recommended oil sump temperature is 200°F. Where reducers will be used at maximum ambient and full catalog rating. Contact Cone Drive for lubrication recommendations.

Sludge

It is necessary that the oil be clean and free from sludge at all times to obtain long life from a gear unit. Sludge in gear units may be caused by excessive heat, from dust and dirt and other contaminants and by the presence of moisture or chemical fumes. Therefore, every precaution should be taken to prevent water and foreign particles from entering the gear case.

Cone Drive Reducers are Shipped without Oil.

At assembly all reducers are treated with a rust inhibitor. This treatment coats all internal parts and will protect the reducer for a period of 30 days. If the unit is to be stored longer than 30 days, see long term storage instructions.

Oil Change

If an approved synthetic lubricant is used, it should be changed after 5000 hours of operation or once per year, whichever occurs first. These change intervals are recommended for units operating under favorable conditions. Where operating conditions are severe, such as a rapid rise and fall in temperature of the gear case with accompanied sweating of the inside walls and resulting formation of sludge, or where operation is in moist or dusty atmospheres, or in the presence of chemical fumes or extended running at sump temperatures in excess of 180° F, it may be necessary to change the oil at intervals of one to three months. It is recommended a sampling program be established with your lubricant manufacturer where reducers are exposed to the severe operating conditions, mentioned above.

Oil Level

Cone Drive reducers are furnished with a bronze colored hex head pipe plug to indicate oil level. An oil level tag is affixed to the unit near the oil level indicator. Oil level should always be checked with the unit stopped. Estimated oil capacities for standard reducers, are listed in this section.

Double and Triple Reductions Reducers.

These units utilize separate housings and are furnished with separate oil sumps. It is important that all sumps are filled to the proper oil level.

Grease Packed Bearings

Bearings that are at least partially submerged in oil do not require special maintenance. However, bearings that are not submerged in oil require grease lubrication. Grease fittings and internal retainers are furnished when required. They should be greased with a high quality lithium base NLGI #2 or NLGI #3 bearing grease at normal maintenance intervals depending on the duty cycle of the reducer.

Extreme Pressure (E.P.) Lubricants

Extreme Pressure (E.P.) lubricants or cylinder oils with sulphur-phosphorus additives are not acceptable and should not be used in Cone Drive Speed reducers or worm gearing.

Oil Capacities

Approximate Capacities in Quarts & Gallons

SINGLE REDUCTION REDUCERS - FLOOR MOUNTED POSITION

UNIT SIZE		20	25	30	35	40	50	60	70	80	100	120
WORM OVER GEAR	HO SHO	1 Qt.	1 1/2 Qt.	2 1/2 Qt.	1 Gal.	1 1/2 Gal.	2 1/2 Gal.	3 3/4 Gal.	6 1/2 Gal.	10 1/2 Gal.	19 Gal.	45 Gal.
	ALT OIL LEVEL	1/2 Qt.	1 Qt.	1 1/2 Qt.	2 1/2 Qt.	1 Gal.	1 3/4 Gal.	2 1/2 Gal.	4 Gal.	6 1/2 Gal.	12 1/2 Gal.	26 Gal.
WORM UNDER GEAR	HU	1/2 Qt.	1 Qt.	1 1/2 Qt.	3 1/2 Qt.	1 1/2 Gal.	2 1/4 Gal.	3 1/2 Gal.	5 1/4 Gal.	7 3/4 Gal.	15 Gal.	30 Gal.
	SHU											
VERTICAL OUTPUT SHAFT	HV SHV	1 Qt.	1 Qt.	1 1/2 Qt.	2 1/2 Qt.	1 Gal.	1 3/4 Gal.	2 3/4 Gal.	5 Gal.	6 1/2 Gal.	14 Gal.	26 Gal.

BEARING GREASE:

High quality lithium base
NLGI #2 or NLGI #3

NOTES:

Note #1 - The listed synthetic lubricants are acceptable for use in force feed lubrication systems or other special applications.

Note #2 - Worm gears operating at a sliding velocity in excess of 10 m/s (2,000 ft. per min.) may require force feed lubrication. For force feed lubrication recommendations, see our Product Catalog or contact our Application Engineers.

Note #3 - If a reducer is to be operated at an input rpm other than that shown on the name plate, contact our Application Engineers for recommendations.

Note #4 - Pour point of the oil used should be 5° C (9° F) less than the minimum ambient temperature expected. For special temperature or operating conditions, contact our Application Engineers for the proper lubrication selection.

DOUBLE REDUCTION REDUCERS - FLOOR MOUNTED POSITION

UNIT SIZE	20 30	20 35	25 40	25 50	30 60	30 70	35 70	40 70	40 80	50 100	60 120
OO-UO-VO OOS-UOS-VOS	3 Qt.	1½ Gal.	1¾ Gal.	2¾ Gal.	4¼ Gal.	7 Gal.	7¼ Gal.	7½ Gal.	11½ Gal.	20¾ Gal.	47½ Gal.
OU-UU-VU	2½ Qt.	1 Gal.	1¾ Gal.	2½ Gal.	4 Gal.	5¼ Gal.	5½ Gal.	6 Gal.	8½ Gal.	16 Gal.	30 Gal.
OOS-UUS-VUS			1¼ Gal.	2 Gal.	3¾ Gal.	6¼ Gal.	6½ Gal.	7 Gal.	9¾ Gal.	18½ Gal.	34 Gal.
OV-UV-VV OVS-UVS-VVS			2 Qt.	2 Qt.							

GEARMOTORS & HELICAL/WORM REDUCERS - ALL POSITIONS

UNIT SIZE		25	30	35	40	50	60	70	80
ALL MODELS MOUNTED WITH WORM UNDER GEAR	STANDARD SHAFT								
	HOLLOW SHAFT	2 Qt.	2 1/2 Qt.	1 1/4 Gal.	2 1/4 Gal.	3 Gal.	4 1/2 Gal.	7 Gal.	8 1/2 Gal.
ALL MODELS MOUNTED WITH WORM OVER GEAR		1 1/2 Qt.	1 1/4 Gal.	2 Gal.	2 1/4 Gal.	4 Gal.	5 Gal.	9 Gal.	11 Gal.
ALL MODELS MOUNTED WITH VERTICAL OUTPUT SHAFT		2 1/2 Qt.	3 1/2 Qt.	1 1/2 Qt.	2 1/4 Gal.	3 Gal.	3 3/4 Gal.	8 Gal.	10 1/2 Gal.
ALL MODELS MOUNTED WITH INPUT END UP		4 Qt.	1 1/4 Gal.	2 1/4 Gal.	3 Gal.	5 1/4 Gal.	6 3/4 Gal.	13 1/2 Gal.	16 Gal.
ALL MODELS MOUNTED WITH INPUT END DOWN		3 1/2 Qt.	1 Gal.	1 3/4 Gal.	2 1/2 Gal.	3 1/2 Gal.	4 3/4 Gal.	8 3/4 Gal.	10 1/2 Gal.

APPROVED SYNTHETIC LUBRICANTS:

BRAND NAME:	Uptime SHC634 Synthetic Lubricant	Emery-2843 synthetic Lubricant	Keystone KSL-367 Synthetic Lubricant	Mobil SHC634 Synthetic Lubricant	Pinnacle 460 Synthetic Lubricant
MANUFACTURER:	Distributed by Textron Industrial Gears expressly from Mobil Oil company	Henkel Corp./Emery Group	Keystone/Atochem	Mobil Oil Corp.	Texaco Lubricants Co.

IMPORTANT: Do not overfill units. Fill to center line of oil gauge or to pipe plug identified with oil level sticker. Oil capacities will vary due to mounting positions or type of gearshaft mounting used, such as solid shaft, hollow shaft or spread bearings. Each reducer is built and oil levels are set at the factory for a specific mounting position.

TEXTRON
POWER TRANSMISSION

240 E. 12th Street,
P.O. Box 272
Traverse City,
MI 49685-0272

Approved List of Lubricants

For Cone Drive Double Enveloping Worm Gear Speed Reducers & Gearsets

Center Distance	Worm Speed RPM	Ambient Temperature		Worm Speed above (RPM)	Ambient Temperature
		(-10° C to +10° C) (14°F to 50°F)	(+10° C to +50° C) (50°F to 125°F)		(-10° C to +50° C) (14°F to 125°F)
Up to 6" inclusive	0 - 700	8 Comp.	8A Comp.	700	8 Comp.
Over 6" to 12"	0 - 450	8 Comp.	8A Comp.	450	8 Comp.
Over 12" to 18"	0 - 300	8 Comp.	8A Comp.	300	8 Comp.
Over 18" & above	0 - 200	8 Comp.	8A Comp.	200	8 Comp.

Viscosity Range			
AGMA Lubricant Number	ASTM System		ISO Grade
	SUS@210°F	SUS@100°F	CST@40°F
7 Comp.	125 - 150	1919-2346	ISO 460 (414-506)
8 Comp.	150 - 190	2837-3467	ISO 680 (612-748)
8A Comp.	190 - 250	4171-5098	ISO 1000 (900-1100)

Manufacturer	AGMA #8 Compound (Non-EP)			AGMA #8A Compound (Non-EP)		
	Brand Name	PPF	SUS@210°F	Brand Name	PPF	SUS@210°F
Distributed by Cone Drive / Textron Power Transmission expressly from Mobil Oil Corp.	Uptime 600W Super Cylinder Oil	10	155	Uptime Extra Hecla Super Cylinder Oil	20	198
Amoco	Cylinder Oil 680	15	200	Cylinder Oil 1000	15	243
BP Oil (not available in USA)	Jax Super Cylinder	30	190	Energol DC-C 1000	6	1000 CST
Behnke Lubricants Inc.	Steam Cylinder Oil 150	5	167	Jax Super Cylinder	15	243
Bel-Ray Company Inc.	No-Tox Worm Gear Lube (FOOD GRADE H1) Oil ISO 680	5	216	Steam Cylinder Oil 250	10	205
Bel-Ray Company Inc.	Mystik Power Lube #680	5	212	No-Tox Worm Gear Lube (FOOD GRADE H1) Oil ISO 1000	5	292
Cato Oil and Grease Corp.	Garwal #680	35	183	Mystik Power Lube #1000	5	315
Century Lubricating Oils Inc.	Cylinder Oil W-ISO #680	10	191	Cylinder Oil W-ISO #1000	10	252
Chevron Products Comp.	Cylinder Oil #680-7	15	193	Inca #1000	35	211
Citgo Petroleum Corp.	Inca Oil #680	30	165	Worm Gear #1000	20	222
Conoco Inc.	Worm Gear Oil #680	20	180	Enlulol SCO-193 Comp.	15	916 CST
Dryden Oil Company Inc.	Enlulol SCO-3400	15	685 CST	Cylesstic TK 1000	30	227
Engineered Lubricants	Cylesstic TK 680	20	184			
Exxon Company	Cylan Steam Cylinder Oil 680	20	175	Lubriplate CP-8A	35	230
Fina Oil Company	Lubriplate CP-8	22	160			
Fiske Brothers Refining	*Lubriplate SPO-288	20	173	Cylesso TK 1000	37	925 CST
Fiske Brothers Refining	PQ-AGMA#8	10	175	Kendco 206 Comp.	35	229
Huls	Cylesso TK 680	37	680 CST			
Imperial/Esso Oil	Kendco 155 Comp.	25	177	Extra Hecla Super Cylinder Oil	30	200
Kendall Motor Oil Company	680 Almasol	15	191	Cylinder Oil # 1000	30	1000 CST
Lubrication Engineers	Modoc #175	30	190			
Lyondell Lubricants	600W Super Cylinder Oil	20	155	243 Cylinder Oil #8A	15	220
Mobil Oil Corp.	Cylinder Oil #680	30	680 CST			
Pennzoil Products Company	Cylinder Oil #6-NR	36	680 CST	Vanguard 1000	25	220
Pennzoil Products Company	Hector 630-S	10	172			
Phillips 66 Company	#147 Steam Cylinder Oil	10	190			
Primrose Oil Company	Valvata J-680	20	650 CST			
Schaeffer Mfg. Company	Sun Gear Oil 8C	10	677			
Shell Oil Products Company	Vanguard 680	20	190			
Sunoco						
Texaco Lubricants Company						

Approved List of Lubricants (continued)

For Cone Drive Double Enveloping Worm Gear Speed Reducers & Gearsets

Manufacturer	Brand Name -SYNTHETICS
Distributed by Cone Drive / Textron Power Transmission expressly from Mobil Oil Company	Uptime SHC634 Synthetic Lubricant*
Henkel Corp. / Emery Group	Emery-2843 Synthetic Lubricant*
Keystone / Atochem	Keystone KSL-367 Synthetic Lubricant*
Mobil Oil Corp.	Mobil SHC634 Synthetic Lubricant*
Texaco Lubricants Co.	Pinnacle 460 Synthetic Lubricant*

Bearing Grease: High quality lithium base NLG #2 or NLGI #3

Notes:

- 1 The listed synthetic lubricants are acceptable for use as an AGMA #7, AGMA #8, and AGMA #8A. The AGMA #7 lubricants are primarily used in force feed lubrication systems or other special applications.
- 2 Worm gears operating at a sliding velocity in excess of 10 m/s (2,000 ft. / min.) may require force feed lubrication. For force feed lubrication recommendations, contact us.
- 3 Major oil companies, not on the above list, do not have products which meet the requirement of AGMA #9005-D94.
- 4 Manufacturers listed above, in **bold print**, have product available world wide. Contact a listed manufacturer for availability in your area.
- 5 All lubricants are listed per the manufacturers recommendation
- 6 (*) This is a special lubricant, not an AGMA compound.
- 7 Centistoke viscosity values are at 40° C.
- 8 If a Cone Drive reducer is to be operated at an input rpm other than that shown on the name plate, contact us for specific recommendations.
- 9 For double and triple reduction reducers an ISO 1000 (AGMA #8A) lubricant can be used in the primary as well as the final reduction stages.
- 10 Pour point of the oil should be 5° C (9° F) less than the minimum ambient temperature expected. For special temperature or operating conditions, contact us for the proper lubrication selection.
- 11 AGMA specifications require a viscosity index (VI) of 90 (min.). However, lubricants listed with a VI of less than 90 may be used if a recommended lubricant with a VI of 90 (min.) is not available.

Sales: 888-99-4Cone & 888-Radicon
Parts & Service: 888-726-Cone in USA & 800-295-3749 in Canada

TEXTRON

Power Transmission

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