

## ELECTRIC CHAIN HOIST

**CM**  
**LODESTAR®**

Before installing hoist, fill in the information below.

Model Number \_\_\_\_\_

Serial No. \_\_\_\_\_

Purchase Date \_\_\_\_\_

Voltage \_\_\_\_\_

Rated Load \_\_\_\_\_

### **RATED LOADS 1/8 TO 3 TONNES 125 KG TO 3000 KG**

Follow all instructions and warning for inspecting,  
maintaining and operating this hoist.

The use of any hoist presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before using this hoist, each operator should become thoroughly familiar with all warnings, instructions and recommendations in this manual. **Retain this manual for future reference and use.**

Forward this manual to operator. Failure to operate equipment as directed in manual may cause injury.



CM HOIST PARTS AND SERVICES ARE AVAILABLE IN THE UNITED STATES AND IN CANADA  
PARTS FOR YOUR HOIST ARE AVAILABLE FROM YOUR LOCAL AUTHORIZED REPAIR STATION. FOR  
THE NAME OF THE NEAREST PARTS OR SERVICE CENTER, VISIT OUR WEB SITE  
[WWW.TSOVERHEADCRANE.COM](http://WWW.TSOVERHEADCRANE.COM) OR CALL OUR CUSTOMER SERVICE DEPARTMENT.

## **WARNING**

Usage of hoists that do not involve lifting of the load on the lower hook or using hoists in the inverted position without special precaution may cause an accident resulting in injury and/or property damage

### **TO AVOID INJURY:**

Consult Columbus McKinnon for information concerning using hoists in these applications.

## **WARNING**

Improper operation of a hoist can create a potentially hazardous situation which, if **NOT** avoided, could result in death, or serious injury. To avoid such a potentially hazardous situation, the operator shall:

1. **NOT** operate a damaged, malfunctioning or unusually performing hoist.
2. **NOT** operate the hoist until you have thoroughly read and understood this Operating, Maintenance and Parts Manual.
3. **NOT** operate a hoist which has been modified.
4. **NOT** lift more than rated load for the hoist.
5. **NOT** use hoist with twisted, kinked, damaged, or worn load chain.
6. **NOT** use the hoist to lift, support, or transport people.
7. **NOT** lift loads over people.
8. **NOT** operate a hoist unless all persons are and remain clear of the supported load.
9. **NOT** operate unless load is centered under hoist.
10. **NOT** attempt to lengthen the load chain or repair damaged load chain.
11. Protect the hoist's load chain from weld splatter or other damaging contaminants.
12. **NOT** operate hoist when it is restricted from forming a straight line from hook to hook in the direction of loading.
13. **NOT** use load chain as a sling, or wrap load chain around load.
14. **NOT** apply the load to the tip of the hook or to the hook latch.
15. **NOT** apply the load unless load chain is properly seated in the chain wheel(s) or sprocket(s).
16. **NOT** apply load if bearing prevents equal loading on all load supporting chains.
17. **NOT** operate beyond the limits of the load chain travel.
18. **NOT** leave load supported by the hoist unattended unless specific precautions have been taken.
19. **NOT** allow the load chain or hook to be used as an electrical or welding ground.
20. **NOT** allow the load chain or hook to be touched by a live welding electrode.
21. **NOT** remove or obscure the warnings on the hoist.
22. **NOT** operate a hoist on which the safety placards or decals are missing or illegible.
23. **NOT** operate a hoist unless it has been securely attached to a suitable support.
24. **NOT** operate a hoist unless load slings or other approved single attachments are properly sized and seated in the hook saddle.
25. Take up slack carefully - make sure load is balanced and load holding action is secure before continuing.
26. Shut down a hoist that malfunctions or performs unusually and report such malfunction.
27. Make sure hoist limit switches function properly.
28. Warn personnel of an approaching load.

## **CAUTION**

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. To avoid such a potentially hazardous situation, the operator shall:

1. Maintain a firm footing or be otherwise secured when operating the hoist.
2. Check brake function by tensioning the hoist prior to each lift operation.
3. Use hook latches. Latches are to retain slings, chains, etc. under slack conditions only.
4. Make sure the hook latches are closed and not supporting any parts of the load.
5. Make sure the load is free to move and will clear all obstructions.
6. Avoid swinging the load or hook.
7. Make sure hook travel is in the same direction as shown on the controls.
8. Inspect the hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
9. Use the hoist manufacturer's recommended parts when repairing the unit.
10. Lubricate load chain per hoist manufacturer's recommendations.
11. **NOT** use the hoist load limiting or warning device to measure load.
12. **NOT** use limit switches as routine operating stops unless allowed by manufacturer. They are emergency devices only.
13. **NOT** allow your attention to be diverted from operating the hoist.
14. **NOT** allow the hoist to be subjected to sharp contact with other hoists, structures, or objects through misuse.
15. **NOT** adjust or repair the hoist unless qualified to perform such adjustments or repairs.

## **SAFETY PRECAUTIONS**

Each Lodestar Electric Hoist is built in accordance with the specifications contained herein and at the time of manufacture complied with our interpretation of applicable sections of the "American Society of Mechanical Engineers Code B30.16 "Overhead Hoists," the National Electrical Code (ANSI/NFPA 70) and the Occupational Safety and Health Act. Since OSHA states the National Electrical Code applies to all electric hoists, installers are required to provide current overload protection and grounding [on the branch circuit section] in keeping with the code. Check each installation for compliance with the application, operation and maintenance sections of these articles.

The safety laws for elevators, lifting of people and for dumbwaiters specify construction details that are not incorporated into the hoists. For such applications, refer to the requirements of applicable state and local codes, and the American National Safety Code for elevators, dumbwaiters, escalators and moving walks (ASME A17.1). Columbus McKinnon Corporation cannot be responsible for applications other than those for which CM equipment is intended.

\*Copies of this standard can be obtained from ASME Order Department, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300, U.S.A.



**THIS SYMBOL POINTS OUT IMPORTANT SAFETY INSTRUCTIONS WHICH IF NOT FOLLOWED COULD ENDANGER THE PERSONAL SAFETY AND/OR PROPERTY OF YOURSELF AND OTHERS. READ AND FOLLOW ALL INSTRUCTIONS IN THIS MANUAL AND ANY PROVIDED WITH THE EQUIPMENT BEFORE ATTEMPTING TO OPERATE YOUR LODESTAR HOIST.**

## HOIST SAFETY IS UP TO YOU...

### **WARNING**

DO NOT LIFT MORE THAN RATED LOAD.

#### CHOOSE THE RIGHT HOIST FOR THE JOB...

Choose a hoist with the capacity for the job. Know the capacities of your hoists and the weight of your loads. Then match them.

The application, the size and type of load, the attachments to be used and the period of use must also be taken into consideration in selecting the right hoist for the job.

Remember, the hoist was designed to ease our burden and carelessness not only endangers the operator, but in many cases, a valuable load.



### **WARNING**

DO NOT OPERATE DAMAGED OR MALFUNCTIONING HOIST.

DO NOT OPERATE WITH TWISTED, KINKED, OR DAMAGED CHAIN.

#### INSPECT

All hoists should be visually inspected before use, in addition to regular, periodic maintenance inspections.

Inspect hoists for operations warning notices and legibility.

Deficiencies should be noted and brought to the attention of supervisors. Be sure defective hoists are tagged and taken out of service until repairs are made.

Under no circumstances should you operate a malfunctioning hoist.

Check for gouged, twisted, distorted links and foreign material. Do not operate hoists with twisted, kinked, or damaged chain links.

Load chain should be properly lubricated.

Hooks that are bent, worn, or whose openings are enlarged beyond normal throat opening should not be used. If latch does not engage throat opening of hook, hoist should be taken out of service.

Chains should be checked for deposits of foreign material which may be carried into the hoist mechanism.

Check brake for evidence of slippage under load.



### **WARNING**

DO NOT PULL AT AN ANGLE. BE SURE HOIST AND LOAD ARE IN A STRAIGHT LINE.

DO NOT USE LOAD CHAIN AS A SLING.

#### USE HOIST PROPERLY

Be sure hoist is solidly held in the uppermost part of the support hook arc.

Be sure hoist and load are in a straight line. Do not pull at an angle.

Be sure load is hooked securely. Do not tip load the hook. Do not load hook latch. Hook latch is to prevent detachment of load under slack chain conditions only.

Do not use load chain as a sling. Such usage damages the chain and lower hook.

Do not operate with hoist head resting against any object. Lift the load gently. Do not jerk it.



### **WARNING**

DO NOT LIFT PEOPLE OR LOADS OVER PEOPLE

#### LIFT PROPERLY

Do not lift co-workers with a hoist.

Make sure everyone is clear of the load when you lift.

Do not remove or obscure operational warning notices.



#### MAINTAIN PROPERLY

##### CLEANING

Hoists should be kept clean and free of dust, dirt, moisture, etc., which will in any way affect the operation or safety of the equipment.

##### LUBRICATION

Chain should be properly lubricated.

##### AFTER REPAIRS

Carefully operate the hoist before returning it to full service.



**VIOLATIONS OF ANY OF THE WARNINGS LISTED MAY RESULT IN SERIOUS PERSONAL INJURY TO THE OPERATOR OR NEARBY PERSONNEL BY NATURE OF RELEASED LOAD OR BROKEN HOIST COMPONENTS.**



## FOREWORD

This manual contains important information to help you properly install, operate and maintain your hoist for maximum performance, economy and safety.

Please study its contents thoroughly before putting your hoist into operation. By practicing correct operating procedures and by carrying out the recommended preventive maintenance suggestions, you will experience long, dependable and safe service. After you have completely familiarized yourself with the contents of this manual, we recommend that you carefully file it for future reference.

The information herein is directed to the proper use, care and maintenance of the hoist and does not comprise a handbook on the broad subject of rigging.

Rigging can be defined as the process of lifting and moving heavy loads using hoists and other mechanical equipment. Skill acquired through specialized experience and study is essential to safe rigging operations. For rigging information, we recommend consulting a standard textbook on the subject.

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## GENERAL INFORMATION

### SPECIFICATIONS

The Lodestar Electric Chain Hoist is a highly versatile materials handling device that can be used to lift loads that are within rated capacity. The mechanical features of these hoists include an alloy steel lift wheel, Load Limiter, hardened steel chain guides, hardened steel gear train, life-time lubrication, forged steel hooks and lightweight aluminum frame. The electrical features include hoist-duty motor, rugged hoist brake, magnetic reversing contactor and voltage conversion board (dual voltage units). The hoist is available with hook or lug suspensions that are supplied separately. Table 1 summarizes the Lodestar Electric Chain Hoist models and the Series 635 Trolleys available. It should be noted that standard single speed hoists are available with 10 (3M), 15 (4.6M) and 20 (6.1M) foot lifts and the standard lift for two speeds hoists is 10 feet. However, hoists with longer lifts are available on a special, per order basis.

### SPECIFICATIONS

Table 1.a.

| Lodestar Electric Chain Hoists<br>Single Speed 115-1-60 |               |      |                             |       |                             |       |             |              |             |                                    |      |
|---|---------------|------|-----------------------------|-------|-----------------------------|-------|-------------|--------------|-------------|------------------------------------|------|
| Model   | Load Capacity |      | Lifting Speed<br>60Hz units |       | Lifting Speed<br>50Hz units |       | Chain Falls | Chain Size   |             | Chain Weight per length<br>of lift |      |
|   | Tonne         | kg   | ft/min                      | m/min | ft/min                      | m/min |             | in x in      | mm x mm     | lb/ft                              | kg/m |
| A   | 1/8           | 125  | 32                          | 9.8   | 26.7                        | 8.1   | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| AA  | 1/8           | 125  | 60                          | 18.3  | 50.0                        | 15.2  | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| B   | 1/4           | 250  | 16                          | 4.9   | 13.3                        | 4.1   | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| C   | 1/4           | 250  | 32                          | 9.8   | 26.7                        | 8.1   | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| E   | 1/2           | 500  | 8                           | 2.4   | 6.7                         | 2.0   | 2           | .250 x .7445 | 6.35 x 18.9 | 1.17                               | 1.74 |
| F   | 1/2           | 500  | 16                          | 4.9   | 13.3                        | 4.1   | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| J   | 1/2           | 500  | 32                          | 9.8   | 26.7                        | 8.1   | 1           | .312 x .8583 | 7.92 x 21.8 | 0.585                              | 0.87 |
| H   | 1             | 1000 | 8                           | 2.4   | 6.7                         | 2.0   | 2           | .250 x .7445 | 6.35 x 18.9 | 1.17                               | 1.74 |
| L   | 1             | 1000 | 16                          | 4.9   | 13.3                        | 4.1   | 1           | .312 x .8583 | 7.92 x 21.8 | 0.94                               | 1.40 |
| R   | 2             | 2000 | 8                           | 2.4   | 6.7                         | 2.0   | 2           | .312 x .8583 | 7.92 x 21.8 | 1.88                               | 2.80 |
| RT  | 3             | 3000 | 5.3                         | 1.6   | 4.4                         | 1.4   | 3           | .312 x .8583 | 7.92 x 21.8 | 2.82                               | 4.20 |

| Lodestar Electric Chain Hoists<br>Single Speed 115-1-60 |                                    |     |                     |      |                     |      |           |  |      |
|---|------------------------------------|-----|---------------------|------|---------------------|------|-----------|--|------|
| Model   | Shortest Distance<br>Between Hooks |     | Motor Power<br>60Hz |      | Motor Power<br>50Hz |      | IP Rating | Net Weight 10' lift less<br>upper suspension |      |
|   | in                                 | mm  | HP                  | kW   | HP                  | kW   |           | lb   | kg   |
| A   | 16.9                               | 429 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 72   | 32.8 |
| AA  | 19.9                               | 505 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 76   | 34.3 |
| B   | 16.9                               | 429 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 73   | 33.1 |
| C   | 16.9                               | 429 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 75   | 34.2 |
| E   | 21.6                               | 549 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 78   | 31.8 |
| F   | 16.9                               | 429 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 76   | 34.5 |
| J   | 18.1                               | 460 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 127  | 57.5 |
| H   | 21.6                               | 549 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 81   | 36.7 |
| L   | 18.1                               | 460 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 125  | 56.7 |
| R   | 25.8                               | 655 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 148  | 67.1 |
| RT  | 32.1                               | 815 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 166  | 75.4 |

## CM REPAIR/REPLACEMENT POLICY

All Columbus McKinnon (CM®) Lodestar Electric Chain Hoists are inspected and performance tested prior to shipment. If any properly maintained hoist develops a performance problem due to a material or workmanship defect, as verified by CM®, repair or replacement of the unit will be made to the original purchaser without charge. This repair/replacement policy applies only to Lodestar Hoists installed, maintained and operated as outlined in this manual, and specifically excludes parts subject to normal wear, abuse, improper installation, improper or inadequate maintenance, hostile environmental effects and unauthorized repairs/modifications.

We reserve the right to change materials or design if, in our opinion, such changes will improve our product. Abuse, repair by an unauthorized person, or use of non-CM replacement parts voids the guarantee and could lead to dangerous operation. For full Terms of Sale, see Sales Order Acknowledgement. Also, refer to the back cover for Limitations of Warranties, Remedies and Damages, and Indemnification and Safe Operation.

## SPECIFICATIONS (CONT.)

Table 1.b.

| Lodestar Electric Chain Hoists<br>Single Speed 230/460-3-60 or 220/380-3-50 or 220/415-3-50 |               |      |                             |       |                             |       |             |              |             |                                    |      |
|---|---------------|------|-----------------------------|-------|-----------------------------|-------|-------------|--------------|-------------|------------------------------------|------|
| Model   | Load Capacity |      | Lifting Speed<br>60Hz units |       | Lifting Speed<br>50Hz units |       | Chain Falls | Chain Size   |             | Chain Weight per length<br>of lift |      |
|   | Tonne         | kg   | ft/min                      | m/min | ft/min                      | m/min |             | in x in      | mm x mm     | lb/ft                              | kg/m |
| A   | 1/8           | 125  | 32                          | 9.8   | 26.7                        | 8.1   | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| AA  | 1/8           | 125  | 60                          | 18.3  | 50.0                        | 15.2  | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| B   | 1/4           | 250  | 16                          | 4.9   | 13.3                        | 4.1   | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| C   | 1/4           | 250  | 32                          | 9.8   | 26.7                        | 8.1   | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| E   | 1/2           | 500  | 8                           | 2.4   | 6.7                         | 2.0   | 2           | .250 x .7445 | 6.35 x 18.9 | 1.17                               | 1.74 |
| F   | 1/2           | 500  | 16                          | 4.9   | 13.3                        | 4.1   | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| J   | 1/2           | 500  | 32                          | 9.8   | 26.7                        | 8.1   | 1           | .312 x .8583 | 7.92 x 21.8 | 0.585                              | 0.87 |
| JJ  | 1/2           | 500  | 64                          | 19.5  | 53.3                        | 16.3  | 1           | .312 x .8583 | 7.92 x 21.8 | 0.94                               | 1.40 |
| H   | 1             | 1000 | 8                           | 2.4   | 6.7                         | 2.0   | 2           | .250 x .7445 | 6.35 x 18.9 | 1.17                               | 1.74 |
| L   | 1             | 1000 | 16                          | 4.9   | 13.3                        | 4.1   | 1           | .312 x .8583 | 7.92 x 21.8 | 0.94                               | 1.40 |
| LL  | 1             | 1000 | 32                          | 9.8   | 26.7                        | 8.1   | 1           | .312 x .8583 | 7.92 x 21.8 | 0.94                               | 1.40 |
| R   | 2             | 2000 | 8                           | 2.4   | 6.7                         | 2.0   | 2           | .312 x .8583 | 7.92 x 21.8 | 1.88                               | 2.80 |
| RR  | 2             | 2000 | 16                          | 4.9   | 13.3                        | 4.1   | 2           | .312 x .8583 | 7.92 x 21.8 | 1.88                               | 2.80 |
| RRS   | 2             | 2000 | 16                          | 4.9   | 13.3                        | 4.1   | 1           | .394 x 1.18  | 10 x 30     | 1.45                               | 2.16 |
| RT  | 3             | 3000 | 5.3                         | 1.6   | 4.4                         | 1.4   | 3           | .312 x .8583 | 7.92 x 21.8 | 2.82                               | 4.20 |
| RRT   | 3             | 3000 | 10.7                        | 3.3   | 8.9                         | 2.7   | 3           | .312 x .8583 | 7.92 x 21.8 | 1.88                               | 2.80 |

| Lodestar Electric Chain Hoists<br>Single Speed 230/460-3-60 or 220/380-3-50 or 220/415-3-50 |                                    |     |                     |      |                     |      |           |  |      |
|---|------------------------------------|-----|---------------------|------|---------------------|------|-----------|--|------|
| Model   | Shortest Distance<br>Between Hooks |     | Motor Power<br>60Hz |      | Motor Power<br>50Hz |      | IP Rating | Net Weight 10' lift less<br>upper suspension |      |
|   | in                                 | mm  | HP                  | kW   | HP                  | kW   |           | lb   | kg   |
| A   | 16.9                               | 429 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 70   | 31.9 |
| AA  | 19.9                               | 505 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 73   | 32.9 |
| B   | 16.9                               | 429 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 71   | 32.2 |
| C   | 16.9                               | 429 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 72   | 32.8 |
| E   | 21.6                               | 549 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 76   | 30.9 |
| F   | 16.9                               | 429 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 73   | 33.1 |
| J   | 18.1                               | 460 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 121  | 54.7 |
| JJ  | 18.1                               | 460 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 127  | 57.5 |
| H   | 21.6                               | 549 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 78   | 35.4 |
| L   | 18.1                               | 460 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 119  | 53.9 |
| LL  | 18.1                               | 460 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 127  | 57.6 |
| R   | 25.8                               | 655 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 142  | 64.4 |
| RR  | 25.8                               | 655 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 150  | 68.0 |
| RRS   | 24.8                               | 630 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 164  | 74.4 |
| RT  | 32.1                               | 815 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 160  | 72.7 |
| RRT   | 32.1                               | 815 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 173  | 78.4 |

## SPECIFICATIONS (CONT.)

Table 1.c.

| Lodestar Electric Chain Hoists<br>Two Speed 230-3-60 or 460-3-60 or 575-3-60 or 220-3-50 or 380-3-50 or 415-3-50 or 550-3-50 |               |      |                             |          |                             |          |             |              |             |                                    |      |
|--|---------------|------|-----------------------------|----------|-----------------------------|----------|-------------|--------------|-------------|------------------------------------|------|
| Model  | Load Capacity |      | Lifting Speed<br>60Hz units |          | Lifting Speed<br>50Hz units |          | Chain Falls | Chain Size   |             | Chain Weight per length<br>of lift |      |
|  | Tonne         | kg   | ft/min                      | m/min    | ft/min                      | m/min    |             | in x in      | mm x mm     | lb/ft                              | kg/m |
| A-2  | 1/8           | 125  | 10.7/32                     | 3.3/9.8  | 8.9/26.7                    | 2.7/8.1  | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| AA-2   | 1/8           | 125  | 20/60                       | 6.1/18.3 | 16.7/50                     | 5.1/15.2 | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| B-2  | 1/4           | 250  | 5.3/16                      | 1.6/4.9  | 4.4/13.3                    | 1.4/4.1  | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| C-2  | 1/4           | 250  | 10.7/32                     | 3.3/9.8  | 8.9/26.7                    | 2.7/8.1  | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| E-2  | 1/2           | 500  | 2.7/8                       | 0.8/2.4  | 2.2/6.7                     | 0.7/2    | 2           | .250 x .7445 | 6.35 x 18.9 | 1.17                               | 1.74 |
| F-2  | 1/2           | 500  | 5.3/16                      | 1.6/4.9  | 4.4/13.3                    | 1.4/4.1  | 1           | .250 x .7445 | 6.35 x 18.9 | 0.585                              | 0.87 |
| J-2  | 1/2           | 500  | 10.7/32                     | 3.3/9.8  | 8.9/26.7                    | 2.7/8.1  | 1           | .312 x .8583 | 7.92 x 21.8 | 0.585                              | 0.87 |
| JJ-2   | 1/2           | 500  | 21.3/64                     | 6.5/19.5 | 17.8/53.3                   | 5.4/16.3 | 1           | .312 x .8583 | 7.92 x 21.8 | 0.94                               | 1.40 |
| H-2  | 1             | 1000 | 2.7/8                       | 0.8/2.4  | 2.2/6.7                     | 0.7/2    | 2           | .250 x .7445 | 6.35 x 18.9 | 1.17                               | 1.74 |
| L-2  | 1             | 1000 | 5.3/16                      | 1.6/4.9  | 4.4/13.3                    | 1.4/4.1  | 1           | .312 x .8583 | 7.92 x 21.8 | 0.94                               | 1.40 |
| LL-2   | 1             | 1000 | 10.7/32                     | 3.3/9.8  | 8.9/26.7                    | 2.7/8.1  | 1           | .312 x .8583 | 7.92 x 21.8 | 0.94                               | 1.40 |
| R-2  | 2             | 2000 | 2.7/8                       | 0.8/2.4  | 2.2/6.7                     | 0.7/2    | 2           | .312 x .8583 | 7.92 x 21.8 | 1.88                               | 2.80 |
| RR-2   | 2             | 2000 | 5.3/16                      | 1.6/4.9  | 4.4/13.3                    | 1.4/4.1  | 2           | .312 x .8583 | 7.92 x 21.8 | 1.88                               | 2.80 |
| RT-2   | 3             | 3000 | 1.8/5.3                     | 0.5/1.6  | 1.5/4.4                     | 0.5/1.4  | 3           | .312 x .8583 | 7.92 x 21.8 | 2.82                               | 4.20 |
| RRT-2  | 3             | 3000 | 3.6/10.7                    | 1.1/3.3  | 3/8.9                       | 0.9/2.7  | 3           | .312 x .8583 | 7.92 x 21.8 | 1.88                               | 2.80 |

| Lodestar Electric Chain Hoists<br>Two Speed 230-3-60 or 460-3-60 or 575-3-60 or 220-3-50 or 380-3-50 or 415-3-50 or 550-3-50 |                                    |     |                     |      |                     |      |           |  |      |
|--|------------------------------------|-----|---------------------|------|---------------------|------|-----------|--|------|
| Model  | Shortest Distance<br>Between Hooks |     | Motor Power<br>60Hz |      | Motor Power<br>50Hz |      | IP Rating | Net Weight 10' lift less<br>upper suspension |      |
|  | in                                 | mm  | HP                  | kW   | HP                  | kW   |           | lb   | kg   |
| A-2  | 16.9                               | 429 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 76   | 34.6 |
| AA-2   | 19.9                               | 505 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 78   | 35.2 |
| B-2  | 16.9                               | 429 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 77   | 34.9 |
| C-2  | 16.9                               | 429 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 77   | 35.1 |
| E-2  | 21.6                               | 549 | 0.25                | 0.19 | 0.21                | 0.16 | 54        | 82   | 33.6 |
| F-2  | 16.9                               | 429 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 78   | 35.4 |
| J-2  | 18.1                               | 460 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 133  | 60.2 |
| JJ-2   | 18.1                               | 460 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 135  | 61.1 |
| H-2  | 21.6                               | 549 | 0.50                | 0.37 | 0.42                | 0.31 | 54        | 83   | 37.6 |
| L-2  | 18.1                               | 460 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 131  | 59.4 |
| LL-2   | 18.1                               | 460 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 135  | 57.6 |
| R-2  | 25.8                               | 655 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 154  | 61.2 |
| RR-2   | 25.8                               | 655 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 158  | 69.8 |
| RT-2   | 32.1                               | 815 | 1.00                | 0.75 | 0.83                | 0.62 | 54        | 172  | 71.6 |
| RRT-2  | 32.1                               | 815 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 181  | 82.1 |
| RRT  | 32.1                               | 815 | 2.00                | 1.49 | 1.67                | 1.24 | 54        | 173  | 78.4 |

## ACCESORIES

### HOOK SUSPENSIONS

Swivel and rigid type hook suspensions (see Figure 1) are available for all Lodestar Electric Hoists. However, rigid type hook suspensions are normally recommended for most application. The hook suspensions are intended for suspending the hoist from a trolley which has a single load bar (such as CM® Series 632 and 633 Trolleys) or for suspending the hoist from a fixed structure.



Figure 1. Hook Suspensions

### LUG SUSPENSION

Lug suspensions (see Figure 2) are available for all Lodestar Electric Hoists. These are rigid type suspensions wherein the lug shown replaces the hook (Figure 1) in the suspension adapter. The Lug suspensions are required for suspending the hoist from the Series 635 Low Headroom, Motor Driven, Universal Trolleys described next.



Figure 2. Lug Suspensions

### SERIES 635 LOW HEADROOM TROLLEY

These are manual push type trolleys (see Figure 3) designed for use with the Lodestar Electric Chain Hoists. A rigid lug suspension (see Figure 2) is required to suspend the hoist from the trolley. The trolley is adjustable for operation on a range of American Standard "S" beams and it will also operate on flat flanged beams.

Figure 3. Series 635 Low Headroom Trolley



Figure 4. Series 635 Motor Driven Trolley

### UNIVERSAL TROLLEY

The UTM Universal Trolley are supplied complete with independent controls, wiring and a four directional control station. These trolleys are adaptable to a wide variety of CMCO hoist products when used in conjunction with the appropriate hoist suspension. Trolley is adjustable for operation on American Standard 'S' beams and will also operate on flat flanged beams.

### SERIES 635 MOTOR DRIVEN TROLLEY

The motor driven trolleys (see Figure 4) are self-contained and supplied complete with independent controls and wiring, including a four directional control station. A rigid lug suspension (see Figure 2) is required to suspend the hoist from the Motor Driven Trolley. The hoist and trolley are joined electrically by connecting the hoist control and power cords (supplied) into the hoist or trolley. The trolley is adjustable for operation on a range of American Standard "S" beams and it will also operate on flat flanged beams.

### LATCHLOK® HOOKS

CM Latchlok hooks (see Figure 5) are available to replace the standard upper and lower hooks used on the Lodestar Electric Hoists.



Figure 5. Latchlok® Hook

### CHAIN CONTAINER

This accessory (see Figure 6) is used to hold slack chain and it is supplied complete with mounting hardware and instructions. The chain container is recommended for those applications where the slack chain would interfere with the load or drag on the floor as may be the case with double or triple reeved units. Chain containers can be furnished for units already in use.



Figure 6. Chain Container

# INSTALLATION

## UNPACKING INFORMATION

When received, the hoist should be carefully inspected for damage which may have occurred during shipment or handling. Check the hoist frame for dents or cracks, the external cords for damaged or cut insulation, the control station for cut or damaged enclosure, and inspect the load chain for nicks and gouges. If shipping damage has occurred, refer to the packing list envelope on the carton for claim procedure.

Before installing the hoist, make sure that the power supply to which it will be connected is the same as that shown on the nameplate located on the side of the hoist.

**NOTE: See Electrical Installation instructions**

## INSTALLING THE SUSPENSION

### A. Single Reeved Units:

#### For Models A,B,C,F, J, JJ, L, & LL:

Remove the hook suspension and (2) suspension screws from the packaging. Place the suspension assembly into the recess on top of the hoist so that the adaptor body follows the contour of the hoist. Insert the suspension screws through the holes in the adaptor and hand thread these into the self-locking nuts enclosed in the hoist.

Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point socket: 3/8" for Models A, B, C, & F and 1/2" for Models J-LL.

#### For Model RRS:

Remove the hook suspension, screw and locknut from the packaging. Slide the suspension assembly into the channel in the top of the hoist. Insert the locknut into the hex recess on the side of the suspension riser, insert the screw through opposite side and hand thread the screw into the self-locking nut.

Securely tighten the screw to the recommended torque (see table 2), using a 3/16" hex bit socket.

## CAUTION

Use of impact tools (electric or pneumatic) may cause premature failure of attaching hardware.

### B. Double Reeved Units:

Remove the hook suspension, (2) suspension screws, (1) dead end pin, (1) washer, and (1) cotter pin from the packaging. It should be noted that the suspension includes a dead end bolt and block for supporting the dead end of the load chain as shown in Figure 7.

Place the suspension assembly into the recess on top of the hoist. The dead end block should project through the bottom of the hoist with the pin hole and slot aligned to the underside of the hoist as shown in Figure 7. If these are not aligned as shown, lift the head of the bolt from the hex recess in the adaptor and turn the bolt and block assembly and reseat the bolt head to obtain the proper alignment. Do not change the position of the dead end block on the bolt to attain this alignment.

Check the position of the pin hole in the dead end block to make sure it has not been disturbed from its factory setting. The distance from the top of the pin hole to the bottom of the hoist should not exceed 1/4" (6.35mm) for Models E, E-2, H,

H-2 and 7/16" (11.11mm) for Models R, R-2, RR, RR-2. If the distance is not correct, adjust the position of the dead end block to obtain the proper distance (see fig. 21, p 73.)

Now, insert the suspension screws through the holes in the adaptor and hand thread these into the self-locking nuts enclosed in the hoist frame. Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point socket: 3/8" for Models E & H and 1/2" for Models R & RR.

The dead end of the load chain is temporarily positioned (a few links from the end) by a wire tie. Do not remove this tie before attaching the chain to the dead end block. (See Fig. 7)

### C. Triple Reeved Units:

These hoists have a sheave hanger which is loosely connected to the top of the frame by a thin metal plate for shipping purposes. To attach the suspension, support the sheave hanger from the underside of the hoist and remove the nut and seat from the sheave stud. Remove and discard the shipping plate and retain the sheave stud nut and seat since they will be reused later.

Remove the suspension assembly from the carton and the two suspension screws. Place the suspension assembly over the sheave stud and into the recess on top of the hoist. Insert the suspension screws through the holes in the suspension adaptor and hand thread these into the self-locking nut enclosed in the hoist. Securely tighten the screws to the recommended seating torque (see Table 2) using a 12 point, 1/2" socket.

After the suspension assembly is installed, secure the sheave stud to the suspension adaptor using the round slotted nut and seat that were formerly used to attach the shipping plate to top of the hoist frame. Place the seat over the stud with the flat side down and then rotate the seat so that there is clearance between the seat and the suspension lug or hook. Assemble the nut to the stud and turn the nut by hand until the nut seats in the seat and the sheave hanger is snug in the frame. Then back off the nut until the hole in the stud is in line with one of the slots in the nut. Using a hammer, drive the retaining pin (packed with the suspension assembly) into the hole in the sheave stud until the end of the pin is flush with the edge of the nut.

## WARNING

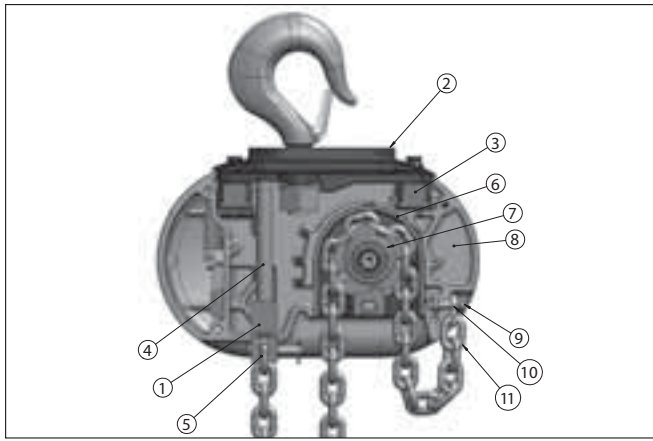
Using other than CM supplied high strength suspension screws to attach the suspension adaptor to the hoist may cause the screws to break and allow the hoist and load to fall.

### TO AVOID INJURY:

Use only the CM supplied suspension screws to attach the suspension to the hoist and hand torque these screws to the recommended seating torque as specified in tables 2a and 2b. DO NOT apply any type of lubricant to the threads of these screws. Lubricating the threads will reduce the effort to seat the screws and as a result, tightening the screws to the above recommended torque may break the screw, damage the suspension adaptor, strip the nuts and/or damage the hoist frame.

**SUSPENSION BOLT SHOULD BE REPLACED ANY TIME  
THE SUSPENSION IS REMOVED FROM THE HOIST**





**Figure 7. Attaching Load Chain Double Reeved Models**

1. Dead end block 7. Lift-wheel
2. Suspension assembly 8. Motor housing
3. Suspension self-locking nut 9. Loose end screw
4. Dead end bolt 10. Loose end link
5. Dead end link 11. Loose end
6. Chain guide

(Do not order parts by these numbers. See parts list)

**Table 2a. Torque Specification: All Models**

| Fastener  | Fastener Description                | Tool Required                                    | *Recommended Seating Torque |           |
|---|-------------------------------------|--|-----------------------------|-----------|
|   |                                     |  | ft-lbf                      | N-m       |
| Brake End cover   | 1/4-20 Slotted Fillister Head Screw | Slotted Blade Screw Driver                       | 4.0 - 5.0                   | 5.4 - 6.8 |
| Motor End Cover   | 1/4-20 Slotted Fillister Head Screw | Slotted Blade Screw Driver                       | 4.0 - 5.0                   | 5.4 - 6.8 |
| Reversing contactor Connecting Screws-1ø                | Terminal Clamp Screw                | Phillips no. 2 or 3/16" slotted head screwdriver | 0.6 - 1.0                   | 0.8 - 1.3 |
| Reversing contactor Connecting Screws-3ø                | Terminal Clamp Screw                | Phillips no. 2 or 3/16" slotted head screwdriver | 0.6 - 1.0                   | 0.8 - 1.3 |
| Limit Switch Guide Screws                               | #10-24 Slotted Fillister Head Screw | Slotted Blade Screw Driver                       | 1.7 - 2.1                   | 2.3 - 2.8 |
| 1/4-20 Button Head Screw for Miscellaneous Applications | 1/4-20 Button Head Socket Cap Screw | 5/32" Hex Driver                                 | 4.2 - 5.0                   | 5.6 - 6.8 |

**Table 2b. Torque Specification: Models A-H**

| Fastener   | Screw Size                          | Tool Required                 | *Recommended Seating Torque |             |
|--|-------------------------------------|-------------------------------|-----------------------------|-------------|
|  |                                     |                               | ft-lbf                      | N-m         |
| Motor Housing / Gear Housing / Back Frame Screws | 1/4"-20 Socket Head Cap Screw       | 3/16" Hex Driver              | 7.9 - 8.3                   | 10.7 - 11.3 |
| Lift-Wheel Nut                                   | 1" - 12 Hex Nut                     | 1-1/2" - 6 or 12 Point Socket | 55.0 - 60.0                 | 74.6 - 81.3 |
| Brake Attaching Screws                           | 1/4-20 Slotted Fillister Head Screw | Slotted Blade Screw Driver    | 4.2 - 5.0                   | 5.6 - 6.8   |
| Brake Armature Mounting Screws                   | M5 Socket Head Cap Screw            | 4mm Hex Driver                | 4.0 - 4.7                   | 5.4 - 6.4   |
| Contact Plate Mounting Nuts                      | 1/4-20 Hex Nut                      | 7/16" - 6 or 12 Point Socket  | 2.0 - 2.5                   | 2.7 - 3.4   |
| Suspension Adapter Screws                        | 3/8"-16 - 12-Point Cap Screw        | 3/8" - 12 Point Socket        | 35.0 - 45.0                 | 47.5 - 61.0 |
| "Lower Hook Block Screws-Double Reeved"          | 1/4"-20 Socket Head Cap Screw       | 3/16" Hex Driver              | 5.0 - 5.8                   | 6.8 - 7.9   |
| Loose End Screw                                  | 1/4"-20 Hex Cap Screw               | 7/16" - 6 or 12 Point Socket  | 4.2 - 5.0                   | 5.6 - 6.8   |
| Chain Stop Screw                                 | 1/4"-20 Socket Head Cap Screw       | 3/16" Hex Driver              | 5.0 - 5.8                   | 6.8 - 7.9   |

**Table 2c. Torque Specification: Models J-RR, RT, RRT**

| Fastener   | Screw Size                           | Tool Required                   | *Recommended Seating Torque |               |
|--|--------------------------------------|---------------------------------|-----------------------------|---------------|
|  |                                      |                                 | ft-lbf                      | N-m           |
| Motor Housing / Gear Housing / Back Frame Screws | 5/16"-18 Socket Head Cap Screw       | 1/4" Hex Driver                 | 14.2 - 15.0                 | 19.2 - 20.3   |
| Lift-Wheel Nut                                   | 1-1/8"-12 Hex Nut                    | 1-11/16" - 6 or 12 Point Socket | 85.0 - 90.0                 | 115.2 - 122.0 |
| Brake Attaching Screw                            | 5/16-18 Slotted Fillister Head Screw | Slotted Blade Screw Driver      | 4.2 - 5.0                   | 5.6 - 6.8     |
| Brake Armature Mounting Screws                   | M6 Socket Head Cap Screw             | 5mm Hex Driver                  | 7.1 - 7.9                   | 9.6 - 10.7    |
| Stator Mounting Screws                           | 1/4"-20 Hex Cap Screw                | 7/16" - 6 or 12 Point Socket    | 4.2 - 5.0                   | 5.6 - 6.8     |
| Suspension Adapter Screws                        | 1/2"-20 12-Point Cap Screw           | 1/2" - 12 Point Socket          | 70.0 - 80.0                 | 94.9 - 108.5  |
| Lower Hook Block Screws<br>-Double Reeved        | 5/16"-18 Socket Head Cap Screw       | 1/4" Hex Driver                 | 10.0 - 11.3                 | 13.6 - 15.3   |
| Loose End Screw                                  | 5/16"-18 Hex Cap Screw               | 1/2" - 6 or 12 Point Socket     | 8.0 - 10.0                  | 10.8 - 13.6   |
| Chain Stop Screw                                 | 1/4"-20 Socket Head Cap Screw        | 3/16" Hex Driver                | 5.0 - 5.8                   | 6.8 - 7.9     |

**Table 2d. Torque Specification: Model RRS**

| Fastener  | Screw Size                           | Tool Required                   | *Recommended Seating Torque |               |
|---|--------------------------------------|---------------------------------|-----------------------------|---------------|
|   |                                      |                                 | ft-lbf                      | N-m           |
| Main Frame/Intermediate Frame/Back Frame Screws | 5/16"-18 Socket Head Cap Screw       | 1/4" Hex Driver                 | 14.2 - 15.0                 | 19.2 - 20.3   |
| 3rd Pinion Nut                                  | 1-1/8"-12 Hex Nut                    | 1-11/16" - 6 or 12 Point Socket | 85.0 - 90.0                 | 115.2 - 122.0 |
| Chain Chute Pin Set Screw Torque                | 1/2-13 Hex Recess Set Screw          | 1/4" Hex Driver                 | 11.7 - 13.3                 | 15.8 - 18.1   |
| Brake Attaching Screw                           | 5/16-18 Slotted Fillister Head Screw | Slotted Blade Screw Driver      | 4.2 - 5.0                   | 5.6 - 6.8     |
| Brake Armature Mounting Screws                  | M6 Socket Head Cap Screw             | 5mm Hex Driver                  | 7.1 - 7.9                   | 9.6 - 10.7    |
| Stator Mounting Screws                          | 1/4"-20 Hex Cap Screw                | 7/16" - 6 or 12 Point Socket    | 4.2 - 5.0                   | 5.6 - 6.8     |
| Suspension Retainer Screw                       | 1/4"-20 Socket Head Cap Screw        | 3/16" Hex Driver                | 4.2 - 5.0                   | 5.6 - 6.8     |
| Chain Container Bracket Mounting Screws         | 9/16"-18 Hex Cap Screw               | 7/16" Hex Driver                | 20.0 - 50.0                 | 27.1 - 67.8   |
| Chain Stop Screws                               | 5/16"-18 Socket Head Cap Screw       | 1/4" Hex Driver                 | 10.0 - 13.0                 | 13.6 - 17.6   |

\*All Torque values are for clean,dry fasteners. DO NOT apply oil or any other lubricant to the fastener threads

## ATTACHING LOAD CHAIN

### RRS & Single.

1. Suspend the hoist from an adequate support.
2. If replacing existing chain, remove chain block kit from loose end of chain by removing the two (2) screws from opposing sides of the block. Remove lower hook assembly by removing the pin holding the chain into the assembly.
3. Using the connecting link, attach new chain to end of starter chain (existing chain if replacing) and feed through chain guides and over liftwheel. Feed enough chain through to be able to attach the chain block kit to the loose end of the chain by assembling the screws and nuts into the appropriate slots and tightening securely.
4. Attach the lower hook assembly to the appropriate end of the chain, by inserting the end link of the chain into the block, and securing the link with the pin.

### Triple Reeve

1. Suspend the hoist from an adequate support.
2. If replacing existing chain, disconnect "loose end" of chain by removing the screw holding loose end link in place on side of hoist frame. Remove dead end of chain by removing the pin holding dead end link into lower hook assembly block.
3. Using a connecting link, attach new chain to the "loose end" of starter chain (existing chain if replacing) and guide through lower hook block, through upper sheave hanger and over sheave wheel, through center hole of plate, and to dead end (center) slot on lower hook assembly. Make certain load chain is free from twists and binds.
4. Place dead end link into dead end slot, and insert pin. Attach loose end link to frame of hoist, using the provided screw. Tighten all fasteners securely.

To attach the chain to the dead end block on Models E, E-2, H, H-2, R, R-2 and RR-2, proceed as follows:

1. Suspend the hoist from an adequate support.
2. On Models E, E-2, H and H-2, insert the last link of the load chain into the dead end block (1) and secure it with the dead end pin, washer and cotter pin furnished with the suspension. Ensure there are no twists in the chain.
3. On Models R, R-2, RR and RR-2, slide the contact block up the chain until it is against the bottom of the hoist and the dead end block is projecting through the square opening in the bottom of the block. Insert the last link of the load chain, making sure there are no twists between the hook block and the dead end block, into the dead end block. Push the contact block up slightly and secure the load chain to the dead end block using the dead end pin, washer and cotter pin furnished with the suspension. The dead end pin also supports the contact block (See Figure 8)



**Figure 8. Contact Block Used on Models R, R-2, RR and RR-2**

Do not remove the plastic ties from the load chain at this time. After the suspension is installed, hoists with a hook suspension can be suspended from its permanent support and then connected to the power supply system (refer to page 14). For hoists with a lug suspension that are to be suspended from a Series 635 Low Headroom Trolley, attach the hoist to the trolley per the following instructions.

## POWER SUPPLY AND ELECTRICAL CONNECTIONS

The hoist should be connected to a branch circuit which complies with the requirements of the National Electrical Code and applicable local codes.

It is recommended, especially for a single phase hoist with a (1) horsepower motor (.75 Kilowatts), that a line with adequate capacity be run directly from the power supply to the hoist to prevent problems with low voltage and circuit overloads.

For grounding of the hoist, the power cord includes a grounding conductor (green yellow, G-Y). Before connecting the hoist to the power supply, check that the power to be used agrees with the position of voltage change plug on the voltage change board. The nominal hoist voltage rating corresponding to the voltage range given on hoist identification plate is:

| Single Speed Units |         | Two Speed Units |         |
|--------------------|---------|-----------------|---------|
| Range              | Nominal | Range           | Nominal |
| 110-120            | 115     | --              | --      |
| 208-240            | 230     | 208-240         | 230     |
| 440-480            | 460     | 440-480         | 460     |
| 550-575            | 575     | 550-575         | 575     |

## THREE PHASE HOIST

Unless ordered on a special basis, all single speed/dual voltage (230/460-3-60, 220/380-3-50 and 220/415-3-50) hoists are factory arranged to operate on 460-3-60 (or 380-3-50 or 415-3-50). However, a voltage change board is provided to easily and quickly change from 460 to 230 (or 380 to 220 or 415 to 220) volt operation. The voltage change board shown in Figure 12 is located in the hoist as shown in Figure 13.

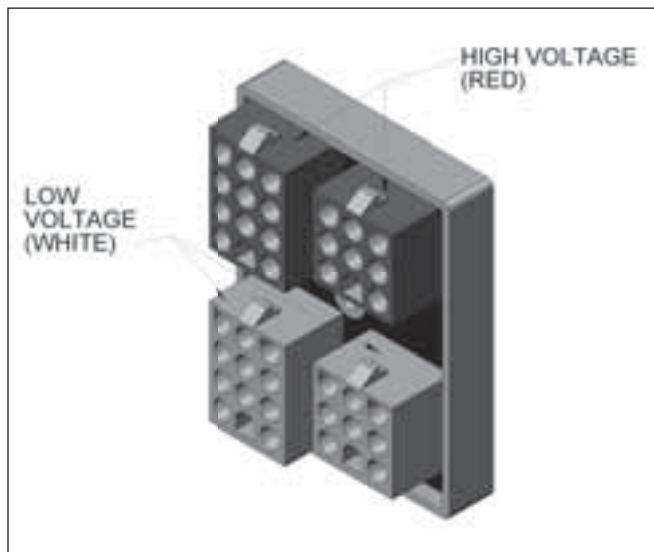


Figure 12. Voltage Change Board

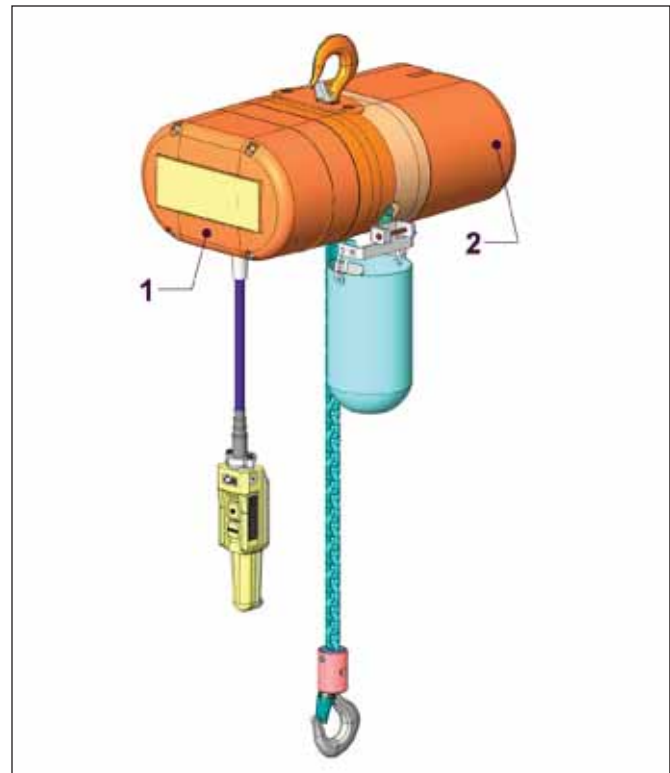


Figure 13. Location of Components

**Voltage conversion board is located under back frame cover (1) for Models A-H and under motor housing cover (2) for Models J-RRT.**

The voltage change board is color coded to indicate high and low voltage connections. Connecting the 9 and 12 pin plugs into the "Red" voltage change board receptacles will connect the hoist for high voltage (380-3-50, 415-3-50 or 460-3-60). To change the hoist voltage to low voltage (208-3-60, 220-3-50 or 230-3-60) simply remove the 9 and 12 pin plugs from the "Red" receptacles and insert same into the "White" receptacles located on the voltage change board. Be sure to make a notation of the new hoist voltage on the tag attached to the power cord.

## POWER PHASING

Since the motor in a three phase hoist can rotate in either direction, depending on the manner in which it is connected to the power supply, the direction of hook movement must be checked prior to each usage.

**NOTE:** Serious damage can result if the hook is run to the upper or lower limit of travel with the hook operating in a direction opposite to that indicated by the control station. Therefore, proceed as follows:

1. Make temporary connections at the power supply.
2. Operate (UP) control momentarily. If hook raises, connections are correct and can be made permanent.
3. If hook lowers, it is necessary to change direction by inter-changing the Grey lead and the Black lead of hoist power supply. Under no circumstances should the internal wiring of the control device or hoist be changed to reverse hook direction. The wiring is inspected and tested before leaving the factory.

Do not force the Lodestar Load-limiter to compensate for improperly adjusted limit switches or reverse voltage phasing.

## **WARNING**

Allowing the hook block to run into the bottom of the hoist when raising a load or allowing the chain to become taut between the loose end screw and the frame when lowering a load may break the chain and allow the load to drop.

### **TO AVOID INJURY:**

Do not allow the hook block to contact the bottom of the hoist or the loose end chain to become taut.

## CHECKING FOR TWIST IN LOAD CHAIN MODELS E,H, E-2, H-2,R, RR, R-2, RR-2

The best way to check for this condition is to run the lower hook, without a load, up to within about 2 feet (.61 meters) of hoist. If the dead end of the chain has been properly installed, a twist can occur only if the lower hook block has been capsized between the strands of chain. Reverse capsize to remove twist.

Models RT, RT-2, RRT and RRT-2

On these models, the load chain is dead ended on top of the lower hook block. If the chain has been properly installed, the only way a twist can occur is if the lower hook block has been capsized between the strands of chain. If this has occurred, two strands of chain will be wrapped around each other and to remove this, reverse the capsize.

## CHECKING FOR ADEQUATE VOLTAGE AT HOIST

The hoist must be supplied with adequate electrical power in order to operate properly. For proper operation, the voltage, (measured at the hoist end of the standard power cord with the hoist operating in the, up direction with full load) must be as indicated in the table below.

| Nominal Voltage | Minimum Running Voltage | Minimum Starting Voltage |
|-----------------|-------------------------|--------------------------|
| 115-1-60        | 104                     | 98                       |
| 230-1-60        | 207                     | 196                      |
| 230-3-60        | 187                     | -                        |
| 460-3-60        | 396                     | -                        |
| 575-3-60        | 495                     | -                        |
| 220-3-50        | 198                     | -                        |
| 380-3-50        | 365                     | -                        |
| 415-3-50        | 399                     | -                        |
| 550-3-50        | 495                     | -                        |

## SIGNS OF INADEQUATE ELECTRICAL POWER (LOW VOLTAGE) ARE:

- Noisy hoist operations due to brake and/or contactor chattering.
- Dimming of lights or slowing of motors connected to the same circuit.
- Heating of the hoist motor and other internal components as well as heating of the wires and connectors in the circuit feeding the hoists.
- Failure of the hoist to lift the load due to motor stalling.
- Blowing of fuses or tripping of circuit breakers.

## **WARNING**

Failure to properly ground the hoist presents the danger of electric shock.

### **TO AVOID INJURY:**

Permanently ground the hoist as instructed in this manual.

To avoid these low voltage problems, the hoist must be connected to an electrical power supply system that complies with the National Electrical Code and applicable local codes. This system must also provide (slow blow fuses or inverse-time type circuit breakers) and provisions for grounding the hoist.

Low voltage may also be caused by using an undersized cord and/or connectors to supply power to the hoist. The following chart should be used to determine the size wires in the extension cord in order to minimize the voltage drop between the power source and the hoist.

| Length of Extension Cord                  | Single Phase Hoists | Three Phase Hoist |
|---|---------------------|-------------------|
|   | Minimum Wire Size   | Minimum Wire Size |
| Up to 50 Feet                             | #14 AWG             | #16 AWG           |
| 80 FEET (24.4 M)                          | #12 AWG             | #16 AWG           |
| 120 FEET (36.7 M)                         | #10 AWG             | #14 AWG           |
| 200 FEET (61.0 M)                         | Contact Factory     | #14 AWG           |
| For runs beyond 200 Feet contact factory. |                     |                   |

## **WARNING**

Failure to provide a proper power supply system for the hoist may cause hoist damage and offers the potential for a fire.

### **TO AVOID INJURY:**

Provide each hoist with a 20 amp, minimum, overcurrent protected power supply system per the National Electrical Code and applicable local codes as instructed in this manual.

Remember, operation with low voltage can void the CM repair/replacement policy. When in doubt about any of the electrical requirements, consult a qualified electrician.

## **WARNING**

Working in or near exposed energized electrical equipment presents the danger of electric shock.

### **TO AVOID INJURY:**

DISCONNECT POWER AND LOCKOUT/TAGOUT  
DISCONNECTING MEANS BEFORE REMOVING COVER OR  
SERVICING THIS EQUIPMENT.

## CHECKING LIMIT SWITCH OPERATION IF HOIST IS EQUIPPED

With hoists that are equipped with an adjustable screw limit switch, the limit switch will automatically stop the hook at any predetermined point when either hoisting or lowering.

### **WARNING**

Allowing the hook block to run into the bottom of the hoist when raising a load or allowing the chain to become taut between the loose end screw and the frame when lowering a load may break the chain and allow the load to drop.

**Do not allow the hook block to contact the bottom of the hoist or the loose end chain to become taut.**

Operate hoist over the entire length of its rated lift, checking upper and lower limit switches for correct operation as follows:

1. Press(UP) control and raise the lower hook until top of hook block is about one foot (305 mm) below the hoist.
2. Cautiously continue raising the hook until the upper limit switch stops the upward motion. The upper limit switch is set at the factory to stop the hook block 3 inches (76.2 mm) from bottom of the hoist on all units with standard 10 foot (3m) lift except Models AA and AA-2. Factory setting is 6 inches (152.4 mm) for these models and for all other models equipped with chain for lifts longer than 10 feet (3m).
3. If adjustment is necessary, see page 23.
4. Press (DOWN) control and cautiously lower hook until lower limit switch stops the downward motion. From 7 to 11 chain links (depending on hoist model) should be between the loose end link and the hoist entry. See Figures 7 and 8.
5. If adjustment is necessary, see page 23.

**NOTE: If the hoist is equipped with a chain container/bag, reset the upper and lower limit switches as indicated on page 23.**

**Under no condition should the hook block or load be permitted to come in contact with the chain container/bag. If contact is made, the function of the chain container can be interfered with and its fasteners imperiled.**

**NOTE: When chain bag is filled to capacity the bag must be no more than 75% filled.**

## CONTROL CORD

Unless ordered on a special basis, the hoist is supplied with a control cord that will position the control station approximately 4 feet above the lower hook when it is at the lower limit of the lift. If this places the control station too close to the floor, a "control cord alteration kit" (Part Number 28642) can be obtained from CM for shortening the length of the control cord.

### **WARNING**

Tying knots or loops to shorten the drop of the control station will make the strain relief ineffective and the internal conductors of the cord may break.

#### **TO AVOID INJURY:**

**Shorten the control cord using the control cord alteration kit and the instructions provided with the kit.**

## OPERATING INSTRUCTIONS

### GENERAL

1. The Load-limiter is designed to slip on an excessive overload. An overload is indicated when the hoist will not raise the load. Also, some clutching noise may be heard if the hoist is loaded beyond rated capacity. Should this occur, immediately release the (UP) control to stop the operation of the hoist. At this point, the load should be reduced to the rated hoist capacity or the hoist should be replaced with one of the proper capacity. When the excessive load is removed, normal hoist operation is automatically restored.

**CAUTION: The Load-limiter is susceptible to overheating and wear when slipped for extended periods. Under no circumstance should the clutch be allowed to slip for more than a few seconds.**

It is not recommended for use in any application where there is a possibility of adding to an already suspended load to the point of overload. This includes dumbwaiter (\*see below) installations, containers that are loaded in mid-air, etc.

(\* Refer to limitations on Page 3 concerning dumbwaiter applications.

2. All hoists are equipped with an adjustable screw limit switch, which automatically stops the hook at any predetermined point when either hoisting or lowering.
3. The control station used on two speed hoists is similar to single speed unit, except that either of two definite speeds may be selected by the operator in both hoisting and lowering. Each control when partially depressed provide SLOW speed and when fully depressed gives FAST speed. Partial release of control returns hoist to slow speed, while complete release allows hoist to stop. Rated lifting speeds are shown on hoist identification plate. SLOW speed is intended as a means of carefully controlling or "spotting" the load, although the hoist may be operated solely at this speed if desired. It is not necessary to operate in the SLOW speed position as the hoist will pick up a capacity load at FAST speed from a standing start. In other words, it is not necessary to hesitate at the slow position when moving control from STOP to FAST position or vice versa.
4. If material being handled must be immersed in water, pickling baths, any liquid, dusty or loose solids, use a sling chain of ample length so that the hook is always above the surface. Bearings in the hook block are shielded only against ordinary atmospheric conditions.

### HOIST

1. Before picking up a load, check to see that the hoist is directly overhead.
2. WHEN APPLYING A LOAD, IT SHOULD BE DIRECTLY UNDER HOIST OR TROLLEY. AVOID OFF CENTER LOADING OF ANY KIND.
3. Take up a slack load chain carefully and start load easily to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower the load and remove the excess load.
4. DO NOT allow the load to swing or twist while hoisting.
5. DO NOT allow the load to bear against the hook latch.



## HOIST WITH LOW HEADROOM TROLLEY

This unit should be moved by pushing on the suspended load or by pulling the empty hook. However, the unit can also be moved by pulling on the control station since an internal steel cable extends the length of the control cord and is anchored to the hoist and to the control station.

## HOIST WITH MOTOR DRIVEN TROLLEY

This unit should be moved by operating the controls marked (Forward) and (Reverse) in control station. Unless altered by the erector, depressing (Forward) control will move the hoist toward motor housing end. Anticipate the stopping point and allow trolley to coast to a smooth stop. Reversing or "plugging" to stop trolley causes overheating of motor and swaying of load.

## SAFE OPERATING INSTRUCTIONS AND PROCEDURES

For safety precautions and a list of Do's and Do Not's for safe operation of hoists, refer to page 3.

1. Permit only competent personnel to operate unit.
2. When preparing to lift a load, be sure that the attachments to the hook are firmly seated in hook saddle. Avoid off center loading of any kind, especially loading on the point of hook.
3. **DO NOT** allow the load to bear against the hook latch. The latch is to help maintain the hook in position while the chain is slack before taking up slack chain.

### **WARNING**

Allowing the load to bear against the hook latch and/or hook tip can result in loss of load.

#### **TO AVOID INJURY:**

**Do not allow the load and/or attachments to bear against the hook latch and/or hook tip. Apply load to hook bowl or saddle only.**

4. **DO NOT** wrap the load chain around the load and hook onto itself as a choker chain.  
Doing this will result in:
  - a. The loss of the swivel effect of the hook which could result in twisted chain and a jammed lift wheel.
  - b. The upper limit switch, if so equipped, is by-passed and the load could hit the hoist.
  - c. The chain could be damaged at the hook.
5. Before lifting load, check for twists in the load chain. On double and triple reeved units, a twist can occur if the lower hook block has been capsized between the strands of chain. Reverse the capsize to remove twist.
6. Stand clear of all loads and avoid moving a load over the heads of other personnel. Warn personnel of your intentions to move a load in their area.
7. **DO NOT** leave the load suspended in the air unattended.
8. **DO NOT** use this or any other overhead materials handling equipment for lifting persons.
9. **DO NOT** load hoist beyond the rated capacity shown on ID plate. When in doubt, use the next larger capacity CM Lodestar Hoist.

10. Warn personnel of your intention to lift a load in the area. Tie off the load with auxiliary chains or cables before access to the area beneath the load is permitted.
11. Take up a slack load chain carefully and start load easily to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower the load and remove the excess load.
12. When lifting, raise the load only enough to clear the floor or support and check to be sure that the attachments to the hook and load are firmly seated. Continue lift only after you are assured the load is free of all obstructions.
13. **DO NOT** allow the load to swing or twist while hoisting.
14. Never operate the hoist when flammable materials or vapors are present. Electrical devices produce arcs or sparks that can cause a fire or explosion.
15. **STAY ALERT!** Watch what you are doing and use common sense. Do not use the hoist when you are tired, distracted or under the influence of drugs, alcohol or medication causing diminished control.

## INSPECTION

To maintain continuous and satisfactory operation, a regular inspection procedure must be initiated to replace worn or damaged parts before they become unsafe. Inspection intervals must be determined by the individual application and are based on the type of service to which the hoist will be subjected.

The type of service to which the hoist is subjected can be classified as "Normal", "Heavy", or "Severe".

### Normal Service:

Involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65 percent of rated load for not more than 25 percent of the time.

### Heavy Service:

Involves operating the hoist within the rated load limit which exceeds normal service.

### Severe Service:

Normal or heavy service with abnormal operating conditions or constant exposure to the elements of nature.

**Two classes of inspection - frequent and periodic - must be performed.**

### Frequent Inspections:

These inspections are visual examinations by the operator or other designated personnel. Records of such inspections are not required. The frequent inspections are to be performed monthly for normal service, weekly to monthly for heavy service, and daily to weekly for severe service, and they should include those items listed in Table 4.

### Periodic Inspections:

These inspections are visual inspections of external conditions by an appointed person. Records of periodic inspections are to be kept for continuing evaluation of the condition of the hoist.

Periodic inspections are to be performed yearly for normal service, semi-annually for heavy service and quarterly for severe service, and they are to include those items listed in Table 5.

**CAUTION: Any deficiencies found during inspections are to be corrected before the hoist is returned to service. Also, the external conditions may show the need for disassembly to permit a more detailed inspection, which, in turn, may require the use of nondestructive type testing**

## PREVENTATIVE MAINTENANCE

In addition to the above inspection procedure, a preventive maintenance program should be established to prolong the useful life of the hoist and maintain its reliability and continued safe use. The program should include the periodic and frequent inspections with particular attention being paid to the lubrication of the various components using the recommended lubricants (see page 127).

## SUSPENSION INSPECTION CRITERIA

**BRACKETS** - Replace any bracelets found to be cracked or distorted.

**BOLTS** - If the suspension is removed for any reason, including inspection, the suspension bolts should be replaced.

**NYLON THREAD LOCKING NUTS** - It is not necessary to replace the nylon thread locking nuts each time the suspension bolts are replaced as long as new bolts with the locking patch are being used. It is recommend that the nylon thread locking nuts are replaced each time the hoist is torn down to allow these nuts to be replaced.

## HOOK REMOVE CRITERIA

Based on B30-10 Hooks shall be removed from service if damage such as the following is visible and shall only be returned to service when approved by a qualified person:

- Missing or illegible rated load identification or illegible hook manufacturers' identification or secondary manufacturer's identification.
- Excessive pitting or corrosion.
- Cracks, nicks, or gouges.
- Wear--any wear exceeding 10% of the original section dimension of the hook or its load pin.
- Deformation--any visibly apparent bend or twist from the plane of the unbent hook.
- Throat opening-any distortion causing an increase in the throat opening of 5% not to exceed ¼" (6mm).
- Inability to lock - any self-locking hook that does no lock.
- Inoperative latch any damaged latch or malfunctioning latch that does not close the hook's throat.
- Thread wear, damage, or corrosion.
- Evidence of excessive heat exposure or unauthorized welding.
- Evidence of unauthorized alterations such as drilling, machining, grinding, or other modifications.

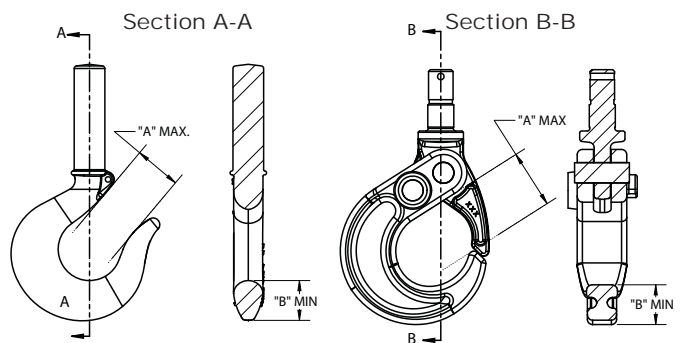


Figure 14. Hook Inspection

| Models  | Latch Type Hook    |                   | Latchlok® Hook    |                   |
|---|--------------------|-------------------|-------------------|-------------------|
|   | "A" Max            | "B" Min           | "A" Max           | "B" Min           |
| A, A-2, AA, AA-2, B, B-2, C, C-2, F AND F-2           | 1.19"<br>(30.2mm)  | .91"<br>(23.1mm)  | 1.48"<br>(37.7mm) | .75"<br>(18.8mm)  |
| E, E-2, H, H-2, J, J-2, JJ, JJ-2, L, L-2, LL AND LL-2 | 1.31"<br>(33.3mm)  | 1.08"<br>(27.5mm) | 1.48"<br>(37.7mm) | .75"<br>(18.8mm)  |
| R, R-2, RR, RR-2 AND RRS                              | 1.50"<br>(38.1 mm) | 1.43"<br>(36.2mm) | 1.92"<br>(48.8mm) | .94"<br>(23.9mm)  |
| RT, RT-2, RRT AND RRT-2                               | 1.50"<br>(38.1 mm) | 1.43"<br>(36.2mm) | 2.50"<br>(63.5mm) | 1.19"<br>(23.9mm) |

| Table 4. Minimum Frequent Inspections |                   |                 |  |
|---------------------------------------|-------------------|-----------------|--|
| TYPE OF SERVICE                       |                   |                 | ITEM   |
| Normal                                | Heavy             | Severe          |  |
| Monthly                               | Weekly to Monthly | Daily to Weekly | a) Brake for evidence of slippage.   |
|                                       |                   |                 | b) Control functions for proper operation.   |
|                                       |                   |                 | c) Hooks for damage, cracks, twists, excessive throat opening, latch engagement and latch operation - see page 18.   |
|                                       |                   |                 | d) Load chain for adequate lubrication, as well as for signs of wear, damaged links or foreign matter - see page 20. |
|                                       |                   |                 | e) Load chain for proper reeving and twists.   |

| Table 5. Minimum Periodic Inspections |                |                |   |
|---------------------------------------|----------------|----------------|---|
| TYPE OF SERVICE                       |                |                | ITEM  |
| Normal                                | Heavy          | Severe         |   |
| Yearly                                | Every 6 Months | Every 3 Months | a) All items listed in Table 4 for frequent inspections.  |
|                                       |                |                | b) External evidence of loose screws, bolts or nuts.  |
|                                       |                |                | c) External evidence of worn, corroded, cracked or distorted hook block, suspension screws, gears, bearings and dead end block and chain pin.   |
|                                       |                |                | d) External evidence of damage to hook retaining nut and pin. Also check the upper suspension adapter making sure it is fully seated in the hoist frame and that both screws are tight.   |
|                                       |                |                | e) External evidence of damage or excessive wear of the liftwheel and hook block sheave chain pockets. Widening and deepening of the pockets may cause the chain to lift-up in the pocket and result in binding between liftwheel and chain guides or between the sheave and hook block. Also, check the chain guide for wear or burring where the chain enters the hoist. Severely worn or damaged parts should be replaced.   |
|                                       |                |                | f) External evidence of excessive wear of brake parts, and AC brake adjustment - see page 22.   |
|                                       |                |                | g) External evidence of pitting or any deterioration of contactor contacts. Check the operation of the control station making sure the buttons operate freely and do not stick in either position.  |
|                                       |                |                | h) Inspect the electrical cords and cables and control station enclosure for damaged insulation.  |
|                                       |                |                | i) Inspect trolley trackwheels for external wear on tread and flange and for wear on internal bearing surfaces as evidenced by a looseness on the stud. Suspension components for damage, cracks, wear and operation. Also check suspension adapter screws for proper tightness - see page 11.  |
|                                       |                |                | j) Inspect the loose end link, loose end screw and dead end block on double reeved units. Replace worn or distorted parts.  |
|                                       |                |                | k) Inspect the suspension lug or hook for excess free play or rotation. Replace worn parts as evidenced by excess free play or rotation.  |
|                                       |                |                | l) Inspect for signs of lubricant leaks at the gasket between the gear housing and back frame. tighten screws holding back frame to gear housing. If leak persists, repack housing and gears with grease and install a new gasket.  |
|                                       |                |                | m) On the Models RT, RT-2, RRT and RRT-2: <ol style="list-style-type: none"> <li>1. Inspect shackle and lug pins for wear. Replace if worn.</li> <li>2. Check dead end screw in lower hook black for wear and tightness*.</li> <li>3. Check shackle pin for proper seating in groove of load bracket.</li> <li>4. Inspect cloverleaf plate on bottom of sheave hanger for wear or burring. Replace if worn.</li> <li>5. Inspect sheave stud nut and seat for wear. Replace if worn or damaged.</li> </ol> |

\*When tightening the special, dead end socket head screw, it should be held firmly in place and torqued from the nut end only to avoid damage to the screw and/or dead end chain link (Refer to step J on page 45).

## INSPECTING THE LOAD CHAIN:

The chain must be inspected at regular intervals, with a minimum of once annually. As the frequency of use increases, the time intervals between inspections must be reduced. During inspection, the chain must be examined along their entire length, including the hidden parts. If the lifting equipment is frequently used with a constant lifting distance or in other words the switch from upward to downward often takes place in the same area, a particularly thorough inspection and lubrication is required in that area. Worn chain can be an indication of worn hoist components. For this reason, the hoist's chain guides, hook blocks and liftwheel (sprocket) should be examined for wear and replaced as necessary when replacing chain.

1. Check to see if chain is dirty or poorly lubricated.
2. Clean the chain with a non-caustic/non-acid type solvent and make a link by link inspection for wear or cracks in the links, twisted or deformed links. Chain with any one of these defects must be replaced.
3. Slack the portion of the chain that normally passes over the lift-wheel (sprocket) or idler sprocket on multi-reeved hoist. Examine the chain links for wear ( see figure 15). If the wire diameter anywhere on the link measures less than 90% of the nominal wire diameter, the chain must be replaced.

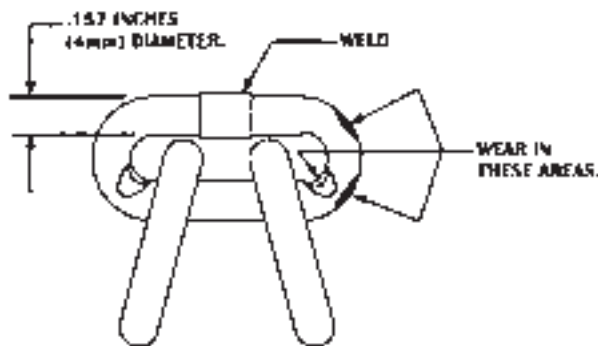
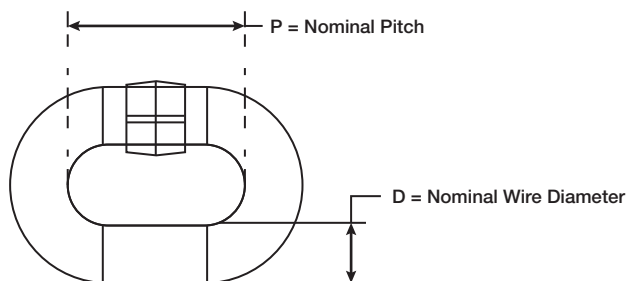


Figure 15. Chain Wear Areas



| Models  | P              | D              |
|---|----------------|----------------|
| A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2, E, E-2, H and H-2                   | .745" (18.9mm) | .250" (6.3mm)  |
| J, J-2, JJ, J-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, and RRT-2 | .858" (21.8mm) | .312" (7.9mm)  |
| RRS   | 1.18 (30.0mm)  | .394" (10.0mm) |

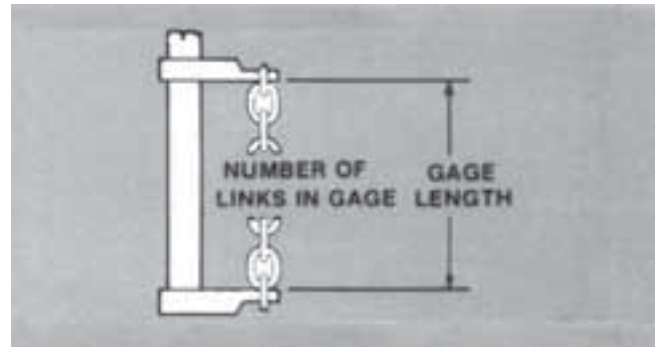


Figure 16. Gaging Load Chain Wear

4. Based upon ASME B30.16, 2012 chain should also be checked for elongation. Select an unworn, unstretched length of the chain (at the slack end for example). Suspend the chain vertically under tension and using a knife blade caliper type gauge, measure the outside length of any convenient number of links, 11 is recommended. Measure the same number of links in the used sections and calculate the percentage in increased length. The chain should be replaced if the length of the used portion is more than 2% longer than the unused portion of the chain. Also, if the pitch of any individual link has elongated by more than 5%, the chain should be replaced.

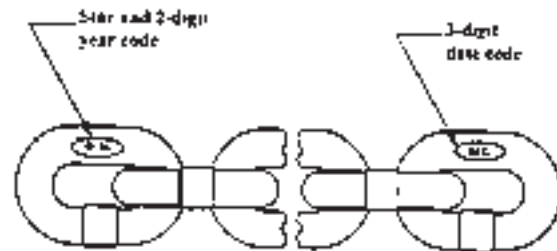


Figure 17. Chain Embossing

**Use only Star (\*) grade load chain and original replacement parts. Use of other chain and parts may be dangerous and voids factory warranty.**

**IMPORTANT:** Do not use replaced chain for other purposes such as lifting or pulling. Load chain may break suddenly without visual deformation. For this reason, cut replaced chain into short lengths to prevent use after disposal.

## **⚠ WARNING**

Use of commercial or other manufacturer's chain and parts to repair CM hoists may cause load loss.

### **TO AVOID INJURY:**

Use only CM supplied replacement load chain and parts. Chain and parts may look alike, but CM chain and parts are made of specific material or processed to achieve specific properties.

## MAINTENANCE

### LOAD-LIMITER

The Load-limiter should operate for the normal life of the hoist without service. The device has been calibrated at the factory for a specific model of hoist. For proper overload protection, be sure before installing a Load-limiter that it is correct for the unit.

| Models                                | Load-Limiter Part Number | Load-Limiter ID (marked on Load-limiter) |
|---------------------------------------|--------------------------|--|
| A,A-2,B,B-2,E,E-2                     | C00000240                | 240                                      |
| AA,AA-2,C,C-2,F,F-2,H,H-2             | C00000241                | 241                                      |
| J,J-2,L,L-2,R,R-2,RT,RT-2             | C00000242                | 242                                      |
| JJ,JJ-2,LL,LL-2,RR,RR-2,RRS,RRT,RRT-2 | C00000243                | 243                                      |

### WARNING

The lubricants used in and recommended for the Lodestar Hoist may contain hazardous materials that mandate specific handling and disposal procedures.

#### TO AVOID CONTACT AND CONTAMINATION:

Handle and dispose of lubricants only as directed in applicable material safety data sheets and in accordance with applicable local, state and federal regulations.

### HOIST LUBRICATION

#### GEARS

**NOTE:** To assure extra long life and top performance, be sure to lubricate the various parts of the Lodestar Hoist using the lubricants specified. If desired, these lubricants may be purchased from CM. Refer to Table of Contents for information on ordering the lubricants.

The gearbox is packed at assembly with grease and should not need to be renewed unless the gears have been removed from the housing and degreased.

If the gears are removed from the housing, wipe the excess grease off with a soft cloth and degrease the gears and housings. Upon reassembly, add grease to gears and housing.

Models A to H hoists require 7 fl. oz. of grease. Model J to RRT excluding RRS hoists require 15 fl. oz. Of grease.

For model RRS hoist: fully coat gear teeth and pack gear box, using a total of 22 fluid ounces of grease

1. Apply 7 ounces of grease on the final gear stage, prior to installing the intermediate frame
2. Apply 15 ounces of grease on the 1st 2 gear stages, prior to installing the back frame.

Also, coat the spline on the end of the drive shaft with a Molydisulphide lubricant such as "Super Herculon".

- The limit switch gears are of molded polymer and require no lubrication.
- Apply a light film of machine oil to the limit switch shaft threads at least once a year.

### BEARINGS

- All bearings and bushings, except the lower hook thrust bearing, are pre-lubricated and require no lubrication. The lower hook thrust bearing should be lubricated at least once a month.

### CHAIN GUIDES, LIFTWHEEL AND LOWER SHEAVE WHEEL

- When the hoist is disassembled for inspection and/or repair, the chain guides, lower sheave wheel (on double chain units) and liftwheel must be lubricated with Lubriplate Bar and Chain Oil 10-R (Fiske Bros. Refining Co. or equivalent) prior to reassembly. The lubricant must be applied in sufficient quantity to obtain natural runoff and full coverage of these parts.

### LOAD CHAIN

A small amount of lubricant will greatly increase the life of load chain. Do not allow the chain to run dry.

Keep it clean and lubricate at regular intervals with Lubriplate Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) or equal lubricant. Normally, weekly lubrication and cleaning is satisfactory, but under hot and dirty conditions, it may be necessary to clean the chain at least once a day and lubricate it several times between cleanings.

When lubricating the chain, apply sufficient lubricant to obtain natural run-off and full coverage, especially in the interlink area.

### WARNING

Used motor oils contain known carcinogenic materials

#### TO AVOID HEALTH PROBLEMS:

Never use used motor oils as a chain lubricant.  
Only use Lubriplate Bar and Chain Oil 10-R as a lubricant for the load chain.

### TROLLEY LUBRICATION

See appropriate trolley manual.

### EXTERIOR FINISH

The exterior surfaces of the hoist and trolleys have a durable, scratch resistant baked powder coating. Normally, the exterior surfaces can be cleaned by wiping with a cloth. However, if the finish is damaged, compatible touch-up paint can be purchased from CM. Refer to page138 for information on ordering the paint.

### TEMPERATURE RATING

Normal ambient operating temperature, unless otherwise specified, range from 0° f (-17°c) to 150° f (60°c). Contact factory for ambient temperature solutions outside this stated range.

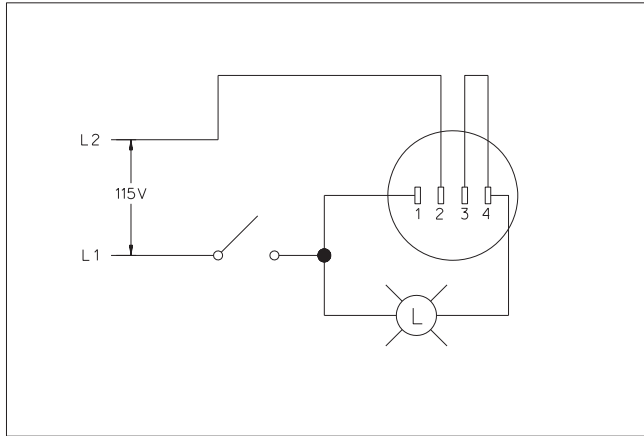
### SOLID STATE REVERSE SWITCH (115-1-60/230-1-60 Units Only)

Above an ambient temperature of 104°F. (40° C.), the frequency of hoist operation should be limited to avoid overheating the solid state reverse switch. Even at temperatures less than 104° F. (40° C.), high duty cycle, frequent starting or reversing, excessive inching, jogging or plugging may overheat the solid state reverse switch. Overheating the switch will cause it to malfunction, and this in turn will overheat the motor and/or damage the solid state reverse switch.

If allowed to cool, the solid state switch will return to normal operation. However, before returning the hoist to service, the following procedure should be used to determine if the switch has been damaged.

1. De-energize the power system supplying the hoist and remove the solid state reverse switch.
2. Connect the solid state reverse switch to a 115-1-60/230-1-60 light circuit as shown below.
3. Close the switch to energize the 115-1-60/230-1-60 power supply. The light bulb will illuminate if the solid state reverse switch is not damaged. If the bulb fails to illuminate, the switch is damaged and must be replaced.
4. Turn the 115-1-60/230-1-60 power off and remove the solid state reverse switch from the test circuit.

Reinstall the solid state reverse switch in the hoist and re-connect it using the wiring diagram supplied with the hoist. Re-energize the power system supplying the hoist and test for proper operation. Also, ventilate the space around the hoist and/or reduce duty cycle, excessive starting, excessive plugging to reduce future malfunctions of the solid state reverse due to overheating.



## BRAKE ADJUSTMENTS

### DC ELECTRIC BRAKE ASSEMBLY

The correct air gap between field and armature is .008-.018 in (0.2-0.45 mm) for models A through H and .008-.020 in (0.2- 0.5 mm) for models J through RRT. The DC brake is not adjustable. As the friction material wears, the brake gap increases. If the maximum air gap is reached, a new friction disc/rotor should be installed.

Table 6a. Limit Switches

| Model              | Hook Travel w/ 44 T.P.I. Shaft (Standard) |     | Hook Travel w/ 56 T.P.I. Shaft (Standard) |     | Hook Travel w/ 64 T.P.I. Shaft (Standard) |     |
|--------------------|---|-----|---|-----|---|-----|
|                    | Max Length of Lift                        |     | Max Length of Lift                        |     | Max Length of Lift                        |     |
|                    | m   | ft  | m   | ft  | m   | ft  |
| A, A-2, C, C-2     | 63  | 206 | 80  | 262 | 91  | 299 |
| AA, AA-2           | 117                                       | 385 | 150                                       | 491 | 171                                       | 561 |
| B, B-2, F, F-2     | 32  | 105 | 41  | 133 | 46  | 152 |
| E, E-2, H, H-2     | 16  | 52  | 20  | 67  | 23  | 76  |
| L, L-2, J, J-2     | 39  | 127 | 49  | 162 | 56  | 185 |
| JJ, JJ-2, LL, LL-2 | 76  | 250 | 97  | 318 | 111                                       | 363 |
| R, R-2             | 20  | 64  | 25  | 81  | 28  | 93  |
| RR, RR-2           | 38  | 124 | 48  | 158 | 55  | 181 |
| RT, RT-2           | 13  | 42  | 16  | 54  | 19  | 62  |
| RRT, RRT-T         | 25  | 83  | 32  | 106 | 37  | 121 |
| RRS                | 38  | 125 | 48  | 159 | 55  | 182 |

Table 6b. Limit Switches

| Model              | Hook Travel, per Notch |      | A (minimum distance between top of hook block and bottom of hoist) |      | B (minimum length of loose end chain) |
|--------------------|------------------------|------|--|------|---------------------------------------|
|                    | mm                     | in   | mm   | in   |                                       |
| A, A-2, C, C-2     | 52.8                   | 2.08 | 38.1   | 1.50 | 6 links                               |
| AA, AA-2           | 98.8                   | 3.89 | 50.8   | 2.00 | 6 links                               |
| B, B-2, F, F-2     | 26.9                   | 1.06 | 38.1   | 1.50 | 6 links                               |
| E, E-2, H, H-2     | 13.5                   | 0.53 | 44.45  | 1.75 | 6 links                               |
| L, L-2, J, J-2     | 30.5                   | 1.20 | 38.1   | 1.50 | 8 links                               |
| JJ, JJ-2, LL, LL-2 | 116.8                  | 4.60 | 63.5   | 2.50 | 8 links                               |
| R, R-2             | 15.2                   | 0.60 | 63.5   | 2.50 | 8 links                               |
| RR, RR-2           | 29.7                   | 1.17 | 63.5   | 2.50 | 8 links                               |
| RT, RT-2           | 10.2                   | 0.40 | 63.5   | 2.50 | 8 links                               |
| RRT, RRT-T         | 19.8                   | 0.78 | 63.5   | 2.50 | 8 links                               |
| RRS                | 30.0                   | 1.18 | 63.5   | 2.50 | 2.50 in                               |



## LIMIT SWITCH ADJUSTMENTS

If limit switch operation has been checked as described on page 16 and is not operating correctly or is not automatically stopping the hook at a desired position, proceed as follows:

1. Disconnect hoist from power supply.
2. Remove back frame cover, see Figure 13.
3. The identification of upper and lower limit switches are indicated on the fiber insulator.
4. Loosen the 2 screws or spring back the rotatable guide to disengage the travel nut

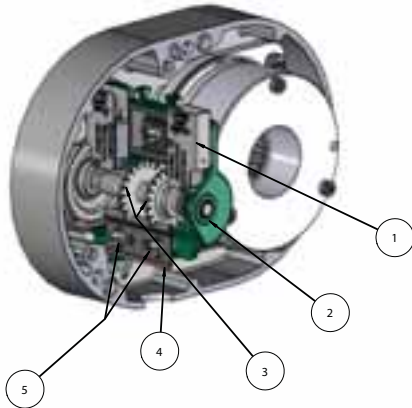
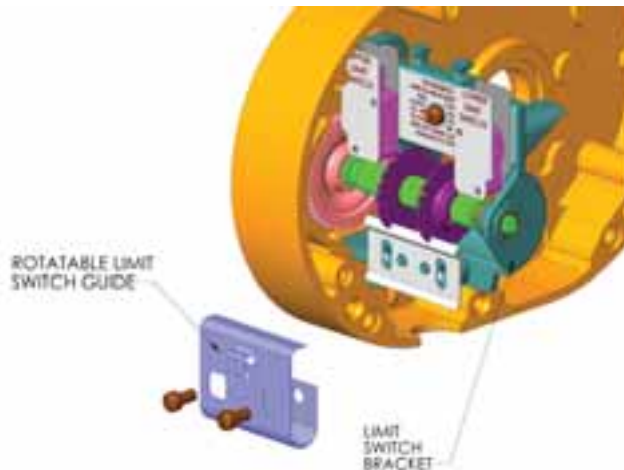


Figure 18. Limit Switches, Models A-H

1. Limit switch sub-assy
2. Limit switch shaft
3. Travelling nuts
4. Guide plate
5. Screws

Figure 18A. Rotatable Limit Switches, Models A-H



## SETTING UPPER LIMIT SWITCH

After completing steps 1 thru 4

5. Refer to table 6 - The "A" Dimensions given are the minimum distance that should be set between the top at hook block and the bottom of the hoist.

**CAUTION: THE "A" DIMENSIONS SHOWN IN TABLE 6 ARE THE MINIMUM ALLOWED FOR SAFE OPERATION AND SHOULD NOT BE REDUCED.**

6. Reconnect hoist to power supply.
7. Run hook to the desired upper position, cautiously operating the hoist without a load.
8. Disconnect hoist from power supply.
9. Moving one travel nut toward the other increases hook travel and away from the other decreases the travel. . Now, turn the nut nearest the switch indicated as the "UPPER LIMIT SWITCH" until it just breaks the limit switch contacts, cautious not to allow the movement of the other travel nut, if previously set. An audible click will be heard as the switch opens. Continue to rotate the nut toward the switch an additional one full tooth.

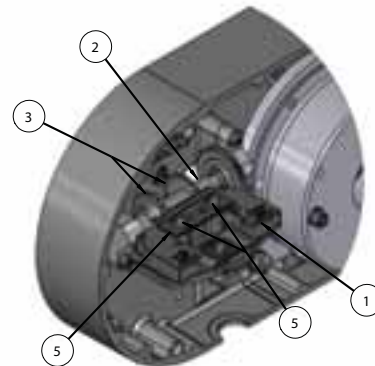


Figure 19. Limit Switches, Models J-RRT

1. Limit switch sub-assy
2. Limit switch shaft
3. Traveling nuts
4. Guide plate
5. Screws

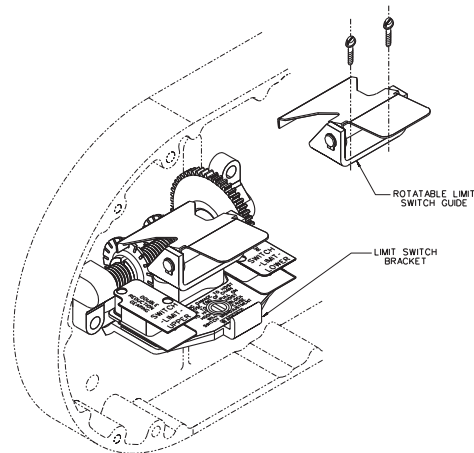


Figure 19A. Rotatable Limit Switches, Models J-RRT

10. Securely reposition the guide plate in the slot
11. Reconnect hoist to power supply and check the stopping point of hook by first lowering the hook about 2 feet (61 cm), then raise the hook by jogging cautiously until the upper limit switch stops upward motion. The stopping point of hook should be the desired upper position. If not, repeat the above instructions.

12. Double check setting by lowering the hook about 2 feet (61 cm) and then run the hook into the upper limit with (UP) control held depressed.
13. Fine adjustment of the upper limit setting may be obtained by inverting the stationary guide plate in Step 10. (Not available with the rotatable guide plate.) The offset on the plate gives adjustments equivalent to 1/2 notch, see Table 6 for the "Hook Travel Per Notch of Limit Switch Nut". When inverting the plate, it may be necessary to use the notch adjacent to the one used in the preliminary setting.

## SETTING LOWER LIMIT SWITCH

After completing steps 1 thru 4

5. Refer to Table 6 - The "B" dimensions given are the minimum length of loose end chain left on the non-load side of the lift wheel when the hook is positioned at the lowest allowable hook position.

**CAUTION: THE "B" DIMENSIONS SHOWN IN TABLE 6 ARE THE MINIMUM ALLOWED FOR SAFE OPERATIONS AND SHOULD NOT BE REDUCED.**

6. Reconnect hoist to power supply.
7. Run hook to the desired lower position, cautiously operating the hoist without a load.
8. Disconnect hoist from power supply.
9. Moving one travel nut toward the other increases hook travel and away from the other decreases hook travel. Now, turn the nut nearest the switch indicated as the "LOWER LIMIT SWITCH" until it just breaks the limit switch contacts, cautious not to allow the movement of the other travel nut if previously set. An audible click will be heard as the switch opens. Continue to rotate the nut toward the switch an additional one full tooth.
10. Securely reposition the guide plate in the slot.
11. Reconnect hoist to power supply and check the stopping point of hook by first raising the hook about 2 feet (61 cm) then lower the hook by jogging cautiously until the lower limit switch stops downward motion. The stopping point of the hook should be the desired lower position, if not repeat the above instructions.
12. Double check setting by raising the hook about 2 feet (61 cm) and then run the hook into the lower limit with (DOWN) control held depressed.
13. Fine adjustment of the lower limit setting may be obtained by inverting the stationary guide plate in Step 10. (Not available with the rotatable guide plate). The plate offset on the plate gives adjustments equivalent to 1/2 notch, see Table 6 for the "Hook Travel per Notch of Limit Switch Nut". When inverting the plate, it may be necessary to use the notch adjacent to the one used in the preliminary setting.

## CONVERTING LIMIT SWITCH GUIDES

1. Disconnect the hoist from the power supply system.
2. Refer to the exploded views and remove the back frame cover from the hoist.  
Remove and discard the limit switch guide plate - retaining the 2 screws.
3. Refer to Figure 18A and 19A and assemble the limit switch guide plate to the limit switch bracket. Secure using the 2 screws.

## TROUBLE SHOOTING ALL HOISTS TABLE 7

| TROUBLE   | PROBABLE CASE  | REMEDY   |
|---|--|--|
| 1. Hook does not respond to the control station or control device | A.) No voltage at hoist-main line or branch circuit switch open; branch line fuse blown or circuit breaker tripped.  | A.) Close switch, replace fuse or reset breaker.   |
|   | B.) Phase failure (single phasing, three phase unit only)-open circuit, grounded or faulty connection in one line of supply system, hoist wiring, reversing contactor, motor leads or windings.                          | B.) Check for electrical continuity and repair or replace defective part.  |
|   | C.) Upper or lower limit switch has opened the control circuit.  | C.) Press the "other" control and the hook should respond. Adjust limit switches as described on page 23.  |
|   | D.) Open control circuit-open or shorted winding in transformer, reversing contactor coil or loose connection or broken wire in circuit;mechanical binding in contactor control station contacts not closing or opening. | D.) Check electrical continuity and repair or replace defective part.  |
|   | E.) Wrong voltage or frequency.  | E.) Use the voltage and frequency indicated on hoist identification plate. For three phase dual voltage unit, make sure the connections at the voltage change board are the proper voltage as described on page 14.  |
|   | F.) Low Voltage.   | F.) Correct low voltage condition as described on page 14.   |
|   | G.) Brake not releasing-open or shorted coil winding; armature binding.  | G.) Check electrical continuity and connections. Check that correct coil has been installed. The coil for three phase dual voltage unit operates at 230 volts when the hoist is connected for either 230 volt or 460 volt operation. Check brake adjustment as described on page 22. |
|   | H.) Excessive load.  | H.) Reduce loading to the capacity limit of hoist as indicated on the identification plate.  |
| 2.) Hook moves in wrong direction.                                | A.) Wiring connections reversed at either the control station or terminal board (single phase unit only).  | A.) Check connections with the wiring diagram.   |
|   | B.) Failure of the motor reversing switch to effect dynamic braking at time of reversal (single phase unit only).  | B.) Check connections to switch. Replace a damaged or faulty capacitor   |
|   | C.) Phase reversal (three phase unit only).  | C.) Refer to installation instructions on page 14  |

## TROUBLE SHOOTING ALL HOISTS TABLE 7

| TROUBLE  | PROBABLE CASE   | REMEDY  |
|--|---|---|
| 3.) Hook lowers but will not raise.                | A.) Excessive load.   | A.) See item 1H.  |
|  | B.) Open hoisting circuit-open or shorted winding in reversing contactor coil loose connection or broken wire in circuit; control station contacts not making; upper limit switch contacts open.  | B.) Check electrical continuity and repair or replace defective part. Check operation of limit switch as described on page 16.    |
|  | C.) Phase failure (three phase unit only).  | C.) See item 1B.  |
| 4.) Hook raises but will not lower.                | A.) Open lowering circuit-open or shorted winding in reversing contactor coil, loose connection or broken wire in circuit; control station contacts not making; lower limit switch contacts open. | A.) Check electrical continuity and repair or replace defective part. Check operation of limit switch as described on page 15-16. |
|  | B.) Motor reversing switch not operating (single phase unit only).  | B.) See items 2B and 3C.  |
| 5.) Hook lowers when hoisting control is operated. | A.) Phase failure (three phase unit only).  | A.) See item 1B.  |
|  | B.) Phase reversal (three phase unit only).   | B.) Refer to installation instruction on page 14.   |
| 6.) Hook does not stop promptly.                   | A.) Brake slipping.   | A.) Check brake adjustment as described on page 22.   |
|  | B.) Excessive load.   | B.) See item 1H.  |
| 7.) Hoist operates sluggishly.                     | A.) Excessive load.   | A.) See item 1H.  |
|  | B.) Low voltage.  | B.) Correct low voltage condition as described on page 15.  |
|  | C.) Phase failure or unbalanced current in the phases (three phase unit only).  | C.) See item 1B.  |
|  | D.) Brake dragging.   | D.) Check brake adjustment as described on page 22.   |

## TROUBLE SHOOTING ALL HOISTS TABLE 7

| TROUBLE  | PROBABLE CASE   | REMEDY   |
|--|---|--|
| 8.) Motor overheats.                                     | A.) Low voltage.  | A.) Correct low voltage condition as described on page 15.   |
|  | B.) Excessive load.   | B.) See item 1H.   |
|  | C.) Extreme external heating.   | C.) Above an ambient temperature of 40°C. (104°F.), the frequency of hoist operation must be limited to avoid overheating of motor. Special provisions should be made to ventilate the space or shield the hoist from radiation. |
|  | D.) Frequent starting or reversing.   | D.) Avoid excessive inching, jogging or plugging. This type of operation drastically shortens the motor and contactor life and causes excessive brake wear.  |
|  | E.) Phase failure or unbalanced current in the phase (three phase unit only).                             | E.) See item 1B.   |
|  | F.) Brake dragging.   | F.) Check brake adjustment as described on page 22.  |
|  | G.) 115-1-60 Units: Solid state reverse switch exposed to excessive temperature or the switch is damaged. | G.) See page 21.   |
| 9.) Hook fails to stop at either or both ends of travel. | A.) Limit switches not opening circuits.  | A.) Check switch connections, electrical continuity and mechanical operation. Check the switch adjustment as described on page 15-16.  |
|  | B.) Limit Switch Shaft not rotating.  | B.) Check for damaged Limit Switch gears.  |
|  | C.) Traveling nuts not moving along shaft guide plate loose; shaft or nut threads damaged.                | C.) Tighten guide plate screws. Replace damaged part.  |
| 10.) Hook stopping point varies.                         | A.) Limit switch not holding adjustment.  | A.) See item 9.  |
|  | B.) Brake not holding.  | B.) Check the brake adjustment as described on page 22.  |
|  | C.) Binding of Limit Switch Shaft.  | C.) Check Limit Switch Bearing for proper seating.   |

## TROUBLE SHOOTING ALL HOISTS TABLE 7

| TROUBLE   | PROBABLE CASE                     | REMEDY   |
|---|-----------------------------------|--|
| <b>Two Speed Hoists</b>   |                                   |  |
| 11.) Hoist will not operate at slow speed in either direction.                    | A.) Open Circuit.                 | A.) Open or shorted motor winding, loose or broken wire in circuit, speed selecting contactor stuck in opposite speed mode. Replace motor, repair wire and/or replace speed selecting contactor.   |
|   | B.) Phase Failure.                | B.) See item 1B.   |
| 12.) Hoist will not operate at fast speed in either direction.                    | A.) Open Circuit.                 | A.) See Item 11A.  |
|   | B.) Open speed selecting circuit. | B.) Open or shorted winding in speed selecting contactor coil. Loose connection or broken wire in circuit. Mechanical binding in contactor. Control station contacts not making or opening. Replace speed selector; repair connection, replace contactor or control station. |
|   | C.) Phase Failure.                | C.) See Item 1B.   |
| 13.) Hook will not raise at slow speed.   | A.) Excessive load.               | A.) See item 1H.   |
|   | B.) Phase Failure.                | B.) See Item 1B.   |
|   | C.) Open Circuit.                 | C.) See item 11A.  |
|   | D.) Brake not releasing.          | D.) See Item 1G.   |
| 14.) Hook will not lower at slow speed.   | A.) Phase Failure.                | A.) See item 1B.   |
|   | B.) Open Circuit.                 | B.) See item 11A.  |
|   | C.) Brake not releasing.          | C.) See Item 1G.   |
| 15.) Hook will not raise at fast speed.   | A.) Excessive load.               | A.) See item 1H.   |
|   | B.) Phase Failure.                | B.) See Item 1B.   |
|   | C.) Brake not releasing.          | C.) See Item 1G.   |
| 16.) Hook will not lower at fast speed.   | A.) Phase Failure.                | A.) See Item 1B.   |
|   | B.) Brake not releasing.          | B.) See Item 1G.   |
| 17.) Hook moves in proper direction at one speed, wrong direction at other speed. | A.) Phase reversal.               | A.) Wiring reconnected improperly. Interchange two leads of motor winding that is out of phase at the speed selecting relay.   |



## ELECTRICAL DATA

### TO DETECT OPEN AND SHORT CIRCUITS IN ELECTRICAL COMPONENTS

Open circuits in the coils of electrical components may be detected by isolating the coil and checking for continuity with an ohmmeter or with the unit in series with a light or bell circuit.

Shorted turns are indicated by a current draw substantially above normal (connect ammeter in series with suspected element and impose normal voltage) or D.C. resistance substantially below normal. The current method is recommend for coils with very low D.C. resistance.

Motor current draw in the stator should be measured with the rotor in place and running. Brake, relay and contactor coil current should be measured with the core iron in operating position.

**Table 8. Electrical Data for Hoist Components**

| Transformer Voltage | Leads                            | *D.C. RESISTANCE (OHMS) |
|---------------------|----------------------------------|-------------------------|
| 230/460 to 115      | X2 to X1<br>H2 to H1<br>H3 to H4 | 27.9<br>99.0<br>111.8   |
| 230/380 to 48       | X2 to X1<br>H2 to H1<br>H3 to H4 | 5.2<br>99.0<br>112.6    |
| 220/415 to 24       | X2 to X1<br>H2 to H1<br>H3 to H4 | 1.3<br>100.4<br>114.9   |
| 575 to 115          | X2 to X1<br>H4 to H1             | 28.4<br>329.1           |

| Models        | CONTACTOR OR SPEED SELECTOR COIL VOLTAGE | NOMINAL CURRENT (AMPS) | *D.C. RESISTANCE (OHMS) |
|---------------|--|------------------------|-------------------------|
| A thru H-2    | 115<br>48<br>24                          | 0.04<br>0.09<br>0.19   | 297.5<br>56.3<br>14.9   |
| JJ thru RRT-2 | 115<br>48<br>24                          | 0.07<br>0.17<br>0.33   | 126.6<br>25.1<br>6.4    |

| Models                          | DC BRAKE COIL VOLTAGE | NOMINAL CURRENT (AMPS) | *D.C. RESISTANCE (OHMS) |
|---------------------------------|-----------------------|------------------------|-------------------------|
| A, AA, B, C, E<br>F and H       | 103                   | 0.243                  | 424.4                   |
| A thru H-2                      | 205                   | 0.122                  | 1681                    |
| A-2 thru H-2                    | 255                   | 0.098                  | 2601                    |
| J, JJ, L, LL, R, RR,<br>RT, RRT | 103                   | 0.311                  | 331.5                   |
| J thru RRT-2                    | 205                   | 0.161                  | 1273                    |
| J thru RRT-2                    | 255                   | 0.118                  | 2167                    |

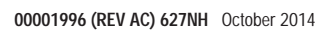
\*Resistance values listed are nominal and they may vary slightly from component to component.

\*\*On dual voltage units (230/460-3-60, 220/380-3-50 and 220/415-3-50), brake coils operate on 230 (220) volts.

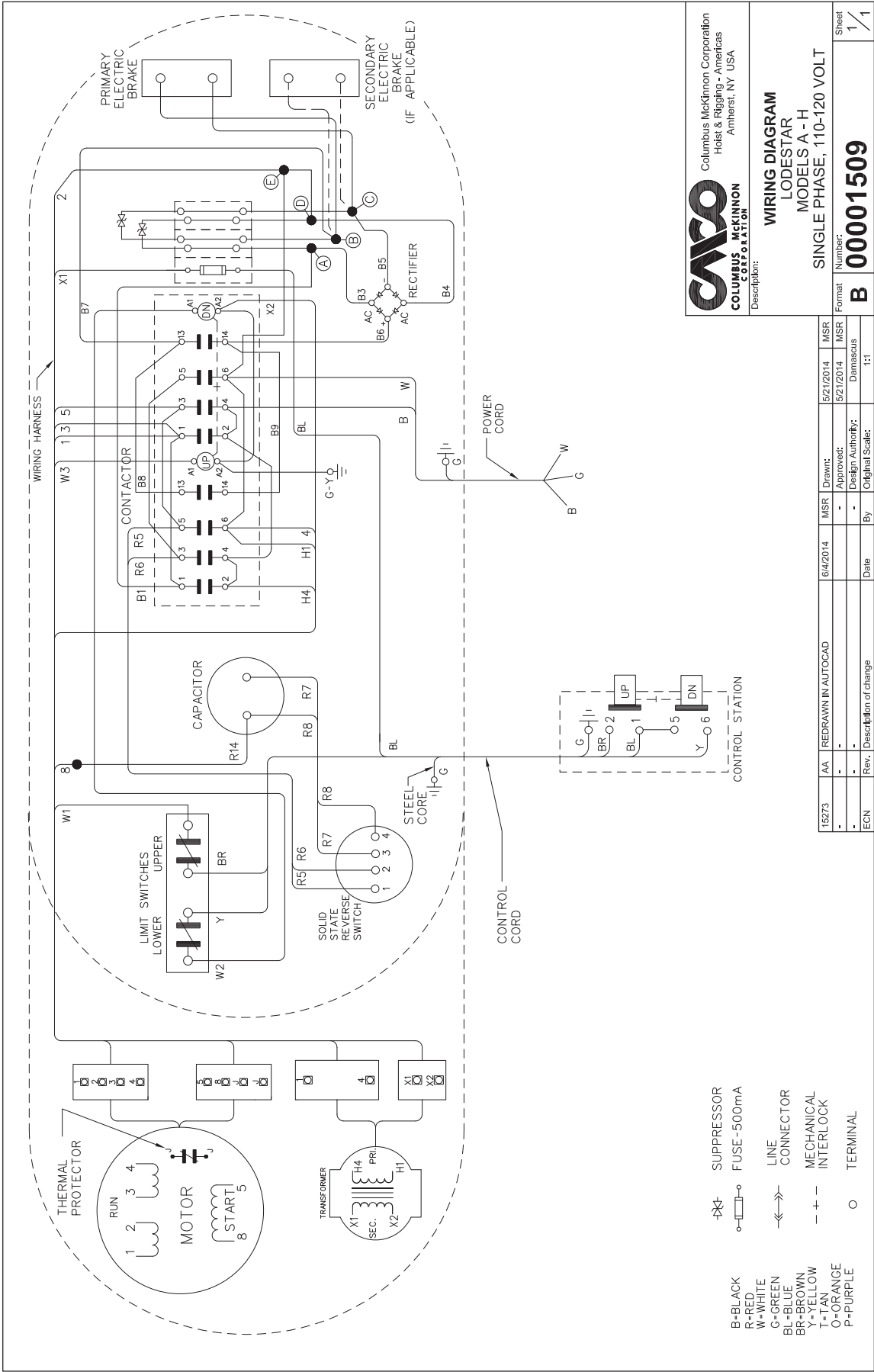
Table 8. Electrical Data for Hoist Components (continued)

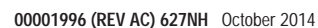
| MOdels                                      | Volts-Phase<br>Hertz | H.P. (kW)            | Full Load<br>Current<br>(Amps) | Leads  | *D.C.<br>Resistance<br>(Ohms) |
|---|----------------------|----------------------|--------------------------------|--|-------------------------------|
| A,B,E                                       | 110-1-50             | 1/4(.19)             | 3.2                            | 1 - 2  | 7.2                           |
|   |                      |                      |                                | 3 - 4  | 7.2                           |
|   |                      |                      |                                | 5 - 8  | 5.8                           |
| A,B,E                                       | 115-1-60             | 1/4 (.19)            | 4.6                            | 1 - 2  | 4.3                           |
|   |                      |                      |                                | 3 - 4  | 4.3                           |
|   |                      |                      |                                | 5 - 8  | 4.9                           |
| A,B,E                                       | 220-1-50             | 1/4 (.19)            | 1.6                            | 1 - 2  | 7.2                           |
|   |                      |                      |                                | 3 - 4  | 7.2                           |
|   |                      |                      |                                | 5 - 8  | 5.8                           |
| A,B,E                                       | 230-1-60             | 1/4 (.19)            | 2.3                            | 1 - 2  | 4.3                           |
|   |                      |                      |                                | 3 - 4  | 4.3                           |
|   |                      |                      |                                | 5 - 8  | 4.9                           |
| AA,C,F,H                                    | 110-1-50             | 1/2 (.37)            | 6.4                            | 1 - 2  | 2.7                           |
|   |                      |                      |                                | 3 - 4  | 2.7                           |
|   |                      |                      |                                | 5 - 8  | 3.5                           |
| AA,C,F,H                                    | 115-1-60             | 1/2 (.37)            | 7.2                            | 1 - 2  | 1.9                           |
|   |                      |                      |                                | 3 - 4  | 1.9                           |
|   |                      |                      |                                | 5 - 8  | 3.6                           |
| A,B,E                                       | 220-1-50             | 1/2 (.37)            | 3.2                            | 1 - 2  | 2.7                           |
|   |                      |                      |                                | 3 - 4  | 2.7                           |
|   |                      |                      |                                | 5 - 8  | 3.5                           |
| A,B,E                                       | 230-1-60             | 1/2 (.37)            | 3.6                            | 1 - 2  | 1.9                           |
|   |                      |                      |                                | 3 - 4  | 1.9                           |
|   |                      |                      |                                | 5 - 8  | 3.6                           |
| A,B,E                                       | 230/460-3-60         | 1/4 (.19)            | 1.4/0.7                        | 3 - 6<br>2 - 5<br>1 - 4<br>8 - 9<br>8 - 7<br>9 - 7 | 14.8                          |
|   | 220/380-3-50         |                      | 1.4/0.7                        |  | 14.8                          |
|   | 220/415-3-50         |                      | 1.4/0.7                        |  | 14.8                          |
|   | 575-3-60             |                      | 0.5                            |  | 29.5                          |
|   | 550-3-50             |                      | 0.6                            |  | 29.5                          |
|   |                      |                      |                                |  | 1 - 2<br>2 - 3<br>1 - 3       |
| AA,C,F,H                                    | 230/460-3-60         | 1/2 (.37)            | 1.8/0.9                        | 3 - 6  | 7.8                           |
|   | 220/380-3-50         |                      | 2.1/1.0                        | 2 - 5  | 7.8                           |
|   | 220/415-3-50         |                      | 2.1/1.0                        | 1 - 4  | 7.8                           |
|   | 575-3-60             |                      | 0.8                            | 8 - 9  | 15.6                          |
|   | 550-3-50             |                      | 0.9                            | 8 - 7  | 15.6                          |
|   |                      |                      |                                | 9 - 7  | 15.6                          |
| A-2, B-2,<br>E-2                            | 230-3-60             | .08/.25<br>(.06/.19) | 1.6/1.6                        | 12 - 3   | 17.5                          |
|   | 220-3-50             |                      | 1.9/2.1                        | 11 - 3   | 17.5                          |
|   |                      |                      |                                | 11 - 12  | 17.5                          |
| A-2, AA-2,<br>B-2, C-2,<br>E-2, F-2,<br>H-2 | 230-3-60             | .15/.5<br>(.12/.37)  | 1.8/2.0                        | 12 - 3   | 13.5                          |
|   | 220-3-50             |                      | 2.1/2.4                        | 11 - 3   | 13.5                          |
|   |                      |                      |                                | 11 - 12  | 13.5                          |
|   | 460-3-60             |                      | 1.0/1.0                        | 1 - 2  | 25.0                          |
|   | 380-3-50             |                      | 1.2/1.2                        | 1 - 3  | 25.0                          |
|   | 415-3-50             |                      | 1.2/1.2                        | 2 - 3  | 25.0                          |
|   | 575-3-60             |                      | .8/.85                         | 12 - 3   | 63.0                          |
|   |                      |                      |                                | 11 - 3   | 63.0                          |
|   |                      |                      |                                | 11 - 12  | 63.0                          |
|   |                      |                      |                                | 1 - 2  | 104.0                         |
|   |                      |                      |                                | 1 - 3  | 104.0                         |
|   |                      |                      |                                | 2 - 3  | 104.0                         |
| J,L,R,RT                                    | 110-1-50             | 1 (.75)              | 11.6                           | 12 - 3   | 99.1                          |
|   | 115-1-60             |                      | 9.8                            | 11 - 3   | 99.1                          |
|   |                      |                      |                                | 11 - 12  | 99.1                          |

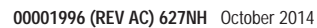
| MOdels                         | Volts-Phase<br>Hertz | H.P. (kW)          | Full Load<br>Current<br>(Amps) | Leads   | *D.C.<br>Resistance<br>(Ohms) |
|--------------------------------|----------------------|--------------------|--------------------------------|---------|-------------------------------|
| J,L,R,RT                       | 220-1-50             | 1 (.75)            | 5.8                            | 1 - 2   | 1.1                           |
|                                | 230-1-60             |                    | 4.9                            | 3 - 4   | 1.1                           |
| J,L,R,RT                       | 230/460-3-60         | 1 (.75)            | 3.0/1.5                        | 5 - 8   | 1.3                           |
|                                | 220/380-3-50         |                    | 3.6/1.8                        | 3 - 6   | 4.7                           |
|                                | 220/415-3-50         | 1 (.75)            | 3.6/1.8                        | 2 - 5   | 4.7                           |
|                                |                      |                    |                                | 1 - 4   | 4.7                           |
|                                | 575-3-60             | 1 (.75)            | 1.5                            | 8 - 9   | 9.4                           |
|                                |                      |                    |                                | 8 - 7   | 9.4                           |
|                                | 550-3-50             | 1 (.75)            | 1.8                            | 9 - 7   | 9.4                           |
|                                |                      |                    |                                | 1 - 2   | 29.6                          |
|                                | 230/460-3-60         | 2 (1.5)            | 5.8/2.9                        | 2 - 3   | 29.6                          |
|                                |                      |                    | 6.4/3.3                        | 1 - 3   | 29.6                          |
| JJ, LL, RR,<br>RRS, RRT        | 220/380-3-50         | 2 (1.5)            | 6.4/3.3                        | 3 - 6   | 2.2                           |
|                                | 220/415-3-50         |                    |                                | 2 - 5   | 2.2                           |
|                                | 575-3-60             | 2 (1.5)            | 3.2                            | 1 - 4   | 2.2                           |
|                                |                      |                    |                                | 8 - 9   | 9.4                           |
|                                | 550-3-50             | 2 (1.5)            | 3.5                            | 8 - 7   | 9.4                           |
|                                |                      |                    |                                | 9 - 7   | 9.4                           |
| J-2,L-<br>2,R-2,<br>RT-2       | 230-3-60             | .33/1<br>(.25/.75) | 3.4/5.0                        | 12 - 3  | 7.7                           |
|                                | 220-3-50             |                    | 3.2/4.7                        | 11 - 3  | 7.7                           |
|                                |                      |                    |                                | 11 - 12 | 7.7                           |
|                                | 460-3-60             |                    | 1.5/2.4                        | 1 - 2   | 19.4                          |
|                                | 380-3-50             |                    | 1.6/2.4                        | 1 - 3   | 19.4                          |
|                                | 415-3-50             |                    | 1.6/2.4                        | 2 - 3   | 19.4                          |
|                                | 575-3-60             |                    | 1.1/1.9                        | 12 - 3  | 29.9                          |
|                                |                      |                    |                                | 11 - 3  | 29.4                          |
|                                |                      |                    |                                | 11 - 12 | 29.0                          |
|                                |                      |                    |                                | 1 - 2   | 80.2                          |
|                                |                      |                    |                                | 1 - 3   | 80.1                          |
|                                |                      |                    |                                | 2 - 3   | 82.2                          |
| JJ-2, LL-<br>2, RR-2,<br>RRT-2 | 230-3-60             | .67/2<br>(.50/1.5) | 5.8/8.8                        | 12 - 3  | 42.9                          |
|                                | 220-3-50             |                    | 6.6/9.5                        | 11 - 3  | 40.1                          |
|                                |                      |                    |                                | 11 - 12 | 53.2                          |
|                                | 460-3-60             |                    | 3.3/5.1                        | 1 - 2   | 125.7                         |
|                                | 380-3-50             |                    | 3.0/5.0                        | 1 - 3   | 125.8                         |
|                                | 415-3-60             |                    | 3.0/5.0                        | 2 - 3   | 125.2                         |
|                                | 575-3-60             |                    | 2.3/3.5                        | 12 - 3  | 3.2                           |
|                                |                      |                    |                                | 11 - 3  | 3.1                           |
|                                |                      |                    |                                | 11 - 12 | 3.3                           |
|                                |                      |                    |                                | 1 - 2   | 14.1                          |
|                                |                      |                    |                                | 1 - 3   | 14.1                          |
|                                |                      |                    |                                | 2 - 3   | 14.0                          |

**CM**  
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REFERENCE WIRING DIAGRAMS

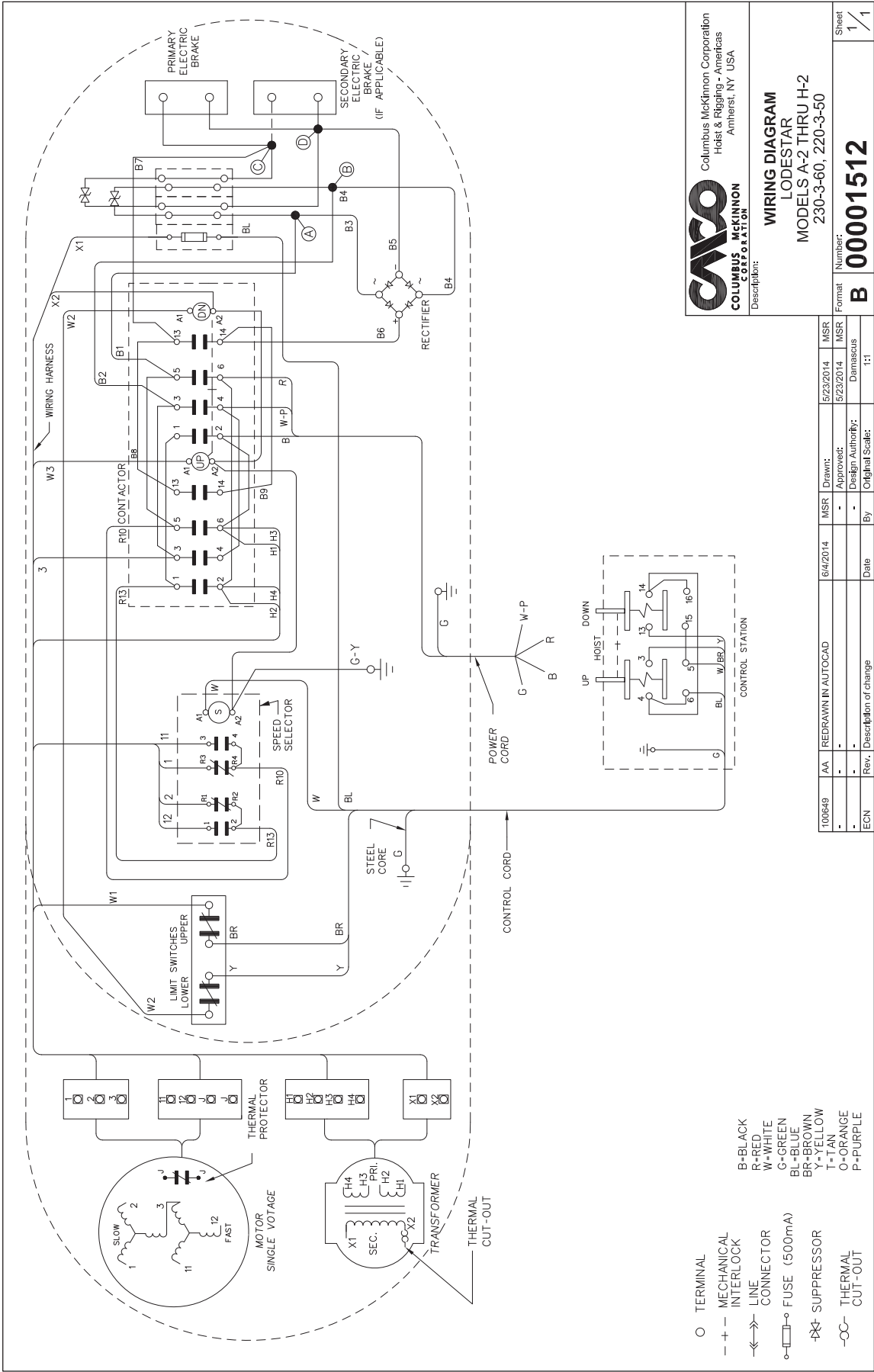


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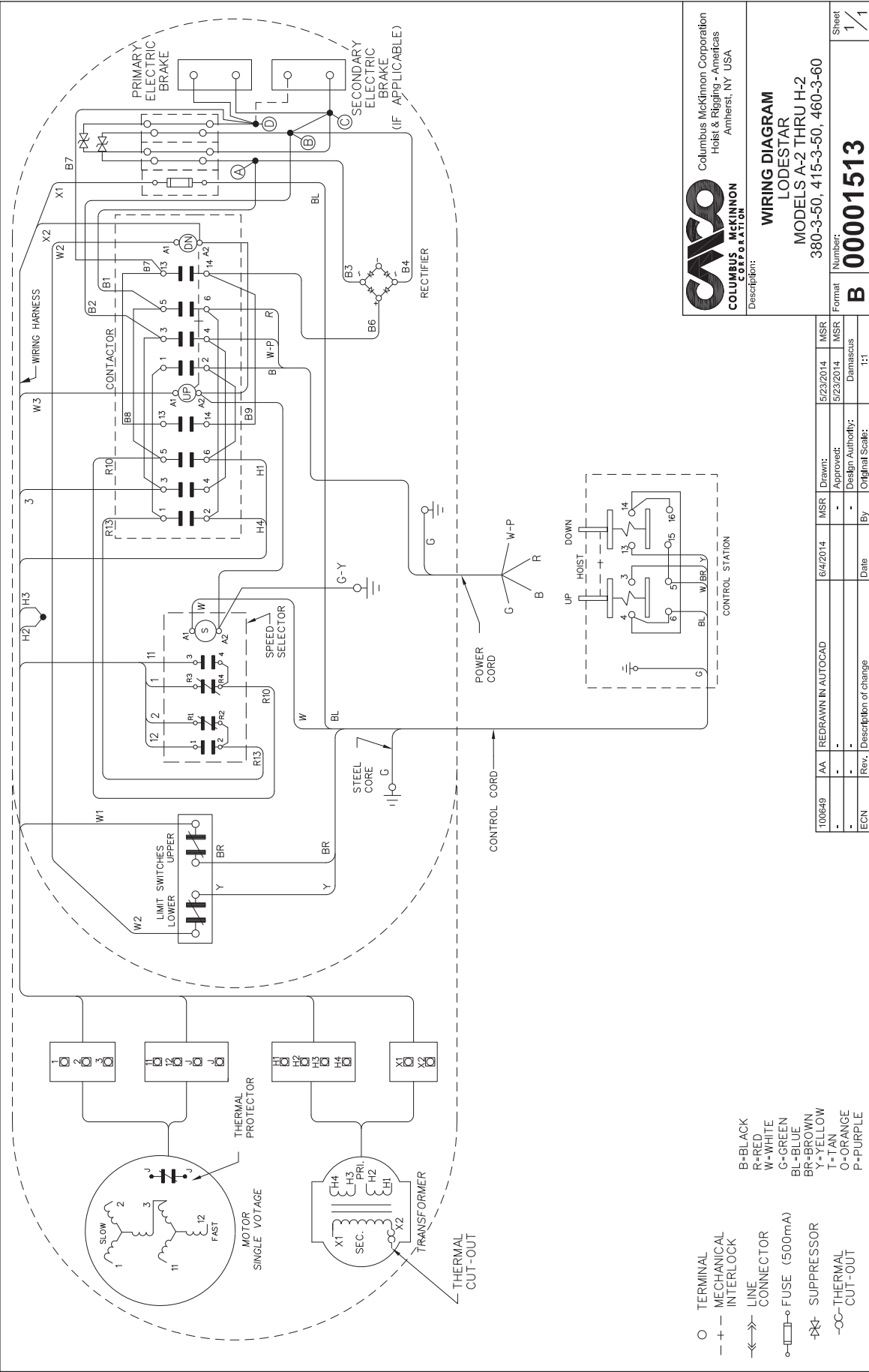
**CM**  
**LODESTAR®**

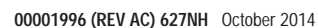


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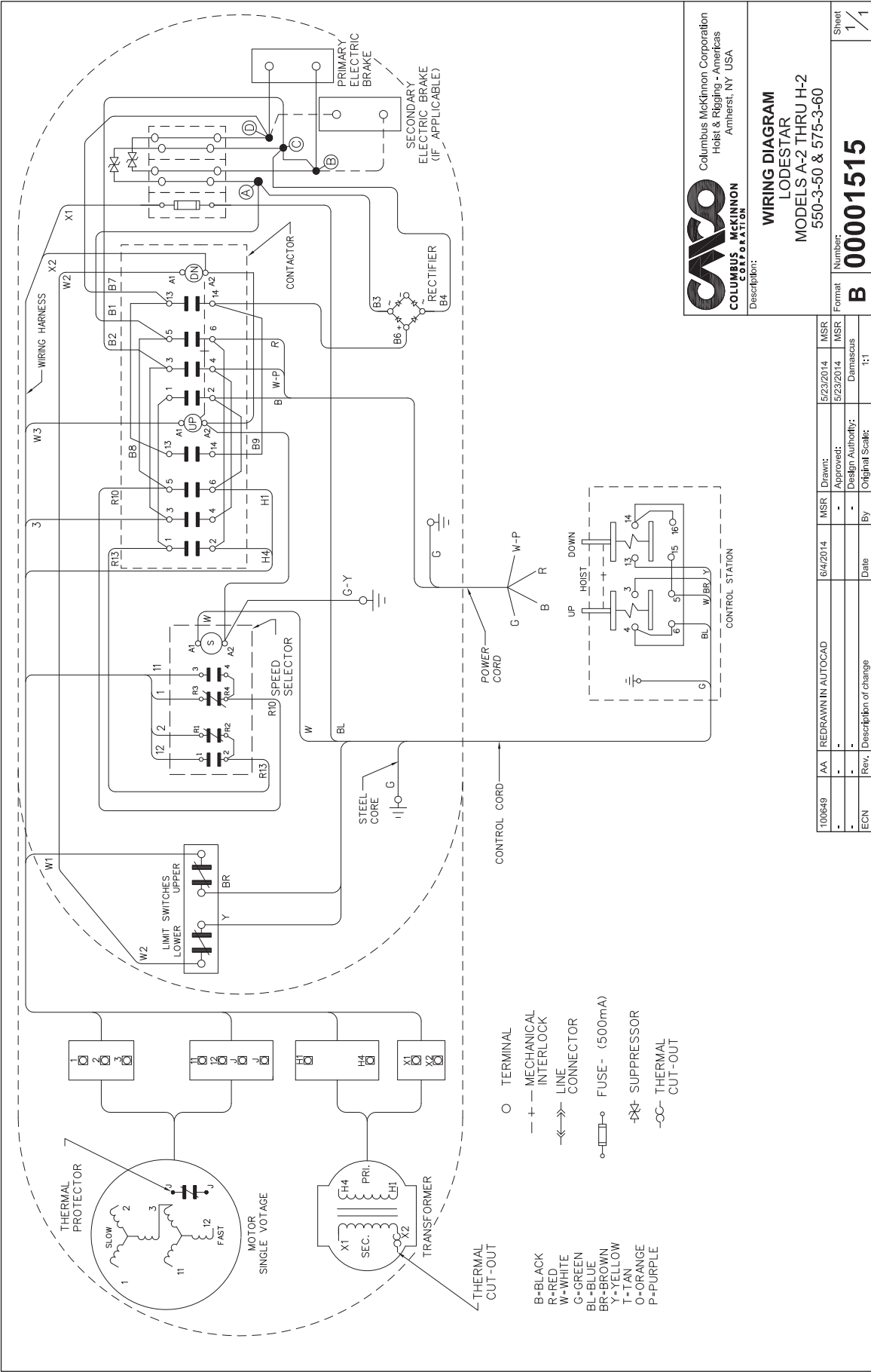


REFERENCE WIRING DIAGRAMS



**CM**  
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REFERENCE WIRING DIAGRAMS



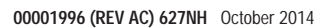
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Columbus McKinnon Corporation  
Holist & Rigging - Americas  
Amherst, NY USA

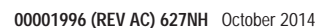
**WIRING DIAGRAM**  
**LODESTAR**  
**MODELS A-2 THRU H-2**  
**550-3-50 & 575-3-60**

Description:

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|--------|----------|-------|
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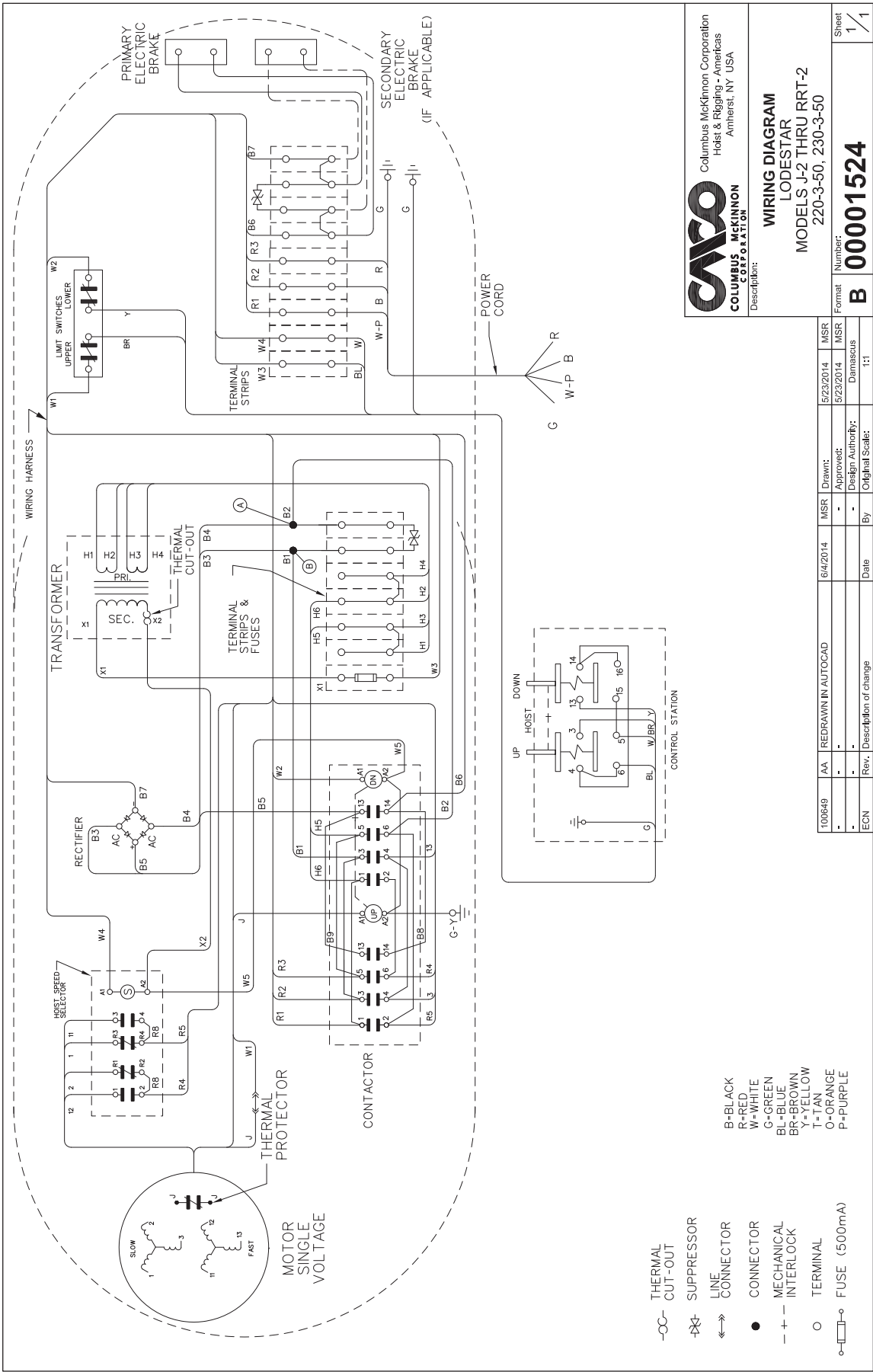
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| 100649 | AA   | REDRAWN IN AUTOCAD    | 6/4/2014 | MSR | Drawn:            | 5/23/2014 | MSR |
|        |      |                       |          |     | Approved:         | 5/23/2014 | MSR |
|        |      |                       |          |     | Design Authority: | Damasius  |     |
| ECN    | Rev. | Description of change | Date     | By  | Original Scale:   | 1:1       |     |

**CM**  
**LODESTAR®**

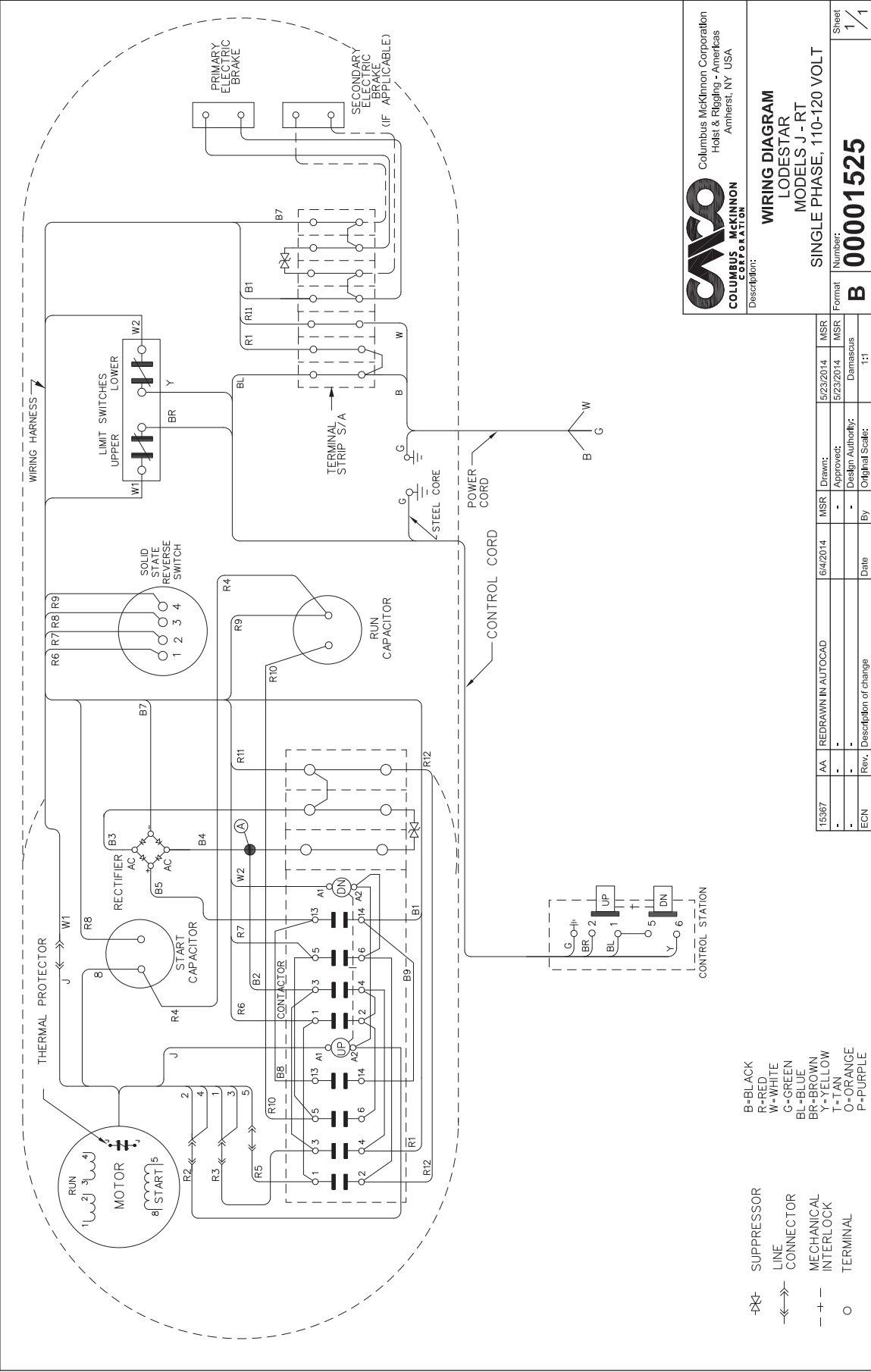
**CM**  
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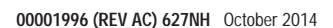


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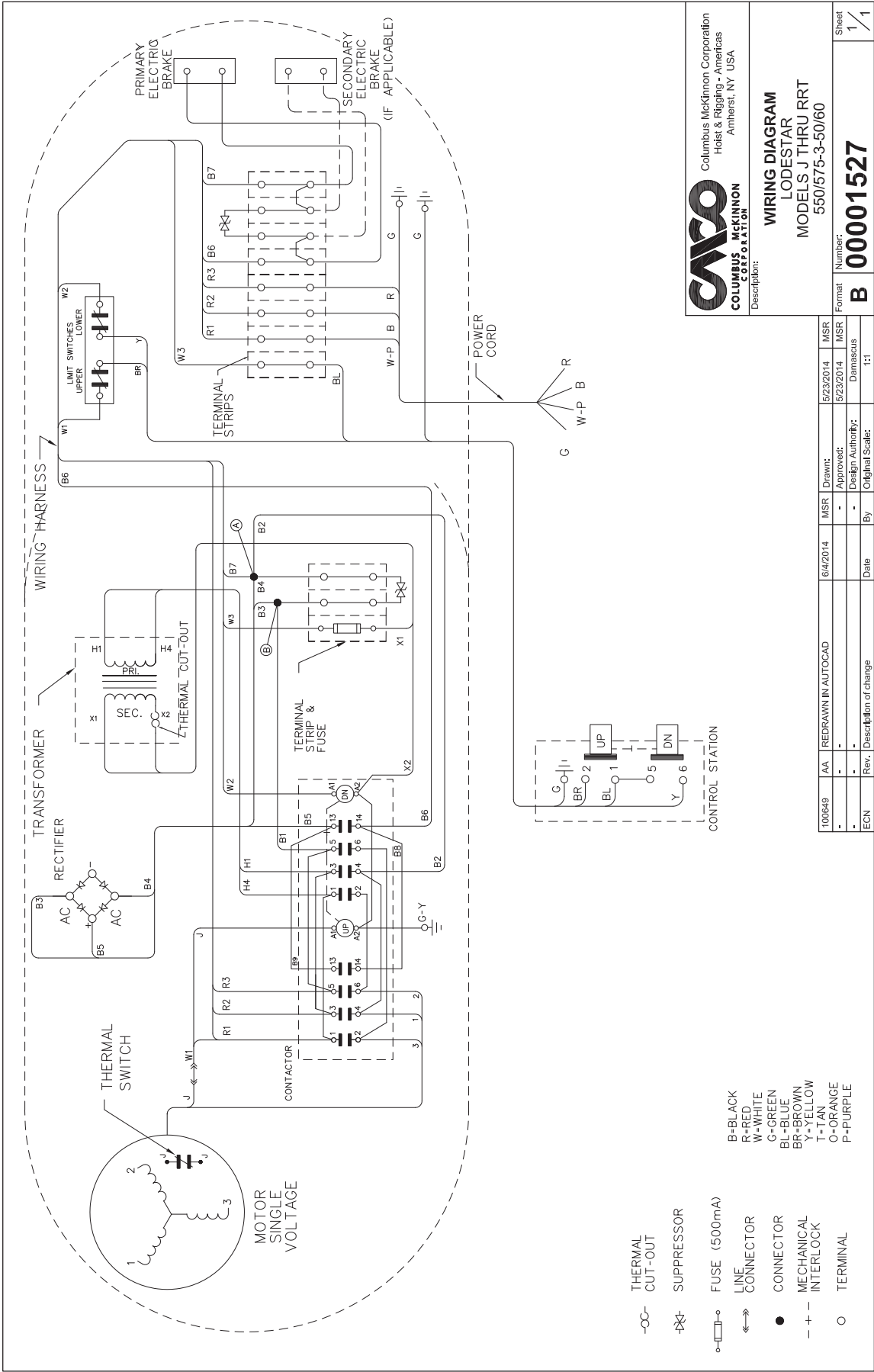


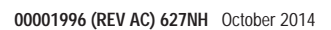
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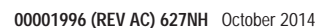


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REFERENCE WIRING DIAGRAMS



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## ASSEMBLY INSTRUCTIONS

### SWIVEL HOOK OR LUG SUSPENSION

Models E, E-2, H, H-2, R, R-2, RR, RR-2 Assemble the dead end bolt and block through the suspension adapter as shown in Figure 21.



Figure 21. Hook Suspension

### FASTENERS

See tables 2a and 2b for recommended torque values.

#### **⚠ WARNING**

Using other than CM supplied high strength suspension screws to attach the suspension adapter to the hoist may cause the screws to break and allow the hoist and load to fall.

#### TO AVOID INJURY:

Use only the CM supplied suspension screws to attach the suspension to the hoist and hand torque these screws to the recommended seating torque as specified in tables 2a and 2b. DO NOT apply any type of lubricant to the threads of these screws. Lubricating the threads will reduce the effort to seat the screws and as a result, tightening the screws to the above recommended torque may break the screw, damage the suspension adapter, strip the nuts and/or damage the hoist frame.

**SUSPENSION BOLT SHOULD BE REPLACED ANY TIME THE SUSPENSION IS REMOVED FROM THE HOIST**

**NOTE: RRS USES CHAIN BLOCK ON LOOSE END AND CHAIN IS NOT SECURED TO THE HOIST.**

### LOWER HOOK BLOCK PIN

When removing or installing the lower hook pin, care must be taken so as to prevent damaging the pin and/or hook block. These pins are tapered groove pins and as a result, they can only be removed in one direction. To remove the pin, a V-Block, drift and hammer (or slow acting press) are required. The drift should be the same diameter as the pin (5/16" diameter (7.94mm) for Models A, A-2, AA, AA-2, B, B-2, C, C-2, F, F-2 and 3/8" (9.52mm) diameter for Models J, J-2, L, L-2, LL, LL-2 and (7/16" diameter (11.11mm) for Model RRS1 and it should be placed on the small end of the pin. The small end of the pin is the end opposite the end on which the 3 grooves are visible. Place the hook block in the V-Block and drive the pin out using the drift and a hammer or slow acting press.

To re-install the pin, the parts must be arranged the same as they were when the pin was removed. To do this, use the small end of the pin as a gage. First check the holes in the hook block body and determine which hole is the largest.

Place the hook body in the V-Block with the larger hole on top. Next, check each end of the hole in the lower hook chain block and determine which end is the largest. Place the chain in the slot of the chain block and insert the chain block, with the large hole on top, into the hook block body. Align the holes in the hook block body with the hole in the chain block and insert the small end of the pin in the hole. Push the pin in by hand until it stops and then use a hammer or slow acting press to drive the pin into position so that the end of the pin is flush with the outside surface of the hook block body.

#### **⚠ WARNING**

Use of improper lower hook chain block pin as well as improper installation of this pin can cause the pin to break and allow the load to fall.

#### TO AVOID INJURY:

Use only CM supplied, special high strength lower hook chain block pin to attach the chain to the lower hook block and install the pin as directed above.

### REMOVAL AND INSTALLATION OF LOAD CHAIN

#### **⚠ WARNING**

Improper installation (reeving) of the load chain can result in a dropped load.

#### TO AVOID INJURY/DAMAGE:

- Verify use of proper size and type of hoist load chain for specific hoist.
- Install load chain properly as indicated below.

**NOTE: When installing load chain in Models E, H, R, RR, E-2, H-2, R-2 and RR-2 by either of the "starter chain" methods, two loose end connecting links (627-743) must be used. Hoist load chain can be installed by any one of several methods.**

#### **⚠ WARNING**

USE OF COMMERCIAL OR OTHER MANUFACTURER'S CHAIN AND PARTS TO REPAIR CM HOISTS MAY CAUSE LOAD LOSS.

#### TO AVOID INJURY:

Use only CM supplied replacement load chain and parts. Chain and parts may look alike, but CM chain and parts are made of specific material or processed to achieve specific properties.

The first method is recommended when replacing severely worn load chain and requires disassembling the hoist. Method 2 does not require hoist disassembly, where as Method 3 requires only partial disassembly.

#### Method #1

- Disconnect hoist from power supply.
- Remove back frame cover and disengage the limit switch guide plate from the traveling nuts, see page 23.
- Detach loose end of load chain from hoist frame, see Figure 7. Also, on single reeved models, detach the lower hook block from the load chain. On double reeved models E, H, R, & RR unfasten the dead end side of load chain. On triple reeved Models RT, RRT, RT-2 and RRT-2, detach the load chain from the lower hook block.
- Continue to disassemble the hoist and inspect the liftwheel, chain guides, motor housing and gear housing

which if worn or damaged may cause premature failure of the new chain. Parts can be easily identified by referring to pages Parts List section of table of contents.

- e. If the liftwheel pockets, in particular the ends, are worn or scored, replace liftwheel. If chain guides and housing are worn, cracked or damaged these parts should also be replaced.
- f. Reassemble hoist with the new load chain inserted over the liftwheel. Position chain with the weld on up standing links away from liftwheel and leave only one foot of chain hanging free on loose end side. Make sure the last chain link is an upstanding link. On double reeved models, make sure that the new load chain has an even number of links. On triple reeved models, make sure that the new chain has an odd number of links. This will prevent twist in chain. To simplify handling when reassembling the hoist, a short undamaged piece of the old chain may be used as a "starter chain". Position this piece of chain in exactly the same manner as explained above for the "new chain", and complete the reassembly of the hoist.
- g. Attach the loose end link to chain and connect it to the hoist frame with the loose end screw, washer and lock washer, see Figure 7.

#### BE CERTAIN THERE IS NO TWIST.

**CAUTION: For double reeved models, be sure to disconnect one of the loose end links from the load chain before attaching it to the hoist.**

- h. For single reeved models, attach the hook block to load chain and proceed to step K.
- i. For double reeved models, run the hoist (UP) until only 3 feet (.9 m) in chain remains on dead end side. This will minimize the chance of introducing a twist between hook block and hoist. Allow the chain to hang free to remove twists. Using a wire as a starter, insert the chain, flat link first, into lower hook block (upstanding links will have weld toward sheave) and pull through. Insert last link into slot in dead end block making sure that no twist exists in the reeving at any point. Assemble dead end pin, washer and cotter pin as shown in Figure 7.
- j. Using a wire as a starter, insert the chain, flat link first, into lower hook block (upstanding links will have weld toward sheave) and pull through. Insert last link into slot in dead end block making certain that no twist exists in the reeving at any point. Assemble dead end pin, washer and cotter pin as shown in Figure 7.
- k. Adjust limit switches as described in Table 6, page 22. If the new chain is longer than the old, check to be sure limit switch will allow for new length of lift. In the event maximum adjustment does not allow entire length of lift, check with CM® for modification if necessary.
- l. For triple reeved models, run the hoist (UP) until only 4 feet (1.2 m) of chain remains on the dead end side. This will minimize the chance of introducing a twist between the hook block and hoist. Allow the chain to hang free to remove twists. Using a wire as a starter, insert the chain, upstanding link first, into lower hook block (upstanding links will have welds toward sheave) and pull through. Using a wire as a starter, insert the chain, upstanding link first, into the outboard cloverleaf of the hanger. Make sure there are no twists between the hook block and then pull the chain through. In the sheave hanger, the up standing links will have the welds toward the sheaves. Run the chain down to the hook block and making sure there are no twists between the

sheave hanger and the hook block, insert the end of the chain into the recess in the top of the hook block. Slide the dead end screw, with flat sides vertical, through the hole in the top of the hook block. Place the lock washer and nut on the threaded end of the dead end screw. Use an Allen wrench to hold the head of the dead end screw stationary and rotate the nut to tighten. To properly tighten the nut, apply a torque of 45 (61N•m) to 55 pound feet (74.6 N•m) while holding the head of the dead end screw stationary. Also, when tightening this dead end screw, it should be held firmly in position and torqued from the nut end to avoid damaging the screw and/or chain.

### **WARNING**

Do not allow hook block to hit hoist or allow load chain to become taut between loose end screw and frame or else serious damage will result. If hook block should inadvertently hit the hoist-the hoist frames, load chain and hook block should be inspected for damage before further use.

#### Method #2

Treat the old load chain in hoist as a "starter chain" and proceed with steps from Method #1, a, b, c and h thru k. If a starter chain is used, the loose end link (two links required for double reeved models) can serve as a temporary coupling link to connect together the starter chain in the hoist and the new load chain to be installed. Then, under power, reeve the new load chain through the liftwheel area, replacing the starter chain in unit. Run enough chain through to attach loose end link to hoist frame.

#### Method #3

- a. First proceed with Steps 1a, b & c from Method #1.
- b. Then, carefully run the load chain out of the hoist.
- c. Disconnect hoist from power supply.
- d. Remove the electric brake assembly.
- e. Rotate the brake hub by hand, at the same time feeding the load chain into and through liftwheel area with hoist upside down or using a wire to pull the load chain up onto the liftwheel as explained in Method #1 step 1f.
- f. Refer to Method #1 steps g thru j above to complete the installation.

## CUTTING CHAIN

CM® Load chain is hardened and it is difficult to cut. The following methods are recommended when cutting a length of new chain from stock or cutting off worn chain.

1. Use a grinder and nick the link on both sides (Figure 22), then secure the link in a vise and break off with a hammer.
2. Use a 177.8 mm (7 inches) minimum diameter by 3.175 mm (1/8 inch) thick abrasive wheel (or type recommended by wheel supplier) that will clear adjacent links.
3. Use a bolt cutter (Figure 23) similar to the H.K. Porter No. 0590MTC with special cutter jaws for cutting hardened chain (25.4mm-1 inch) long cutting edge.

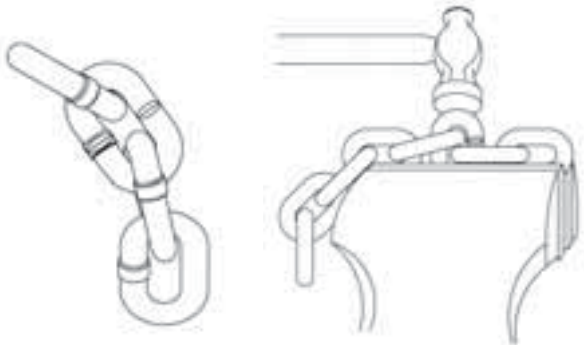
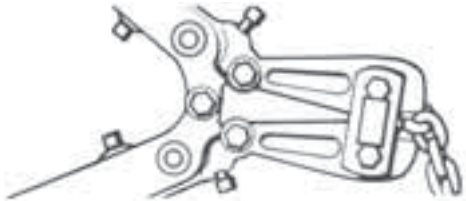


Figure 22A. Cutting Chain by Nicking Figure



22B. Cutting Chain with a Bolt Cutter

### **WARNING**

Cutting Chain Can Produce Flying Particles.

#### TO AVOID INJURY:

- Wear Eye Protection.
- Provide A shield Over Chain to Prevent Flying Particles.

### **WARNING**

Using "Commercial" or other manufacturer's parts to repair the CM Lodestar Hoists may cause load loss.

#### TO AVOID INJURY:

Use only CM supplied replacement parts. Parts may look alike but CM parts are made of specific materials or processed to achieve specific properties.

### **WARNING**

#### Testing

Before using, all altered, repaired or used hoists that have not been operated for the previous 12 months shall be tested by the user for proper operation. First test the unit without a load and then with a light load of 22.7 kg. (50 pounds) times the number of load supporting parts of load chain to be sure that the hoist operates properly and that the brake holds the load when the control is released. Next test with a load of \*125% of rated capacity. In addition, hoists in which load sustaining parts have been replaced should be tested with \*125% of rated capacity by or under the direction of an appointed person and written report prepared for record purposes. After this test, check that the Load-limiter functions.

**\*If Load-limiter prevents lifting of a load of 125% of rated capacity, reduce load to rated capacity and continue test.**

**NOTE: For additional information on inspection and testing, refer to Code B30.16 "Overhead Hoists" obtainable from ASME Order Department, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300, U.S.A.**

## ORDERING INSTRUCTIONS

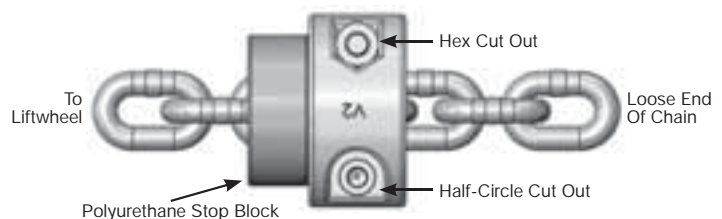
The following information must accompany all correspondence orders for replacement parts:

1. Hoist Model Number from identification plate.
2. Serial number of the hoist stamped below identification plate.
3. Voltage, phase, Hertz from the identification plate.
4. Length of lift.
5. Part number of part from parts list.
6. Number of parts required.
7. Part name from parts list. If trolley replacement parts are ordered, also include the type and capacity of trolley.

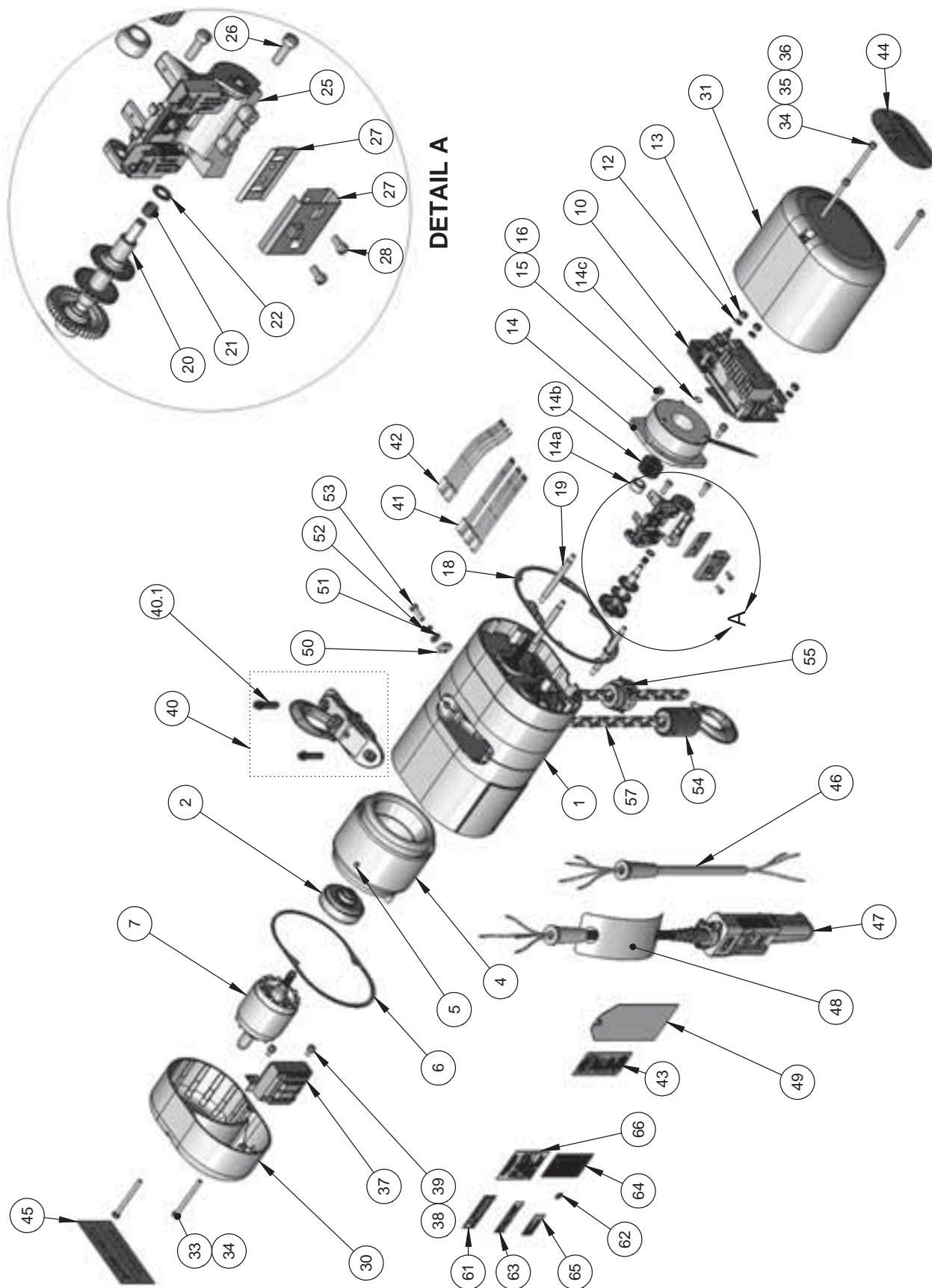
**NOTE: When ordering replacement parts, it is recommended that consideration be given to the need for also ordering such items as gaskets, fasteners, insulators, etc. These items may be damaged or lost during disassembly or just unfit for future use because of deterioration from age or service**

## CHAIN STOP INSTALLATION

Place polyurethane stop block over loose end of chain and slide past desired spot that the chain stop is to be located. Place one half of chain stop on chain. Then place other half on top of the first half of chain stop. (Note: be sure that the half circle cut out side of one stop block half is aligned with hex cut out side.) Place one (1) nut into hex cutout insert one (1) screw with one (1) lock washer through hole opposite nut and loosely tighten. Repeat for second connection. Tighten both screw connections to ensure that they do not come loose.



# MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2





## MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2

| Item No. | Description  | MODELS<br>A & A-2           | MODELS<br>AA & AA-2 | MODELS<br>B & B-2 | MODELS<br>C & C-2 | MODELS<br>E & E-2 | MODELS<br>F & F-2 | MODELS<br>H & H-2 | QTY. |
|----------|--|-----------------------------|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| 1        | GEAR BOX SUB-ASSY - DC TYPE BRAKE SEE GEARBOX SECTION            | 00000830C                   | 00000831C           | 00000832C         | 00000833C         | 00000832C         | 00000834C         |                   | 1    |
|          | CLEAN ROOM GEAR BOX SUB-ASSY - DC TYPE BRAKE SEE GEARBOX SECTION | 00000835W                   | 00000836W           | 00000837W         | 00000838W         | 00000837W         | 00000839W         |                   |      |
| 2        | CLUTCH ASSEMBLY  | C00000240                   | C00000241           | C00000240         | C00000241         | C00000240         | C00000241         |                   | 1    |
| 3        | EMPTY  | -                           |                     |                   |                   |                   |                   |                   | -    |
| 4        | STATOR - 115/230V-50HZ-1Ø  | 00000473                    | 00000472            | 00000473          | 00000472          | 00000473          | 000004721         |                   | 1    |
|          | STATOR - 115/230V-60HZ-1Ø  | 00000467                    | 00000462            | 00000467          | 00000462          | 00000467          | 00000462          |                   |      |
|          | STATOR - 230/460V-3Ø   | 00000466                    | 00000461            | 00000466          | 00000461          | 00000466          | 00000461          |                   |      |
|          | STATOR - 575V-3Ø   | 00000469                    | N/A                 | 00000469          | 00000465          | 00000469          | 00000465          |                   |      |
|          | STATOR-230V-2 SPEED  | 00000471                    | 00000463            | 00000471          | 00000463          | 00000471          | 00000463          |                   |      |
|          | STATOR-460V-2 SPEED  | 00000464                    | 00000464            | 00000464          | 00000464          | 00000464          | 00000464          |                   |      |
|          | STATOR-575V-2 SPEED  | 00000470                    | N/A                 | 00000470          | 00000470          | 00000470          | 00000470          |                   |      |
| 5        | STATOR PIN   | 983541                      |                     |                   |                   |                   |                   |                   | 1    |
| 6        | MOTOR COVER GASKET   | 27847                       |                     |                   |                   |                   |                   |                   | 1    |
| 7        | ROTOR ASSEMBLY 50HZ-1Ø   | 00000261                    | 00000261            | 00000261          | 00000261          | 00000261          | 00000261          |                   | 1    |
|          | ROTOR ASSEMBLY 60HZ-1Ø   | 00000265                    | 00000261            | 00000265          | 00000261          | 00000265          | 00000261          |                   |      |
|          | ROTOR ASSEMBLY 3Ø  | 00000264                    | 00000260            | 00000264          | 00000260          | 00000264          | 00000260          |                   |      |
|          | ROTOR ASSEMBLY - 2 SPEED   | 00000262                    | 00000263            | 00000262          | 00000263          | 00000262          | 00000263          |                   |      |
| 8-9      | EMPTY  | -                           |                     |                   |                   |                   |                   |                   | -    |
| 10       | CONTACTOR PLATE ASSEMBLY   | SEE CONTACTOR PLATE SECTION |                     |                   |                   |                   |                   |                   | 1    |
| 11       | EMPTY  | -                           |                     |                   |                   |                   |                   |                   | -    |
| 12       | LOCK WASHER  | 982226                      |                     |                   |                   |                   |                   |                   | 3    |
| 13       | CONTACTOR PLATE MOUNTING NUT                                     | 982514                      |                     |                   |                   |                   |                   |                   | 3    |
| 14       | BRAKE ASSEMBLY   | SEE DC BRAKE SECTION        |                     |                   |                   |                   |                   |                   | 1    |
| 14a      | BRAKE HUB SPACER   | SEE DC BRAKE SECTION        |                     |                   |                   |                   |                   |                   | 0-1  |
| 14b      | BRAKE HUB  | SEE DC BRAKE SECTION        |                     |                   |                   |                   |                   |                   | 0-2  |
| 14c      | BRAKE HUB SNAP RING  | SEE DC BRAKE SECTION        |                     |                   |                   |                   |                   |                   | 1    |
| 15       | LOCK WASHER  | 982226                      |                     |                   |                   |                   |                   |                   | 2    |
| 16       | BRAKE MOUNTING SCREW   | 982708                      |                     |                   |                   |                   |                   |                   | 2    |
| 17       | EMPTY  |                             |                     |                   |                   |                   |                   |                   |      |
| 18       | BACK FRAME COVER GASKET  | 27848                       |                     |                   |                   |                   |                   |                   | 1    |
| 19       | CONTACTOR PLATE MOUNTING STUD                                    | 27836                       |                     |                   |                   |                   |                   |                   | 3    |
| 20       | LIMIT SWITCH SHAFT S/A - 44 TPI                                  | 00000521                    |                     |                   |                   |                   |                   |                   | 1    |
|          | LIMIT SWITCH SHAFT S/A - 56 TPI                                  | 00000522                    |                     |                   |                   |                   |                   |                   |      |
|          | LIMIT SWITCH SHAFT S/A - 64 TPI                                  | 00000523                    |                     |                   |                   |                   |                   |                   |      |
| 21       | LIMIT SWITCH SHAFT SPRING  | 28712                       |                     |                   |                   |                   |                   |                   | 1    |
| 22       | WASHER   | 987878                      |                     |                   |                   |                   |                   |                   | 1    |
| 23-24    | EMPTY  | -                           |                     |                   |                   |                   |                   |                   | -    |

## MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2 (CONT.)

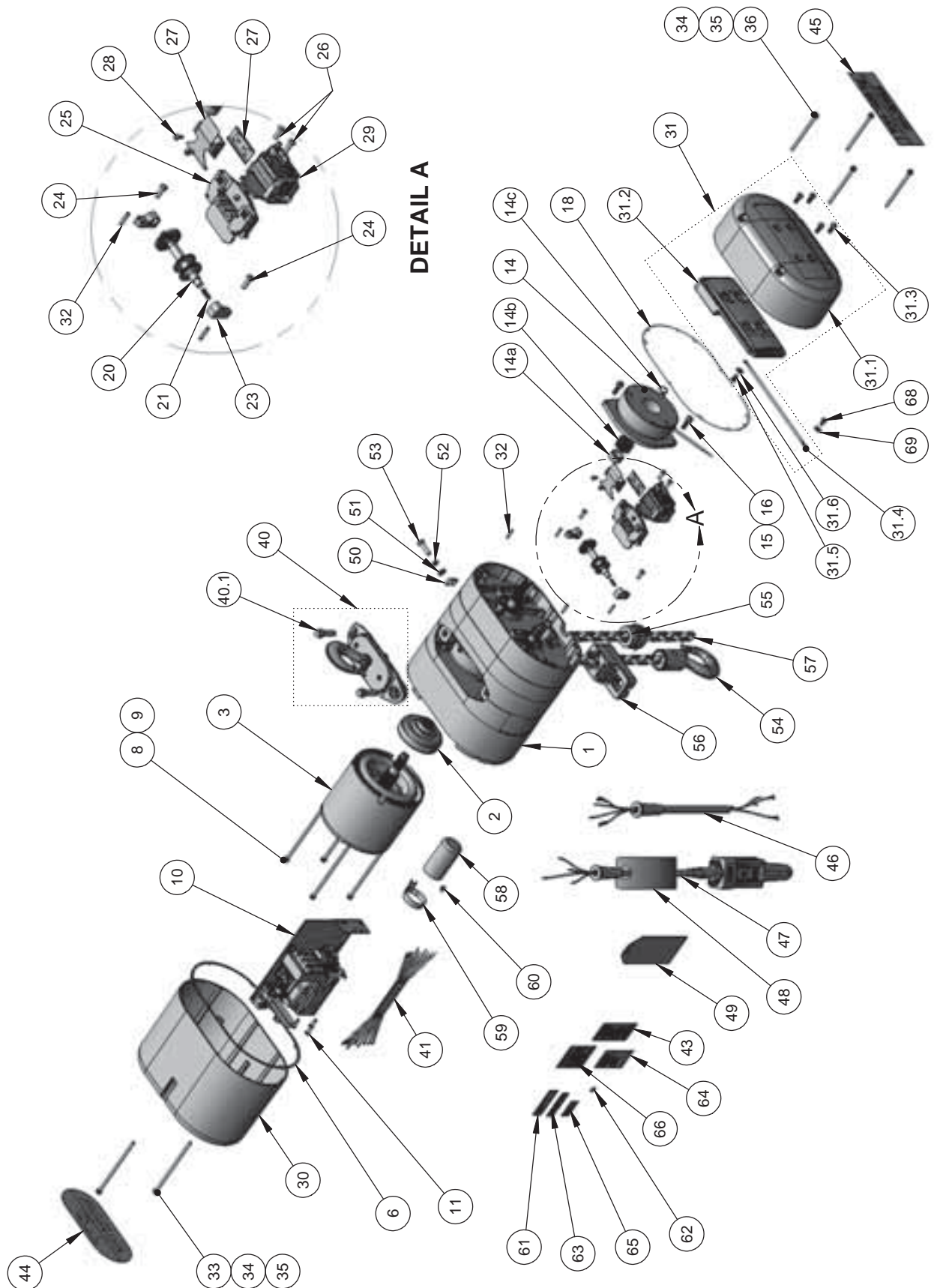
| Item No. | Description                                     | MODELS<br>A & A-2      | MODELS<br>AA & AA-2 | MODELS<br>B & B-2 | MODELS<br>C & C-2 | MODELS<br>E & E-2 | MODELS<br>F & F-2 | MODELS<br>H & H-2 | QTY. |
|----------|---|------------------------|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| 25       | LIMIT SWITCH BRACKET S/A - 1ø                   | 00000532               |                     |                   |                   |                   |                   |                   | 1    |
|          | LIMIT SWITCH BRACKET S/A - 3ø                   | 00000531               |                     |                   |                   |                   |                   |                   |      |
| 26       | LIMIT SWITCH BRACKET SCREWS                     | 982708                 |                     |                   |                   |                   |                   |                   | 2    |
| 27       | LIMIT SWITCH SPRING GUIDE                       | 52737                  |                     |                   |                   |                   |                   |                   | 1    |
|          | LIMIT SWITCH GUIDE PLATE                        | 28714                  |                     |                   |                   |                   |                   |                   |      |
| 28       | LIMIT SWITCH GUIDE MOUNTING SCREW               | 983614                 |                     |                   |                   |                   |                   |                   | 2    |
| 29       | EMPTY   | -                      |                     |                   |                   |                   |                   |                   | -    |
| 30       | MOTOR COVER                                     | 27058                  |                     |                   |                   |                   |                   |                   | 1    |
|          | MOTOR COVER - CLEAN ROOM                        | 27034                  |                     |                   |                   |                   |                   |                   |      |
| 31       | BACK FRAME COVER                                | 28009C                 |                     |                   |                   |                   |                   |                   | 1    |
|          | BACK FRAME COVER - CLEAN ROOM                   | 28009W                 |                     |                   |                   |                   |                   |                   |      |
| 32       | EMPTY   | -                      |                     |                   |                   |                   |                   |                   | -    |
| 33       | MOTOR COVER SCREW                               | 987397                 |                     |                   |                   |                   |                   |                   | 2    |
| 34       | WASHER  | 982251                 |                     |                   |                   |                   |                   |                   | 5    |
| 35       | SCREW RETAINER                                  | 00001747               |                     |                   |                   |                   |                   |                   | 3    |
| 36       | BACK FRAME COVER SCREW                          | 87325                  |                     |                   |                   |                   |                   |                   | 3    |
| 37       | TRANSFORMER 24V SECONDARY                       | 00000586T              |                     |                   |                   |                   |                   |                   | 1    |
|          | TRANSFORMER 48V SECONDARY                       | 00000587T              |                     |                   |                   |                   |                   |                   |      |
|          | TRANSFORMER 120V SECONDARY                      | 00000588T              |                     |                   |                   |                   |                   |                   |      |
| 38       | LOCK WASHER                                     | 982226                 |                     |                   |                   |                   |                   |                   | 2    |
| 39       | TRANSFORMER MOUNTING SCREW                      | 982688                 |                     |                   |                   |                   |                   |                   | 2    |
| 40       | UPPER SUSPENSION ASSEMBLY                       | SEE SUSPENSION SECTION |                     |                   |                   |                   |                   |                   | 1    |
| 40.      | 1 SUSPENSION BOLT                               | 987554                 |                     |                   |                   |                   |                   |                   | 2    |
| 41       | HARNESS-110/115V-1-50/60, 110/115V CON-<br>TROL | 00001516               |                     |                   |                   |                   |                   |                   | 1    |
|          | HARNESS-110/115V-1-50/60, 24/48V CONTROL        | 00001517               |                     |                   |                   |                   |                   |                   |      |
|          | HARNESS-220/230V-1-50/60                        | 00001522               |                     |                   |                   |                   |                   |                   |      |
|          | HARNESS-220/230/380/415/460V-3-50/60            | 00001518               |                     |                   |                   |                   |                   |                   |      |
|          | HARNESS-550/575V-3-50/60                        | 00000807               |                     |                   |                   |                   |                   |                   |      |
|          | HARNESS-220/230V-1-50/60, 2 SPEED               | 00000764               |                     |                   |                   |                   |                   |                   |      |
|          | HARNESS-380/415/460V-1-50/60, 2 SPEED           | 00001519               |                     |                   |                   |                   |                   |                   |      |
|          | HARNESS-550/575V-1-50/60, 2 SPEED               | 00000769               |                     |                   |                   |                   |                   |                   |      |
|          | HARNESS-230-3-60, VFD                           | 00001558               |                     |                   |                   |                   |                   |                   |      |
|          | HARNESS-460-3-60, VFD                           | 00001559               |                     |                   |                   |                   |                   |                   |      |
| 42       | HARNESS-V1 (3Ø ONLY)                            | 00000749               |                     |                   |                   |                   |                   |                   | 1    |
| 43       | WARNING LABEL                                   | 00000779               |                     |                   |                   |                   |                   |                   | 1    |
| 44       | SERIES LABEL                                    | 00000780               |                     |                   |                   |                   |                   |                   | 1    |
| 45       | CAPACITY LABEL                                  | 00000581               |                     | 00000772          |                   | 00000773          |                   | 00000778          | 1    |



## MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2 (CONT.)

| Item No. | Description                      | MODELS<br>A & A-2  | MODELS<br>AA & AA-2 | MODELS<br>B & B-2 | MODELS<br>C & C-2 | MODELS<br>E & E-2 | MODELS<br>F & F-2 | MODELS<br>H & H-2 | QTY.     |
|----------|----------------------------------|--|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------|
| 46       | POWER CORD-110/115V-1-50/60      | 29924  |                     |                   |                   |                   |                   |                   | 1        |
|          | POWER CORD-220/230V-1-50/60      | 29925  |                     |                   |                   |                   |                   |                   |          |
|          | POWER CORD-3Ø (1 & 2 SPEED)      | 23606515   |                     |                   |                   |                   |                   |                   |          |
|          | POWER CORD-CREEP CONTROL         | 29924  |                     |                   |                   |                   |                   |                   |          |
| 47       | CONTROL CORD                     | SEE CONTROL CORD SECTION                                   |                     |                   |                   |                   |                   |                   | 1        |
| 48       | WARNING TAG                      | 68209  |                     |                   |                   |                   |                   |                   | 1        |
| 49       | INSTRUCTION TAG                  | 29271  |                     |                   |                   |                   |                   |                   | 1        |
| 50       | LOOSE END LINK                   | 27351  |                     |                   |                   |                   |                   |                   | 1        |
| 51       | WASHER                           | 954802   |                     |                   |                   |                   |                   |                   | 1        |
| 52       | LOCK WASHER                      | 982226   |                     |                   |                   |                   |                   |                   | 1        |
| 53       | LOOSE END SCREW                  | 927764   |                     |                   |                   |                   |                   |                   | 1        |
| 54       | LOWER HOOK BLOCK ASSEMBLY        | SEE LOWER HOOK BLOCK SECTION                               |                     |                   |                   |                   |                   |                   | 1        |
| 55       | CHAIN STOP KIT                   | 24015K   |                     |                   |                   |                   |                   |                   | 1        |
| 56       | EMPTY                            | -  |                     |                   |                   |                   |                   |                   | -        |
| 57       | LOAD CHAIN                       | 85944 (ZINC PLATED)  |                     |                   |                   |                   |                   |                   | AS REQ'D |
|          |                                  | 85889 (BURNISHED AND OILED)                                |                     |                   |                   |                   |                   |                   |          |
|          |                                  | 85965 (ZINC PHOSPHATE PLATED)                              |                     |                   |                   |                   |                   |                   |          |
|          |                                  | 85915 (NICKEL PLATED)                                      |                     |                   |                   |                   |                   |                   |          |
|          |                                  | 85952 (STAINLESS STEEL - FOR USE IN CLEAN ROOM HOIST ONLY) |                     |                   |                   |                   |                   |                   |          |
| 58-60    | EMPTY                            |  |                     |                   |                   |                   |                   |                   |          |
| 61       | ELECTRICAL WARNING LABEL         | 24842  |                     |                   |                   |                   |                   |                   | 2        |
| 62       | ROHS LABEL                       | 00000782   |                     |                   |                   |                   |                   |                   | 1        |
| 63       | ELECTRICAL INFORMATION LABEL     | 24846  |                     |                   |                   |                   |                   |                   | 1        |
| 64       | BILINGUAL WARNING LABEL          | 27248  |                     |                   |                   |                   |                   |                   | 1        |
| 65       | MANUFACTURE LABEL                | 927236   |                     |                   |                   |                   |                   |                   | 1        |
| 66       | CHAIN LABEL                      | 928894   |                     |                   |                   |                   |                   |                   | 1        |
| 67       | HOIST IDENTIFICATION PLATE/LABEL | CONTACT FACTORY  |                     |                   |                   |                   |                   |                   | 1        |

**MODELS J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, & RRT-2**



# MODELS J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, & RRT-2 (CONT.)

| Item No. | Description  | MODELS<br>J & J-2               | MODELS<br>JJ & JJ-2 | MODEL L<br>MODEL<br>L-2 | MODELS<br>LL & LL-2 | MODELS<br>R & R-2 | MODELS<br>RR & RR-2 | MODELS<br>RT & RT-2 | MODELS<br>RRT &<br>RRT-2 | QTY. |
|----------|--|---------------------------------|---------------------|-------------------------|---------------------|-------------------|---------------------|---------------------|--------------------------|------|
| 1        | GEAR BOX SUB-ASSY - DC TYPE BRAKE<br>SEE GEARBOX SECTION | 00000845C                       | 00000846C           | 00000847C               | 00000845C           | 00000847C         | 00000845C           | 00000848C           | 00000849C                | 1    |
| 2        | CLUTCH ASSEMBLY  | 00000242                        | 00000243            | 00000242                | 00000243            | 00000242          | 00000243            | 00000242            | 00000243                 | 1    |
| 3        | 3/4 MOTOR - 115V-1Ø                                      | 00000401                        | -                   | 00000401                | -                   | 00000401          | -                   | 00000401            | -                        | 1    |
|          | 3/4 MOTOR - 230V-1Ø                                      | 00000428                        | -                   | 00000428                | -                   | 00000428          | -                   | 00000428            | -                        |      |
|          | 3/4 MOTOR - 230/460V-3Ø                                  | 00000440                        | 00000450            | 00000440                | 00000450            | 00000440          | 00000450            | 00000440            | 00000450                 |      |
|          | 3/4 MOTOR - 575V-3Ø                                      | 00000433                        | 00000439            | 00000433                | 00000439            | 00000433          | 00000439            | 00000433            | 00000439                 |      |
|          | 3/4 MOTOR - 230V-2 SPEED                                 | 00000414                        | 00000420            | 00000414                | 00000420            | 00000414          | 00000420            | 00000414            | 00000420                 |      |
|          | 3/4 MOTOR - 460V-2 SPEED                                 | 00000415                        | 00000421            | 00000415                | 00000421            | 00000415          | 00000421            | 00000415            | 00000421                 |      |
|          | 3/4 MOTOR - 575V-2 SPEED                                 | 00000418                        | 00000422            | 00000418                | 00000422            | 00000418          | 00000422            | 00000418            | 00000422                 |      |
| 4        | EMPTY  | -                               |                     |                         |                     |                   |                     |                     |                          | -    |
| 5        | EMPTY  | -                               |                     |                         |                     |                   |                     |                     |                          | -    |
| 6        | MOTOR COVER GASKET                                       | 35845                           |                     |                         |                     |                   |                     |                     |                          | 1    |
| 7        | ROTOR ASSEMBLY   | -                               |                     |                         |                     |                   |                     |                     |                          | -    |
| 8        | LOCK WASHER  | 982226                          |                     |                         |                     |                   |                     |                     |                          | 4    |
| 9        | MOTOR MOUNTING SCREW - 1Ø                                | 87377                           |                     |                         |                     |                   |                     |                     |                          | 4    |
|          | MOTOR MOUNTING SCREW -<br>230/460V-3-60 OR 575V-3-60     | 87377                           | 87336               | 87377                   | 87336               | 87377             | 87336               | 87377               | 87336                    |      |
|          | MOTOR MOUNTING SCREW - 2 SPEED                           | 87336                           |                     |                         |                     |                   |                     |                     |                          |      |
| 10       | CONTACTOR PLATE ASSEMBLY                                 | SEE SEE CONTACTOR PLATE SECTION |                     |                         |                     |                   |                     |                     |                          | 1    |
| 11       | CONTACTOR PLATE MOUNTING SCREW                           | 983656                          |                     |                         |                     |                   |                     |                     |                          | 3    |
| 12       | EMPTY  | -                               |                     |                         |                     |                   |                     |                     |                          | -    |
| 13       | EMPTY  | -                               |                     |                         |                     |                   |                     |                     |                          | -    |
| 14       | BRAKE ASSEMBLY   | SEE BRAKE SECTION               |                     |                         |                     |                   |                     |                     |                          | 1    |
| 14a      | BRAKE HUB SPACER   | SEE BRAKE SECTION               |                     |                         |                     |                   |                     |                     |                          | 0-2  |
| 14b      | BRAKE HUB  | SEE BRAKE SECTION               |                     |                         |                     |                   |                     |                     |                          | 0-2  |
| 14c      | BRAKE HUB SNAP RING                                      | SEE BRAKE SECTION               |                     |                         |                     |                   |                     |                     |                          | 1    |
| 15       | LOCK WASHER  | 945851                          |                     |                         |                     |                   |                     |                     |                          | 2    |
| 16       | BRAKE MOUNTING SCREW                                     | SEE BRAKE SECTION               |                     |                         |                     |                   |                     |                     |                          | 1-2  |
| 18       | BACK FRAME COVER GASKET                                  | 00000236                        |                     |                         |                     |                   |                     |                     |                          | 1    |
| 19       | EMPTY  | -                               |                     |                         |                     |                   |                     |                     |                          | -    |
| 20       | LIMIT SWITCH SHAFT S/A - 44 TPI                          | 00000525                        | 00000525            | 00000524                | 00000525            | 00000524          | 00000525            | 00000524            | 00000525                 | 1    |
|          | LIMIT SWITCH SHAFT S/A - 56 TPI                          | 00000527                        | 00000527            | 00000526                | 00000527            | 00000526          | 00000527            | 00000526            | 00000527                 |      |
|          | LIMIT SWITCH SHAFT S/A - 64 TPI                          | 00000529                        | 00000529            | 00000528                | 00000529            | 00000528          | 00000529            | 00000528            | 00000529                 |      |
| 21       | LIMIT SWITCH SHAFT SPRING                                | 35703                           |                     |                         |                     |                   |                     |                     |                          | 1    |
| 22       | EMPTY  | -                               |                     |                         |                     |                   |                     |                     |                          | -    |
| 23       | LIMIT SWITCH BEARING                                     | 35751                           |                     |                         |                     |                   |                     |                     |                          | 2    |
| 24       | LIMIT SWITCH BEARING SCREWS                              | 983656                          |                     |                         |                     |                   |                     |                     |                          | 2    |
| 25       | LIMIT SWITCH BRACKET S/A                                 | 36827                           |                     |                         |                     |                   |                     |                     |                          | 1    |
| 26       | LIMIT SWITCH BRACKET SCREWS                              | 983656                          |                     |                         |                     |                   |                     |                     |                          | 2    |
| 27       | LIMIT SWITCH GUIDE PLATE                                 | 28714                           |                     |                         |                     |                   |                     |                     |                          | 1    |
|          | LIMIT SWITCH GUIDE PLATE-ROTATABLE                       | 52500                           |                     |                         |                     |                   |                     |                     |                          |      |
| 28       | LIMIT SWITCH GUIDE MOUNTING SCREW                        | 983614                          |                     |                         |                     |                   |                     |                     |                          | 2    |

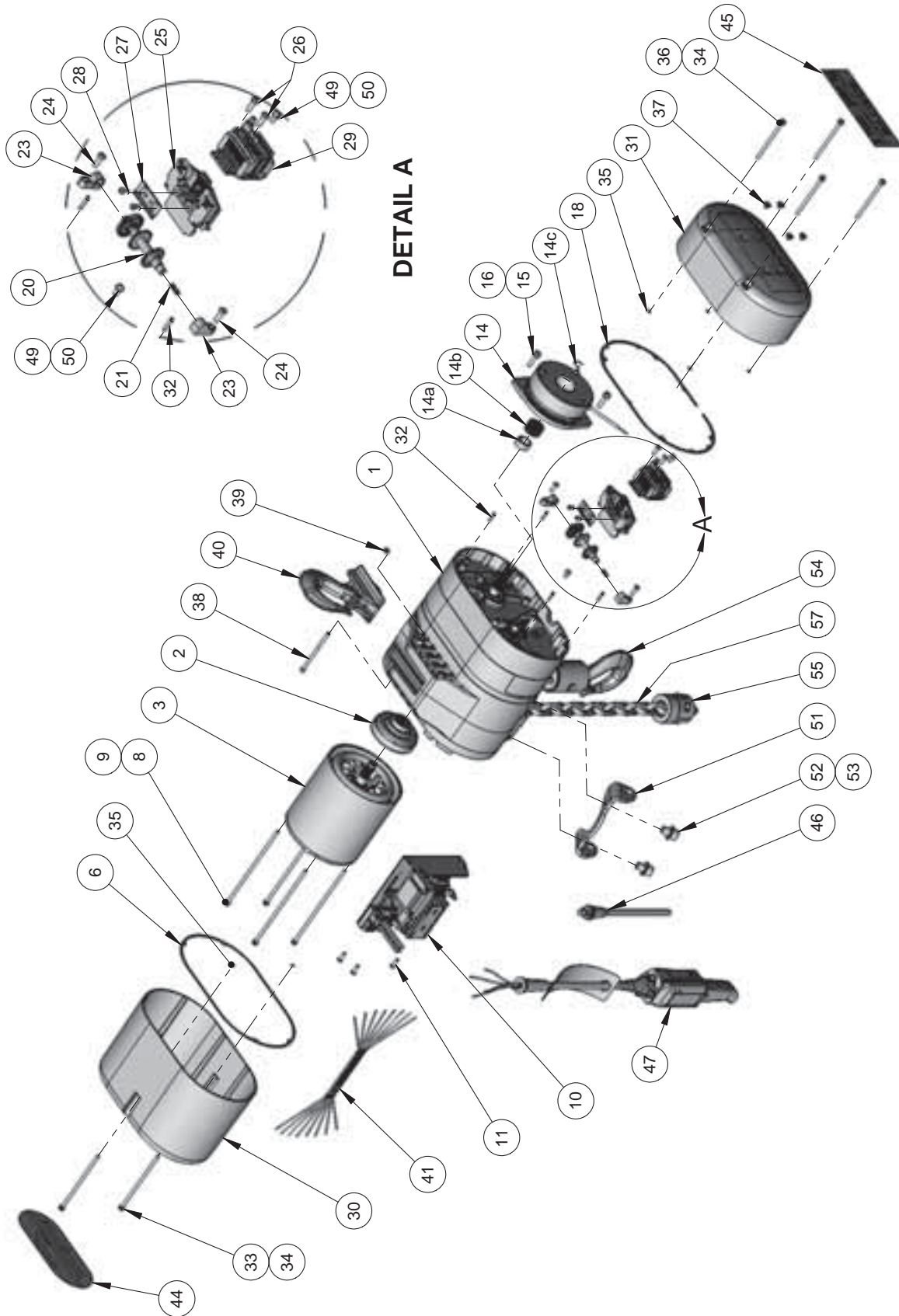
# **MODELS J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, & RRT-2 (CONT.)**

| Item No. | Description                                   | MODELS<br>J & J-2           | MODELS<br>JJ & JJ-2 | MODEL L<br>MODEL<br>L-2 | MODELS<br>LL & LL-2 | MODELS<br>R & R-2 | MODELS<br>RR & RR-2 | MODELS<br>RT & RT-2 | MODELS<br>RRT &<br>RRT-2 | QTY. |
|----------|---|-----------------------------|---------------------|-------------------------|---------------------|-------------------|---------------------|---------------------|--------------------------|------|
| 29       | TERMINAL STRIP S/A (115V-1Ø)                  | 00001739                    |                     |                         |                     |                   |                     |                     |                          | 1    |
|          | TERMINAL STRIP S/A (230V-1Ø)                  | 00001738                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | TERMINAL STRIP S/A (230/460V-3Ø)              | 00001734                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | TERMINAL STRIP S/A (575V-1Ø)                  | 00001735                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | TERMINAL STRIP S/A (230V-2 SPEED)             | 00001736                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | TERMINAL STRIP S/A (460/575V-2<br>SPEED)      | 00001746                    |                     |                         |                     |                   |                     |                     |                          |      |
| 30       | MOTOR COVER                                   | 36025C                      |                     |                         |                     |                   |                     |                     |                          | 1    |
| 31       | BACK FRAME COVER ASSEMBLY                     | 00000578C                   |                     |                         |                     |                   |                     |                     |                          | 1    |
| 31.1     | BACK FRAME COVER                              | 36008C                      |                     |                         |                     |                   |                     |                     |                          | 1    |
| 31.2     | COUNTER WEIGHT                                | 00000565                    |                     |                         |                     |                   |                     |                     |                          | 1    |
| 31.3     | COUNTER WEIGHT SCREW                          | 00000576                    |                     |                         |                     |                   |                     |                     |                          | 4    |
| 31.4     | TETHER  | 00000575                    |                     |                         |                     |                   |                     |                     |                          | 1    |
| 31.5     | SCREW   | 00000577                    |                     |                         |                     |                   |                     |                     |                          | 1    |
| 31.6     | WASHER  | 00000554                    |                     |                         |                     |                   |                     |                     |                          | 1    |
| 32       | BACK FRAME COVER PINS                         | 983784                      |                     |                         |                     |                   |                     |                     |                          | 4    |
| 33       | MOTOR COVER SCREW                             | 987553                      |                     |                         |                     |                   |                     |                     |                          | 2    |
| 34       | WASHER  | 982251                      |                     |                         |                     |                   |                     |                     |                          | 6    |
| 35       | SCREW RETAINER                                | 00001747                    |                     |                         |                     |                   |                     |                     |                          | 6    |
| 36       | BACK FRAME COVER SCREW                        | 968752                      |                     |                         |                     |                   |                     |                     |                          | 4    |
| 37-39    | EMPTY   | -                           |                     |                         |                     |                   |                     |                     |                          | -    |
| 40       | UPPER SUSPENSION ASSEMBLY                     | SEE SUSPENSION SECTION      |                     |                         |                     |                   |                     |                     |                          | 1    |
| 40.1     | SUSPENSION BOLT                               | 36849                       |                     |                         |                     |                   |                     |                     |                          | 2    |
| 41       | HARNESS-110/115V-1-50/60, 110/115V<br>CONTROL | 00001530                    |                     |                         |                     |                   |                     |                     |                          | 1    |
|          | HARNESS-110/115V-1-50/60, 24/48V<br>CONTROL   | 00001523                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | HARNESS-220/230V-1-50/60                      | 00001523                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | HARNESS-<br>220/230/380/415/460V-3-50/60      | 00001531                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | HARNESS-550/575V-3-50/60                      | 00001534                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | HARNESS-220/230V-1-50/60, 2 SPEED             | 00001532                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | HARNESS-380/415/460V-1-50/60, 2<br>SPEED      | 00001533                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | HARNESS-550/575V-1-50/60, 2 SPEED             | 00001533                    |                     |                         |                     |                   |                     |                     |                          |      |
|          | HARNESS-230-3-60, VFD                         | 000001556                   |                     |                         |                     |                   |                     |                     |                          |      |
|          | HARNESS-460-3-60, VFD                         | 00001556                    |                     |                         |                     |                   |                     |                     |                          |      |
| 42       | EMPTY   | -                           |                     |                         |                     |                   |                     |                     |                          | -    |
| 43       | WARNING LABEL                                 | 00000779                    |                     |                         |                     |                   |                     |                     |                          | 1    |
| 44       | SERIES LABEL                                  | 00000781                    |                     |                         |                     |                   |                     |                     |                          | 1    |
| 45       | CAPACITY LABEL                                | 00000774                    | 00000775            |                         |                     | 00000776          |                     | 00000777            |                          | 1    |
| 46       | POWER CORD-110/115V-1-50/60                   | 29042                       |                     |                         |                     |                   |                     |                     |                          | 1    |
|          | POWER CORD-220/230V-1-50/60                   | 29042                       |                     |                         |                     |                   |                     |                     |                          |      |
|          | POWER CORD-3Ø (1 & 2 SPEED)                   | 23606515                    |                     |                         |                     |                   |                     |                     |                          |      |
| 47       | CONTROL STATION AND CORD                      | SEE CONTROL STATION SECTION |                     |                         |                     |                   |                     |                     |                          | 1    |
| 48       | WARNING TAG                                   | 68209                       |                     |                         |                     |                   |                     |                     |                          | 1    |

# **MODELS J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, & RRT-2 (CONT.)**

| Item No. | Description                                     | MODELS<br>J & J-2             | MODELS<br>JJ & JJ-2 | MODEL L<br>MODEL<br>L-2 | MODELS<br>LL & LL-2 | MODELS<br>R & R-2 | MODELS<br>RR & RR-2 | MODELS<br>RT & RT-2 | MODELS<br>RRT &<br>RRT-2 | QTY.        |
|----------|---|-------------------------------|---------------------|-------------------------|---------------------|-------------------|---------------------|---------------------|--------------------------|-------------|
| 49       | INSTRUCTION TAG                                 | 29271                         |                     |                         |                     |                   |                     |                     |                          | 1           |
| 50       | LOOSE END LINK                                  | 35367                         |                     |                         |                     |                   |                     |                     |                          | 1           |
| 51       | WASHER  | 954807                        |                     |                         |                     |                   |                     |                     |                          | 1           |
| 52       | LOCK WASHER                                     | 945851                        |                     |                         |                     |                   |                     |                     |                          | 1           |
| 53       | LOOSE END SCREW                                 | 987210                        |                     |                         |                     |                   |                     |                     |                          | 1           |
| 54       | LOWER HOOK BLOCK ASSEMBLY                       | SEE LOWER HOOK BLOCK SECTION  |                     |                         |                     |                   |                     |                     |                          | 1           |
| 55       | CHAIN STOP KIT                                  | 24016K                        |                     |                         |                     |                   |                     |                     |                          | 1           |
| 56       | CONTACT BLOCK                                   | -                             |                     |                         |                     | 00000224C         |                     | -                   |                          | 1           |
| 57       | LOAD CHAIN                                      | 85949 (ZINC PLATED)           |                     |                         |                     |                   |                     |                     |                          | AS<br>REQ'D |
|          |   | 85979 (BURNISHED AND OILED)   |                     |                         |                     |                   |                     |                     |                          |             |
|          |   | 85966 (ZINC PHOSPHATE PLATED) |                     |                         |                     |                   |                     |                     |                          |             |
|          |   | 85916 (NICKEL PLATED)         |                     |                         |                     |                   |                     |                     |                          |             |
| 58       | SOLID STATE REVERSE SWITCH                      | 35499                         |                     |                         |                     |                   |                     |                     |                          | 1*          |
| 59       | SOLID STATE REVERSE SWITCH MTG.<br>CLAMP        | 27275                         |                     |                         |                     |                   |                     |                     |                          | 1*          |
| 60       | SOLID STATE REVERSE SWITCH MTG.<br>CLAMP SCREW  | 982873                        |                     |                         |                     |                   |                     |                     |                          | 1*          |
| 61       | ELECTRICAL WARNING LABEL                        | 24842                         |                     |                         |                     |                   |                     |                     |                          | 2           |
| 62       | ROHS LABEL                                      | 00000782                      |                     |                         |                     |                   |                     |                     |                          | 1           |
| 63       | ELECTRICAL INFORMATION LABEL                    | 24846                         |                     |                         |                     |                   |                     |                     |                          | 1           |
| 64       | BILINGUAL WARNING LABEL                         | 27248                         |                     |                         |                     |                   |                     |                     |                          | 1           |
| 65       | MANUFACTURE LABEL                               | 927236                        |                     |                         |                     |                   |                     |                     |                          | 1           |
| 66       | CHAIN LABEL                                     | 928894                        |                     |                         |                     |                   |                     |                     |                          | 1           |
| 67       | HOIST IDENTIFICATION PLATE/LABEL<br>(NOT SHOWN) | Contact Factory               |                     |                         |                     |                   |                     |                     |                          | 1           |
| 68       | SCREW   | 00000577                      |                     |                         |                     |                   |                     |                     |                          | 1           |
| 69       | WASHER  | 00000554                      |                     |                         |                     |                   |                     |                     |                          | 1           |

MODEL RRS

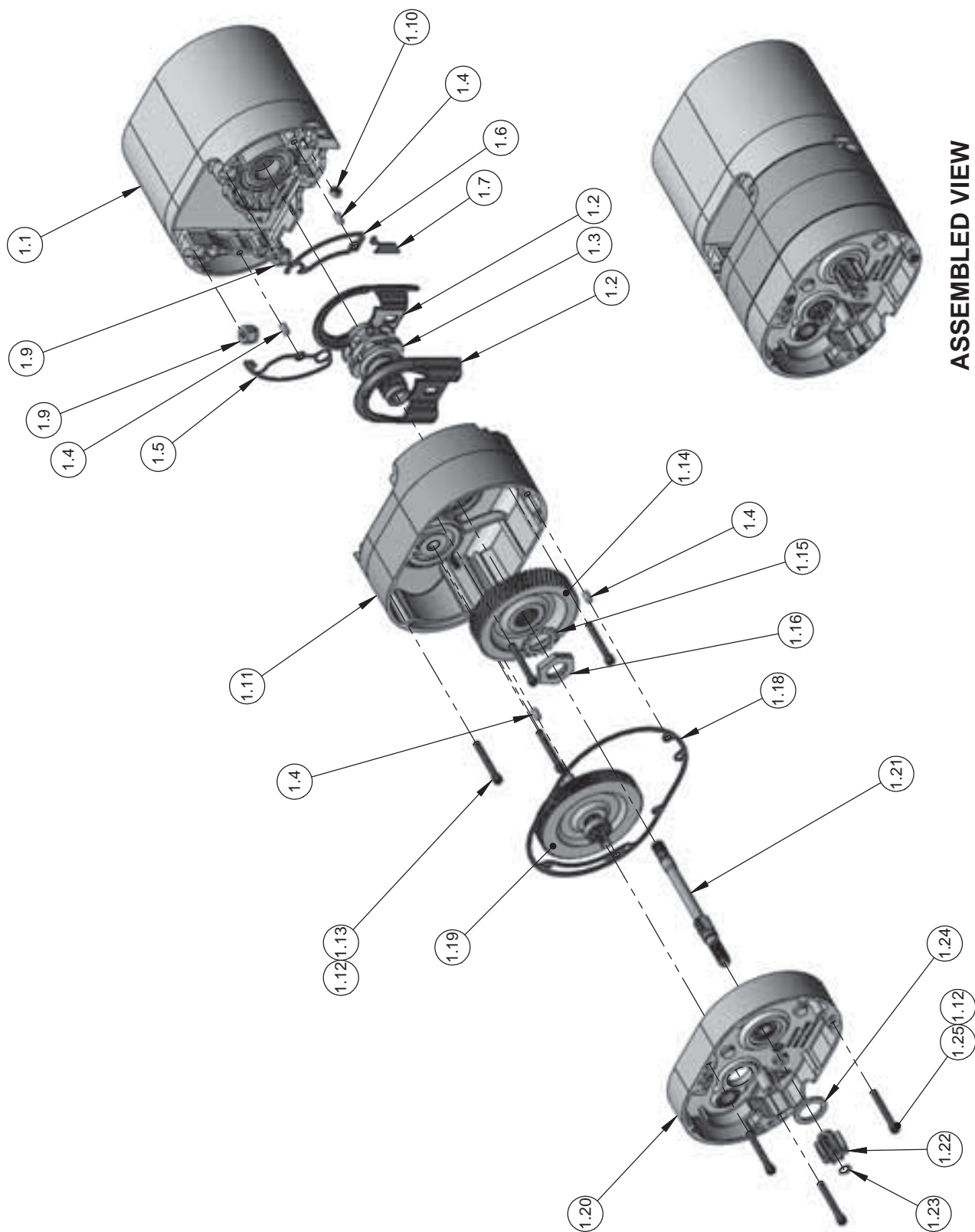


## MODEL RRS

| Item No. | Description                              | Part Number                  | Qty.            |
|----------|--|------------------------------|-----------------|
| 1        | GEARBOX ASSEMBLY-ORANGE                  | 10001000C                    | 1               |
| 2        | CLUTCH ASSEMBLY-V2-2 HP                  | 00000243                     | 1               |
| 3        | MOTOR - 230/460V-WITH PLUG               | 10001023                     | 1               |
|          | MOTOR 2HP- 575V                          | 10001024                     |                 |
| 4        | EMPTY                                    | -                            | -               |
| 5        | EMPTY                                    | -                            | -               |
| 6        | GASKET-MOTOR COVER                       | 10001019                     | 1               |
| 7        | EMPTY                                    | -                            | -               |
| 8        | LOCK WASHER                              | 982226                       | 4               |
| 9        | MOTOR MOUNTING SCREW                     | 87334                        | 4               |
| 10       | CONTACTOR PLATE ASSEMBLY                 | SEE CONTACTOR PLATE SECTION  | 1               |
| 11       | CONTACTOR PLATE MOUNTING SCREWS          | 983656                       | 3               |
| 12       | EMPTY                                    | -                            | -               |
| 13       | EMPTY                                    | -                            | -               |
| 14       | BRAKE ASSEMBLY                           | SEE BRAKE SECTION            | 1               |
| 14a      | BRAKE HUB SPACER                         | 00001433                     | 1               |
| 14b      | BRAKE HUB                                | 00001431                     | 1               |
| 14c      | BRAKE HUB SNAP RING                      | 10409711                     | 1               |
| 15       | LOCK WASHER                              | 945851                       | 2               |
| 16       | BRAKE MOUNTING SCREW                     | 982709                       | 2               |
| 17       | EMPTY                                    | -                            | -               |
| 18       | BACK FRAME COVER GASKET                  | 00000236                     | 1               |
| 19       | EMPTY                                    | -                            | -               |
| 20       | LIMIT SWITCH SHAFT S/A - 44 TPI          | 00000524                     | 1               |
|          | LIMIT SWITCH SHAFT S/A - 56 TPI          | 00000526                     |                 |
|          | LIMIT SWITCH SHAFT S/A - 64 TPI          | 00000528                     |                 |
| 21       | LIMIT SWITCH SHAFT SPRING                | 35703                        | 1               |
| 22       | EMPTY                                    | -                            | -               |
| 23       | LIMIT SWITCH BEARING                     | 35751                        | 2               |
| 24       | LIMIT SWITCH BEARING SCREWS              | 983656                       | 2               |
| 25       | LIMIT SWITCH BRACKET S/A                 | 36827                        | 1               |
| 26       | LIMIT SWITCH BRACKET SCREWS              | 983656                       | 2               |
| 27       | LIMIT SWITCH GUIDE PLATE                 | 28714                        | 1               |
| 28       | LIMIT SWITCH GUIDE PLATE MOUNTING SCREWS | 983614                       | 2               |
| 29       | TERMINAL STRIP S/A (230/460V-3ø)         | 00001734                     | 1               |
|          | TERMINAL STRIP S/A (575V-3ø)             | 00001735                     |                 |
| 30       | MOTOR COVER                              | 36025C                       | 1               |
| 31       | BACK FRAME COVER                         | 36008C                       | 1               |
| 32       | BACK FRAME COVER PINS                    | 983784                       | 4               |
| 33       | MOTOR COVER SCREW                        | 987553                       | 2               |
| 34       | WASHER                                   | 982251                       | 6               |
| 35       | SCREW RETAINER                           | 00001747                     | 6               |
| 36       | BACK FRAME COVER SCREW                   | 968752                       | 4               |
| 37       | HOLE PLUG                                | 00000574                     | 4               |
| 38       | SUSPENSION RETAINER SCREW                | 10001047                     | 1               |
| 39       | SUSPENSION RETAINER NUT                  | 82638                        | 1               |
| 40       | UPPER SUSPENSION ASSEMBLY                | SEE SUSPENSION SECTION       | 1               |
| 41       | WIRING HARNESS (230/460V-3ø)             | 00001531                     | 1               |
|          | WIRING HARNESS (575V-3ø)                 | 00001534                     |                 |
| 42       | LINE CONNECTOR (NOT SHOWN)               | 982158                       | 1               |
| 43       | EMPTY                                    | -                            | -               |
| 44       | SERIES LABEL                             | 00000781                     | 1               |
| 45       | CAPACITY LABEL                           | 00000776                     | 1               |
| 46       | POWER CORD                               | 23606515                     | 1               |
|          | KIT, LESS POWER CORD                     | 28039                        |                 |
| 47       | CONT STATION AND CORD                    | SEE LOWER HOOK BLOCK SECTION | 1               |
| 48       | EMPTY                                    | -                            | -               |
| 49       | GROUND SCREW                             | 987827                       | 2               |
| 50       | LOCK WASHER                              | 982226                       | 2               |
| 51       | CHAIN CONTAINER BRACKET                  | 10001041                     | 1               |
| 52       | WASHER                                   | 10001043                     | 2               |
| 53       | SCREW                                    | 982433                       | 2               |
| 54       | LOWER HOOK ASSEMBLY                      | 10001052                     | 1               |
| 55       | CHAIN BLOCK KIT                          | 10001029                     | 1               |
| 56       | CHAIN STARTER LINK (NOT SHOWN)           | 85960LEL                     | 1               |
| 57       | LOAD CHAIN, ZINC PLATED                  | 85960EN                      | REQ'D LIFT +2FT |



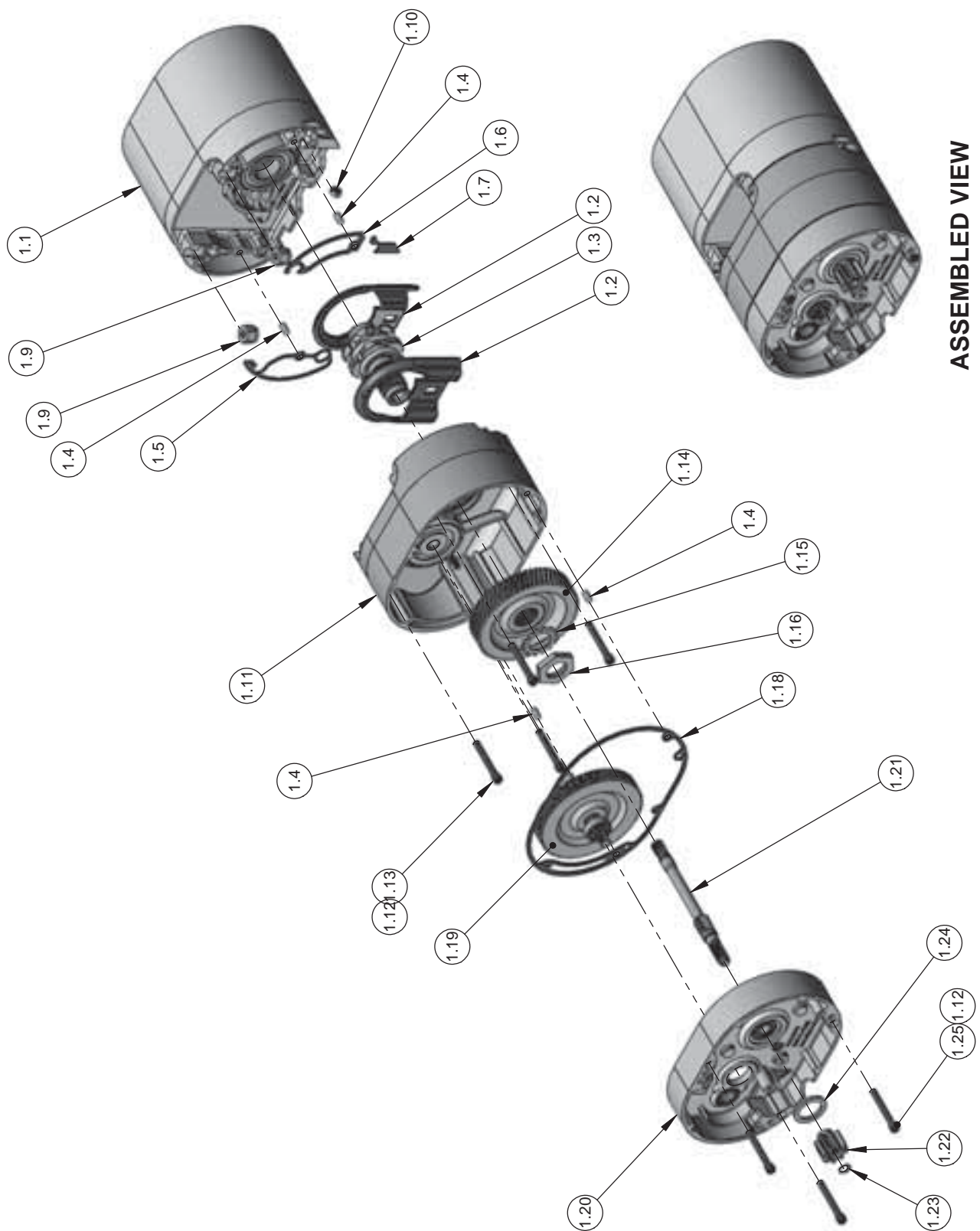
MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2



# MODELS A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2 (CONT.)

| Item No. | Description                        | DC TYPE BRAKE                  |                                |                               |                                |                               | Qty. |
|----------|------------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------------------|------|
|          |                                    | Model A                        | Model AA                       | MODELS B/ E                   | MODELS B/ E                    | MODELS F/ H                   |      |
| 1        | GEARBOX SUB-ASSEMBLY               | 00000830C                      | 00000831C                      | 00000832C                     | 00000833C                      | 00000834C                     | 1    |
|          | CLEAN ROOM GEAR BOX SUB-ASSEMBLY   | 00000835W                      | 00000836W                      | 00000837W                     | 00000838W                      | 00000839W                     |      |
| 1.1      | MOTOR HOUSING SUB-ASSY             | 00000504C                      |                                |                               |                                |                               | 1    |
|          | CLEAN ROOM MOTOR HOUSING 1SUB-ASSY | 00000504W                      |                                |                               |                                |                               |      |
| 1.2      | CHAIN GUIDE                        | 00000232                       |                                |                               |                                |                               | 2    |
|          | CLEAN ROOM CHAIN GUIDE             | 00000811                       |                                |                               |                                |                               |      |
| 1.3      | LIFTWHEEL                          | 00000500                       |                                |                               |                                |                               | 1    |
|          | CLEAN ROOM LIFTWHEEL               | 00000818                       |                                |                               |                                |                               |      |
| 1.4      | DOWEL PIN                          | 82354                          |                                |                               |                                |                               | 4    |
| 1.5      | GASKET-MOTOR HOUSING WIREWAY       | 00000189                       |                                |                               |                                |                               | 1    |
| 1.6      | GASKET MOTOR HOUSING               | 00000190                       |                                |                               |                                |                               | 1    |
| 1.7      | GASKET MOTOR HOUSING               | 00000191                       |                                |                               |                                |                               | 1    |
| 1.8      | EMPTY                              | -                              |                                |                               |                                |                               | -    |
| 1.9      | SUSPENSION NUT                     | 927755                         |                                |                               |                                |                               | 2    |
| 1.10     | LOOSE END NUT                      | 82638                          |                                |                               |                                |                               | 1    |
| 1.11     | GEAR HOUSING SUB-ASSY              | 00000503C                      | 00000503C                      | 00000502C                     | 00000503C                      | 00000502C                     | 1    |
|          | CLEAN ROOM GEAR HOUSING SUB-ASSY   | 00000503W                      | 00000503W                      | 00000502W                     | 00000503W                      | 00000502W                     |      |
| 1.12     | LOCK WASHER                        | 940802                         |                                |                               |                                |                               | 7    |
| 1.13     | GEAR HOUSING SCREW                 | 28830                          |                                |                               |                                |                               | 4    |
| 1.14     | LIFTWHEEL GEAR                     | 00000160<br>(45TEETH)          | 00000159<br>(36TEETH)          | 00000161<br>(59TEETH)         | 00000160<br>(45TEETH)          | 00000161<br>(59TEETH)         | 1    |
| 1.15     | LOCK WASHER                        | 00000199                       |                                |                               |                                |                               | 1    |
| 1.16     | LIFTWHEEL NUT                      | 00000198                       |                                |                               |                                |                               | 1    |
| 1.17     | EMPTY                              | -                              |                                |                               |                                |                               | -    |
| 1.18     | GEAR HOUSING GASKET                | 00000188                       |                                |                               |                                |                               | 1    |
| 1.19     | INTERMEDIATE SHAFT SUB-ASSY        | 00000156<br>(88TEETH/ 12TEETH) | 00000157<br>(88TEETH/ 18TEETH) | 00000155<br>(88TEETH/ 8TEETH) | 00000156<br>(88TEETH/ 12TEETH) | 00000155<br>(88TEETH/ 8TEETH) | 1    |
| 1.20     | BACK FRAME SUB-ASSY                | 00000505C*                     |                                |                               |                                |                               | 1    |
|          | CLEAN ROOM BACK FRAME SUB-ASSY     | 00000505W*                     |                                |                               |                                |                               |      |
| 1.21     | DRIVE SHAFT                        | 00000819 (10 TEETH)            |                                |                               |                                |                               | 1    |
| 1.22     | BRAKE HUB                          | SEE BRAKE SECTION              |                                |                               |                                |                               | 1    |
| 1.23     | RETAINING RING                     | SEE BRAKE SECTION              |                                |                               |                                |                               | 1    |
| 1.24     | SPACER                             | SEE BRAKE SECTION              |                                |                               |                                |                               | 1    |
| 1.25     | BACKFRAME SCREW                    | 982699                         |                                |                               |                                |                               | 3    |

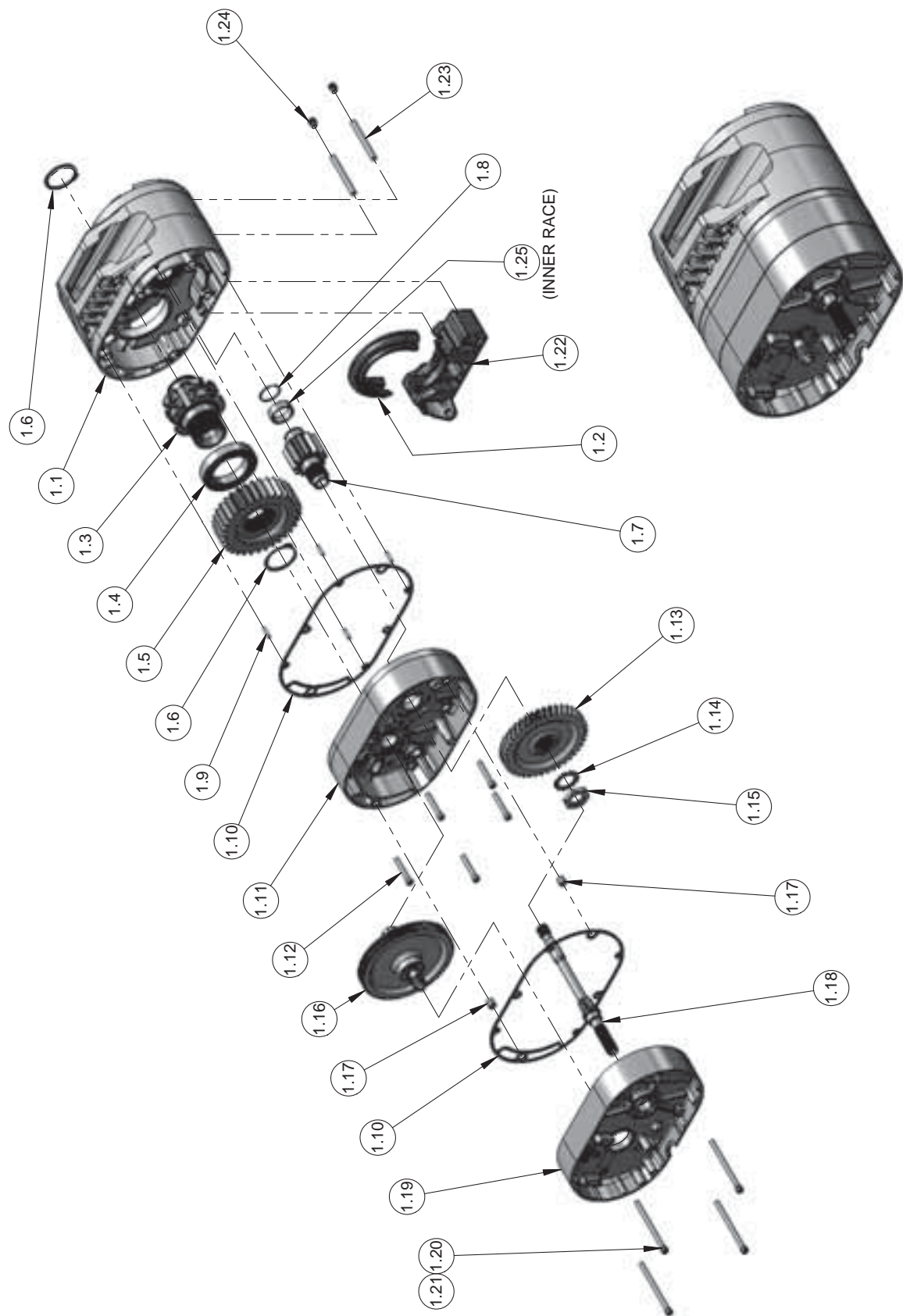
J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, & RRT-2



# J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RT, RT-2, RRT, & RRT-2 (CONT.)

| Item No. | Description                  | DC TYPE BRAKE                   |                                  |                                 |                                 |                                 | Qty. |
|----------|------------------------------|---------------------------------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|------|
|          |                              | MODELS<br>J/LL/RR               | MODEL JJ                         | MODELS<br>L/R                   | MODEL RT                        | MODEL<br>RRT                    |      |
| 1        | GEARBOX SUB-ASSEMBLY         | 00000845C                       | 00000846C                        | 00000847C                       | 00000848C                       | 00000849C                       | 1    |
| 1.1      | MOTOR HOUSING<br>SUB-ASSY    | 00000509C                       | 00000509C                        | 00000509C                       | 00000513C                       | 00000513C                       | 1    |
| 1.2      | CHAIN GUIDE                  | 00000235                        |                                  |                                 |                                 |                                 | 2    |
| 1.3      | LIFT-WHEEL                   | 00000501                        |                                  |                                 |                                 |                                 | 1    |
| 1.4      | DOWEL PIN                    | 82354                           |                                  |                                 |                                 |                                 | 2    |
| 1.5      | GASKET-MOTOR HOUSING WIREWAY | 00000193                        |                                  |                                 |                                 |                                 | 1    |
| 1.6      | GASKET MOTOR HOUSING         | 00000194                        |                                  |                                 |                                 |                                 | 1    |
| 1.7      | GASKET MOTOR HOUSING         | 00000549                        |                                  |                                 |                                 |                                 | 1    |
| 1.8      | SUSPENSION ANCHOR            | 35066                           |                                  |                                 |                                 |                                 | 2    |
| 1.9      | SUSPENSION NUT               | 935791                          |                                  |                                 |                                 |                                 | 2    |
| 1.10     | LOOSE END NUT                | 82639                           |                                  |                                 |                                 |                                 | 1    |
| 1.11     | GEAR HOUSING SUB-ASSY        | 00000507C                       | 00000508C                        | 00000507C                       | 00000512C                       | 00000512C                       | 1    |
| 1.12     | LOCK WASHER                  | 940830                          |                                  |                                 |                                 |                                 | 8    |
| 1.13     | GEAR HOUSING SCREW           | 982682                          |                                  |                                 |                                 |                                 | 8    |
| 1.14     | LIFEWHEEL GEAR               | 00000163 (66<br>TEETH)          | 00000162 (42<br>TEETH)           | 00000163 (66<br>TEETH)          | 00000163 (66<br>TEETH)          | 00000163 (66<br>TEETH)          | 1    |
| 1.15     | LOCK WASHER                  | 986276                          |                                  |                                 |                                 |                                 | 1    |
| 1.16     | LIFTWHEEL NUT                | 35773                           |                                  |                                 |                                 |                                 | 1    |
| 1.17     | ALIGNMENT BUSHING            | 35768                           |                                  |                                 |                                 |                                 | 2    |
| 1.18     | GEAR HOUSING GASKET          | 00000192                        |                                  |                                 |                                 |                                 | 1    |
| 1.19     | INTERMEDIATE SHAFT SUB-ASSY  | 00000146 (47<br>TEETH/ 8 TEETH) | 00000170 (47<br>TEETH/ 10 TEETH) | 00000171 (92<br>TEETH/ 8 TEETH) | 00000171 (92<br>TEETH/ 8 TEETH) | 00000146 (47<br>TEETH/ 8 TEETH) | 1    |
| 1.2      | BACK FRAME SUB-ASSY          | 00000510C                       |                                  |                                 |                                 |                                 | 1    |
| 1.21     | DRIVE SHAFT                  | 00000821 (10<br>TEETH)          | 00000821 (10<br>TEETH)           | 00000820 (10<br>TEETH)          | 00000820 (10<br>TEETH)          | 00000821 (10<br>TEETH)          | 1    |
| 1.22     | BRAKE HUB                    | SEE BRAKE SECTION               |                                  |                                 |                                 |                                 | 1    |
| 1.23     | RETAINING RING               | SEE BRAKE SECTION               |                                  |                                 |                                 |                                 | 1    |

RRS GEARBOX

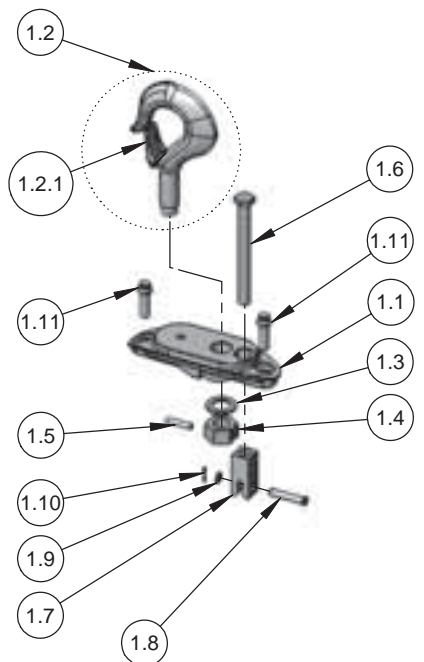


ASSEMBLED VIEW

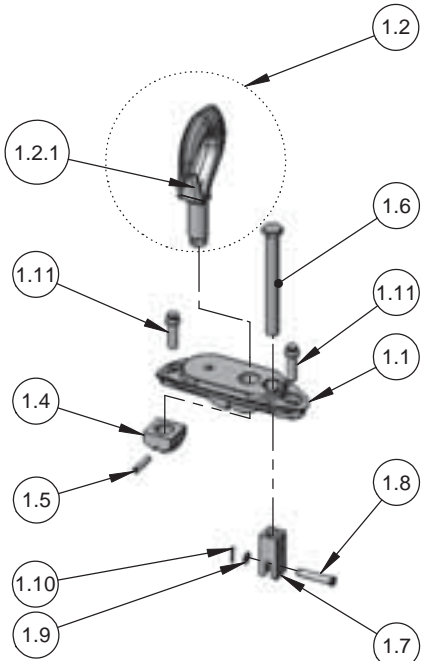
## RRS GEARBOX

| Item No. | Description                    | Part Number | Qty. |
|----------|--------------------------------|-------------|------|
| 1        | GEARBOX ASSEMBLY               | 10001000    | 1    |
| 1.1      | MAIN FRAME SUB ASSEMBLY-ORANGE | 10001001C   | 1    |
| 1.2      | CHAIN GUIDE                    | 10001004    | 1    |
| 1.3      | LIFTWHEEL-5PKT-10MM X 30MM     | 10001074    | 1    |
| 1.4      | RADIAL BALL BEARING            | 10001017    | 1    |
| 1.5      | GEAR-33T                       | 10001006    | 1    |
| 1.6      | RETAINING RING-EXTERNAL        | 10001108    | 2    |
| 1.7      | PINION SUB-ASSY-12T            | 10001007    | 1    |
| 1.8      | RETAINING RING-EXTERNAL        | 10001107    | 1    |
| 1.9      | SPRING PIN                     | 983784      | 4    |
| 1.1      | GASKET-GEAR HOUSING-V2         | 00000192    | 2    |
| 1.11     | INT. FRAME-SUB-ASSY-ORANGE     | 10001009C   | 1    |
| 1.12     | SCREW                          | 982682      | 5    |
| 1.13     | GEAR - 42 TEETH                | 00000162    | 1    |
| 1.14     | WASHER-LOCK-EXT TOOTH          | 986276      | 1    |
| 1.15     | NUT                            | 35773       | 1    |
| 1.16     | SHAFT SUB-ASSY 10T/92T         | 10001011    | 1    |
| 1.17     | DOWEL, BACK FRAME              | 35768       | 2    |
| 1.18     | DRIVE SHAFT-10T                | 10001012    | 1    |
| 1.19     | V2 BACK FRAME S/A-ORANGE       | 00000510C   | 1    |
| 1.20     | SCREW                          | 80409       | 4    |
| 1.21     | LOCK WASHER                    | 940830      | 4    |
| 1.22     | CHAIN CHUTE-MACHINED-BLACK     | 10001014B   | 1    |
| 1.23     | DOWEL PIN                      | 10001038    | 2    |
| 1.24     | SET SCREW                      | 10001045    | 2    |
| 1.25     | CYLINDRICAL ROLLER BEARING     | 10001016    | 1    |

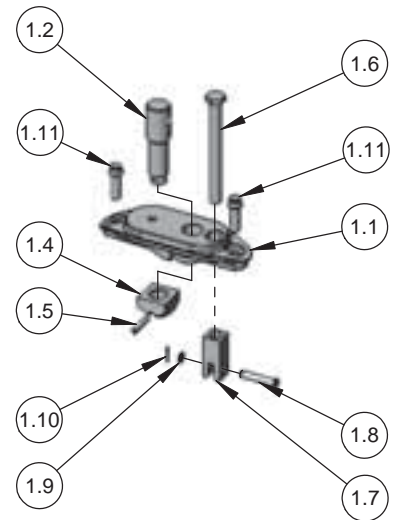
## MODEL A TO RRT-2 EXCLUDES RRS.



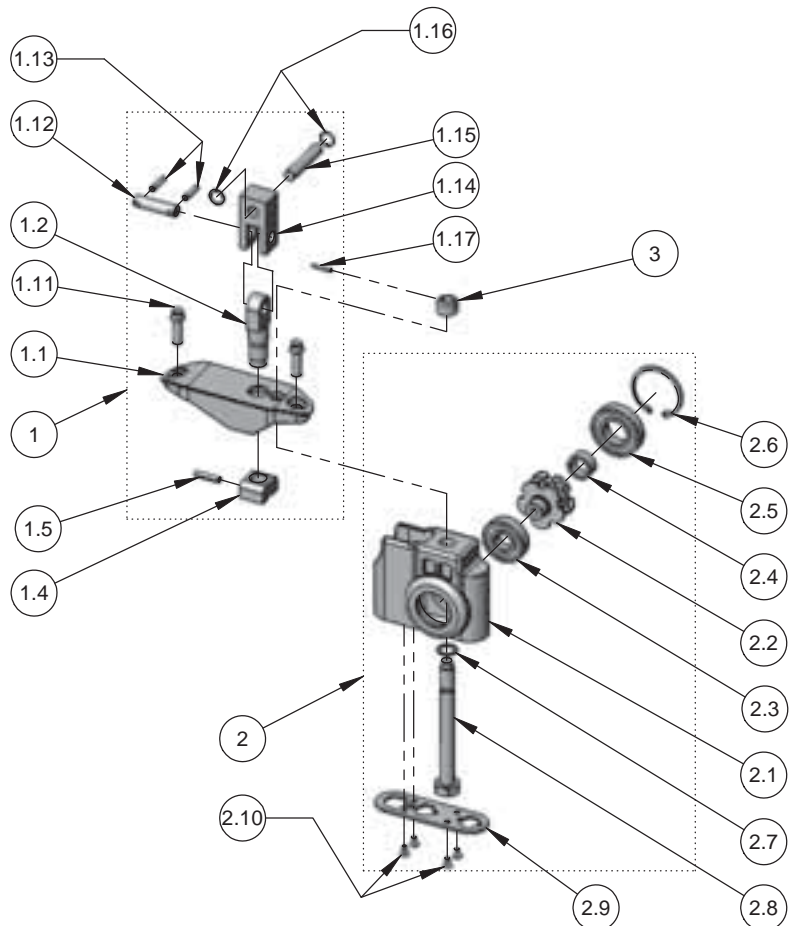
SWIVEL HOOK ASSEMBLY



RIGID HOOK ASSEMBLY



LUG ASSEMBLY



TRIPLE REEVED LUG ASSEMBLY

## UPPER SUSPENSIONS



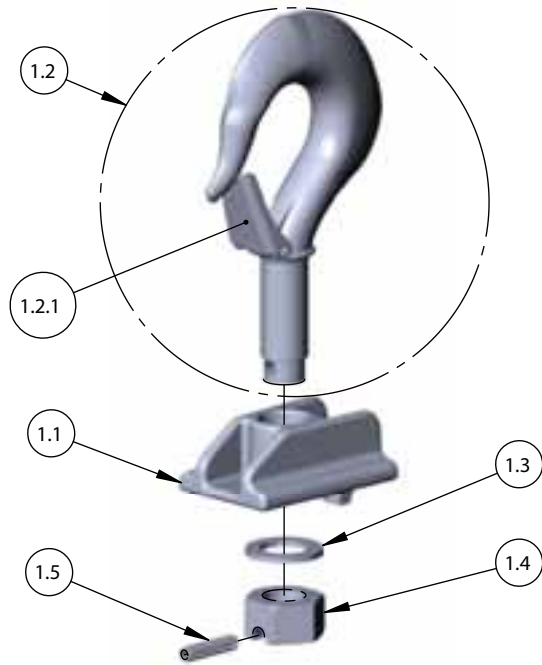
# UPPER SUSPENSIONS

| Item No. | Description  | Part Numbers   |                             |  |                               |                                   | QTY. |
|----------|--|--|-----------------------------|--|-------------------------------|-----------------------------------|------|
|          |  | MODELS<br>A, A-2, AA,<br>AA-2, B, B-<br>2, C, C-2, F,<br>F-2 | MODELS<br>E, E-2, H,<br>H-2 | MODELS<br>J, J-2, L, L-<br>2, LL, LL-2 | MODELS<br>R, R-2,<br>RR, RR-2 | MODELS<br>RT, RT-2,<br>RRT, RRT-2 |      |
| 1        | SWIVEL SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK      | 2792NH   | 2793NH                      | 3661NH                                 | 3660NH                        | 9557NH                            | 1    |
|          | SWIVEL SUSPENSION ASSEMBLY - W/ LATCHLOK TYPE HOOK   | 2796NH   | -*                          | 3662NH                                 | 3663NH                        | -*                                |      |
|          | RIGID SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK       | 2788NH   | 2789NH                      | 3651NH                                 | 3658NH                        | 9559NH                            |      |
|          | RIGID SUSPENSION ASSEMBLY - W/ LATCHLOK TYPE HOOK    | 2790NH   | -*                          | 3652NH                                 | -*                            | -*                                |      |
|          | LUG SUSPENSION FOR MOTOR DRIVEN TROLLEY              | 2992NH   | 2993NH                      | 3679NH                                 | 3668NH                        | 9561NH                            |      |
|          | LUG SUSPENSION FOR LOW HEADROOM TROLLEY              | 2778NH   | 2779NH                      | 3677NH                                 |                               |                                   |      |
| 1.1      | SUSPENSION ADAPTER                                   | 00000218B  | 00000223B                   | 00000220B                              | 00000221B                     | 00000222B                         | 1    |
| 1.2      | UPPER HOOK SUB-ASSEMBLY - LATCH TYPE                 | 28689B   | 28697B                      | 35617B                                 | 35616B                        | 36613B                            | 1    |
|          | UPPER HOOK SUB-ASSEMBLY - LATCHLOK TYPE              | 28643  | -*                          | 36678                                  | 36680                         | -*                                |      |
|          | SUSPENSION LUG FOR MOTOR DRIVEN TROLLEY              | 27454  | 27455                       | 35459                                  | 35457                         | 36356                             |      |
|          | SUSPENSION LUG FOR LOW HEADROOM TROLLEY              | 27450  | 27452                       | 35456                                  |                               |                                   |      |
| 1.2.1    | LATCH KIT  | 45661  | 45661                       | 45662                                  | 45663                         | 45663                             | -**  |
| 1.3      | THRUST WASHER (FOR SWIVEL SUSPENSIONS ONLY)          | 27786  | 45930                       | 45930                                  | 45918                         | -                                 | 1    |
| 1.4      | UPPER HOOK COLLAR FOR SWIVEL SUSPENSIONS             | 27350  | 45385                       | 35042                                  | 35041                         | 36352                             | 1    |
|          | UPPER HOOK COLLAR FOR RIGID HOOK AND LUG SUSPENSIONS | 27372  | 27373                       | 35458                                  | 35426                         | 36360                             |      |
| 1.5      | SPRING PIN   | 27805  | 45941                       | 983764                                 | 983762                        | 983762                            | 1    |
| 1.6      | DEAD END BOLT  | -  | 89508                       | -                                      | 35957                         | -                                 | 1    |
| 1.7      | DEAD END BLOCK                                       | -  | 27397                       | -                                      | 35418                         | -                                 | 1    |
| 1.8      | DEAD END PIN   | -  | 82320                       | -                                      | 82314                         | -                                 | 1    |
| 1.9      | WASHER   | -  | 987878                      | -                                      | 987877                        | -                                 | 1    |
| 1.10     | COTTER PIN   | -  | 988330                      | -                                      | 988330                        | -                                 | 1    |
| 1.11     | SUSPENSION SCREW                                     | 987554   | 987554                      | 36849                                  | 36849                         | 36849                             | 2    |
| 1.12     | SUSPENSION LUG SUPPORT PIN                           | -  | -                           | -                                      | -                             | 36366                             | 1    |
| 1.13     | PIN RETAINER   | -  | -                           | -                                      | -                             | 983760                            | 2    |
| 1.14     | SHACKLE  | -  | -                           | -                                      | -                             | 36357                             | 1    |
| 1.15     | SHACKLE SUPPORT PIN                                  | -  | -                           | -                                      | -                             | 36363                             | 1    |
| 1.16     | RING RETAINER  | -  | -                           | -                                      | -                             | 36867                             | 2    |
| 1.17     | SHEAVE STUD PIN                                      | -  | -                           | -                                      | -                             | 983791                            | 1    |
| 2        | UPPER SHEAVE HANGER S/A                              | -  | -                           | -                                      | -                             | 00000285C                         | 1    |
| 2.1      | UPPER SHEAVE HANGER                                  | -  | -                           | -                                      | -                             | 00000281C                         | 1    |
| 2.2      | SHEAVE   | -  | -                           | -                                      | -                             | 00000274                          | 1    |
| 2.3      | BEARING 6305ZZ                                       | -  | -                           | -                                      | -                             | 83674                             | 1    |
| 2.4      | PILOT BUSHING  | -  | -                           | -                                      | -                             | 00000284                          | 1    |
| 2.5      | BEARING 6207ZZ                                       | -  | -                           | -                                      | -                             | 83669                             | 1    |
| 2.6      | RETAINING RING                                       | -  | -                           | -                                      | -                             | 46800                             | 1    |
| 2.7      | WASHER   | -  | -                           | -                                      | -                             | 36370                             | 1    |
| 2.8      | SHEAVE STUD  | -  | -                           | -                                      | -                             | 36372                             | 1    |
| 2.9      | CLOVER LEAF PLATE                                    | -  | -                           | -                                      | -                             | 00000282B                         | 1    |
| 2.10     | SCREW  | -  | -                           | -                                      | -                             | 936823                            | 4    |
| 3        | SHEAVE STUD NUT                                      | -  | -                           | -                                      | -                             | 00000289                          | 1    |

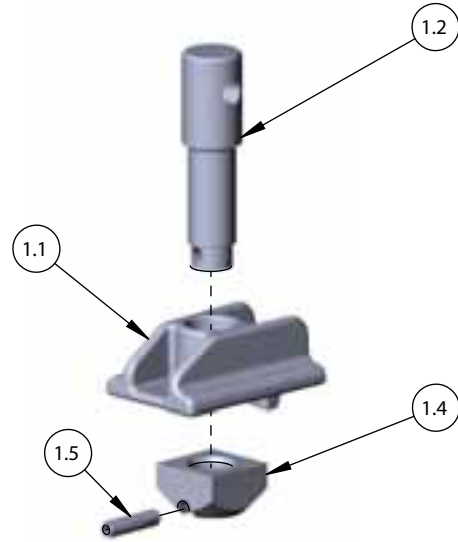
\*Contact factory for Latchlok hooks and assemblies

\*\* Latch Type hooks assemblies come with latches installed

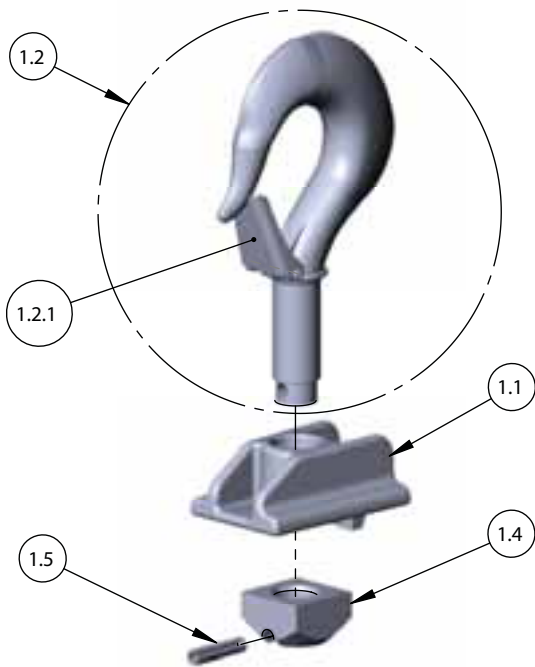
UPPER SUSPENSIONS MODEL RRS



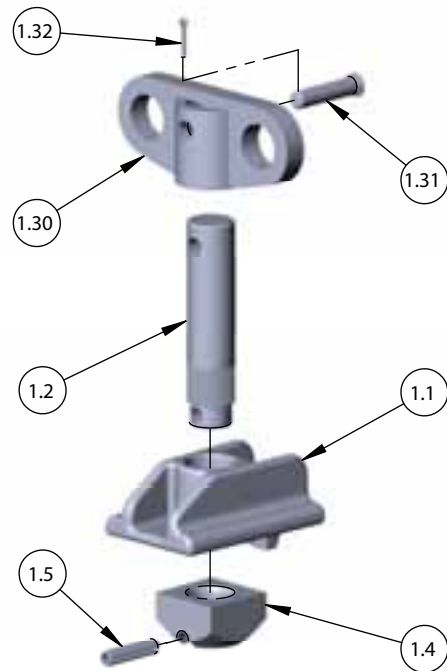
SWIVEL HOOK ASSEMBLY



LUG ASSEMBLY



RIGID HOOK ASSEMBLY

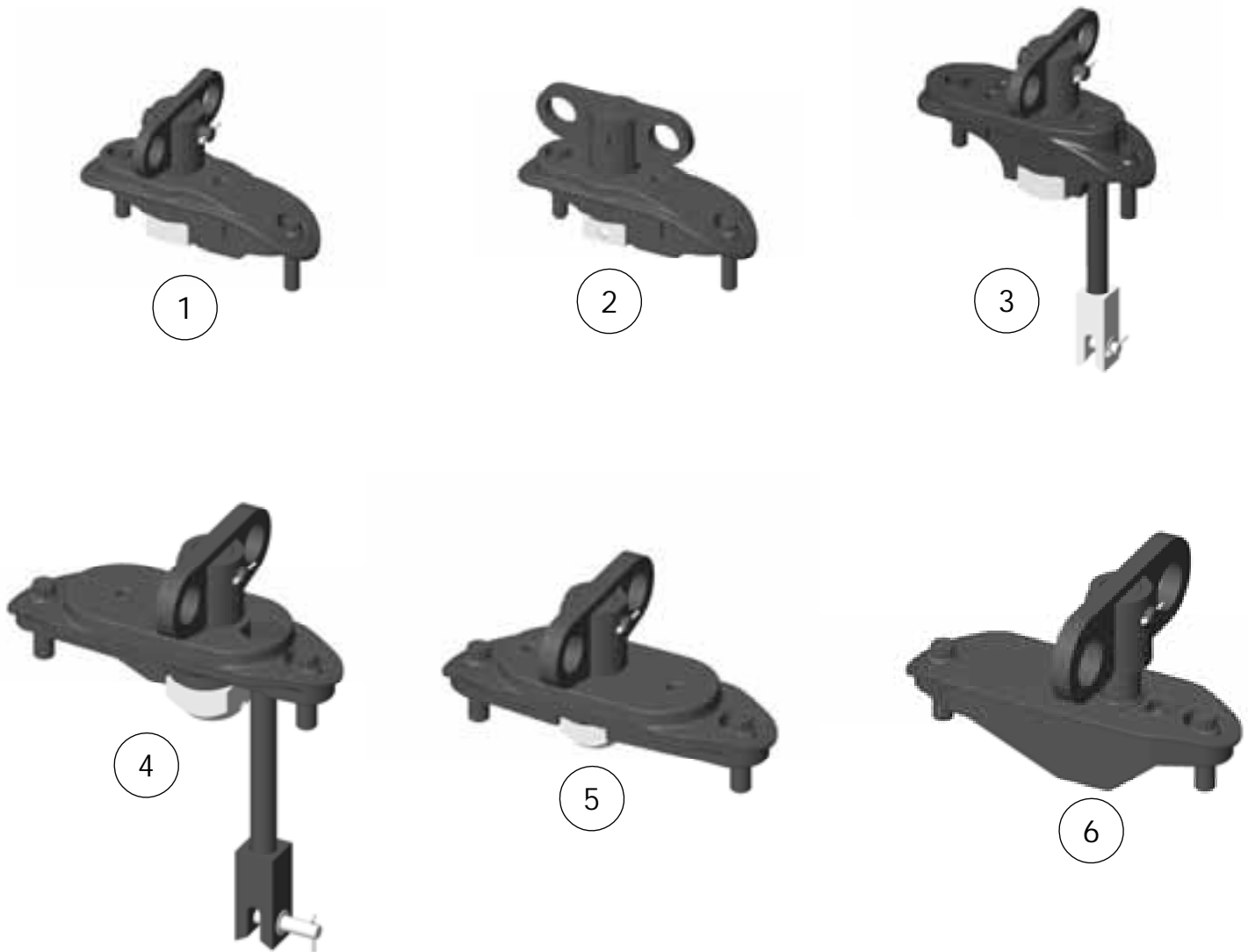


UNIVERSAL TROLLEY LUG ASSEMBLY

## UPPER SUSPENSIONS MODEL RRS

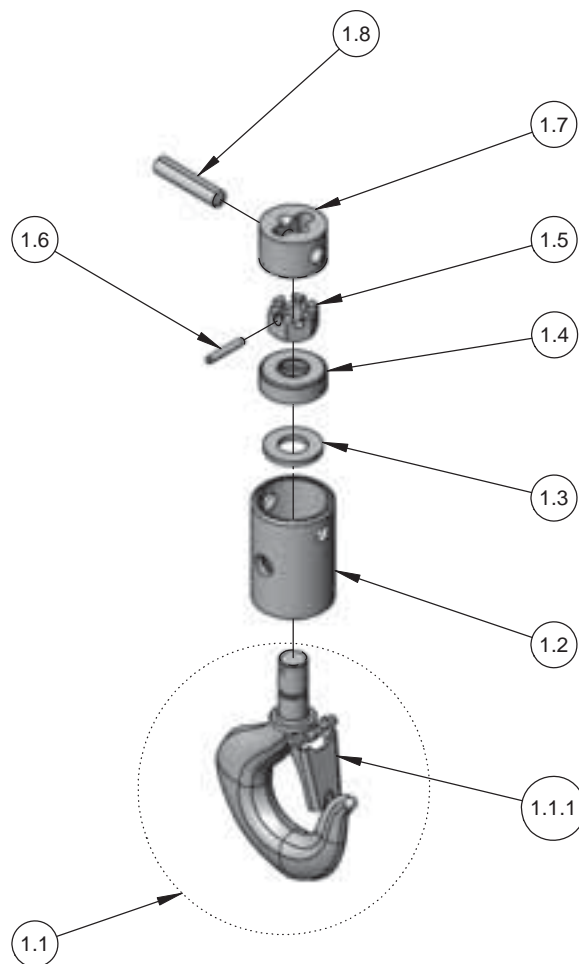
| Item No. | Description   | Part Number | Qty. |
|----------|---|-------------|------|
| 1        | SWIVEL SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK                     | 10001100    | 1    |
|          | SWIVEL SUSPENSION ASSEMBLY - W/ LATCHLOK TYPE HOOK                  | -*          |      |
|          | RIGID SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK                      | 10001101    |      |
|          | RIGID SUSPENSION ASSEMBLY - W/ LATCH TYPE HOOK CROSS MOUNT          | 10001101X   |      |
|          | RIGID SUSPENSION ASSEMBLY - W/ LATCHLOK TYPE HOOK                   | -*          |      |
|          | LUG SUSPENSION FOR LOW HEADROOM OR MOTOR DRIVEN TROLLEY             | 10001103    |      |
|          | LUG SUSPENSION FOR LOW HEADROOM OR MOTOR DRIVEN TROLLEY CROSS MOUNT | 10001103X   |      |
|          | LUG SUSPENSION FOR UNIVERSAL TROLLEY                                | 10001104    |      |
|          | LUG SUSPENSION FOR UNIVERSAL TROLLEY CROSS MOUNT                    | 10001104X   |      |
| 1.1      | SUSPENSION ADAPTER  | 10001050B   | 1    |
| 1.2      | UPPER HOOK SUB-ASSEMBLY - LATCH TYPE                                | 35616B      | 1    |
|          | UPPER HOOK SUB-ASSEMBLY - LATCHLOK TYPE                             | 36680       |      |
|          | SUSPENSION LUG FOR LOW HEADROOM OR MOTOR DRIVEN TROLLEY             | 35457       |      |
|          | SUSPENSION LUG FOR UNIVERSAL TROLLEY                                | 00002508    |      |
| 1.2.1    | LATCH KIT   | 45663       | 1**  |
| 1.3      | THRUST WASHER (FOR SWIVEL SUSPENSIONS ONLY)                         | 35426       | 1    |
| 1.4      | UPPER HOOK COLLAR FOR SWIVEL SUSPENSIONS                            | 35041       | 1    |
|          | UPPER HOOK COLLAR FOR RIGID HOOK AND LUG SUSPENSIONS                | 45918       |      |
| 1.5      | SPRING PIN  | 983762      | 1    |
| 1.6      | DEAD END BOLT   | 35957       | 1    |
| 1.7      | DEAD END BLOCK  | 35418       | 1    |
| 1.8      | DEAD END PIN  | 82314       | 1    |
| 1.9      | WASHER  | 987877      | 1    |
| 1.10     | COTTER PIN  | 988330      | 1    |
| 1.11     | SUSPENSION SCREW  | 36849       | 2    |
| 1.30     | LUG ADAPTER   | 00002503    | 1    |
| 1.31     | LUG ADAPTER PIN   | 00002504    | 1    |
| 1.32     | COTTER PIN  | H5025P      | 1    |

## UPPER SUSPENSIONS UNIVERSAL TROLLEY MODELS A THRU RRT-2 EXCLUDING RRS



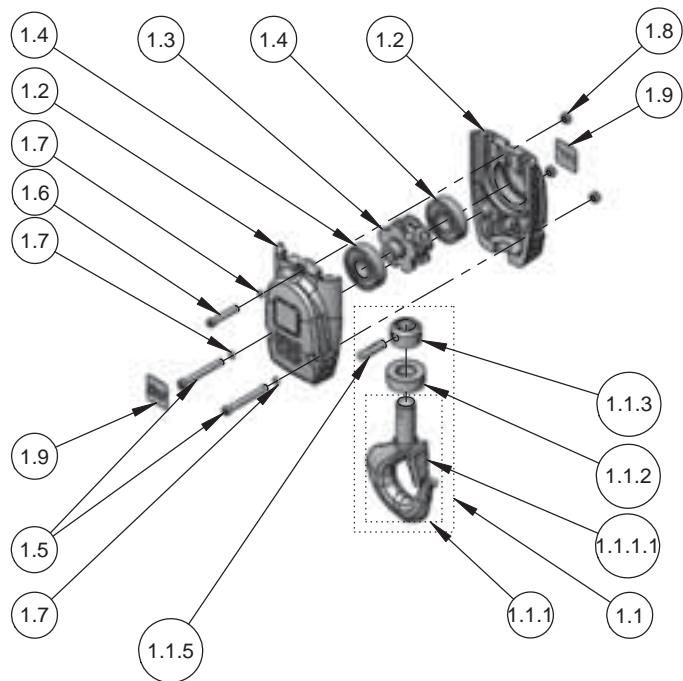
| Item No. | Decription                                    | Reeving | Part Number |
|----------|---|---------|-------------|
| 1        | UT 1 TON SUSPENSION KIT - PARALLEL MOUNT ONLY | 1       | 2292NHUT    |
| 2        | UT 1 TON SUSPENSION KIT - CROSS MOUNT ONLY    | 1       | 2292NHUTC   |
| 3        | UT 1 TON SUSPENSION KIT - CROSS OR PARALLEL   | 2       | 29923NHUT   |
| 4        | UT 2 TON SUSPENSION KIT - CROSS OR PARALLEL   | 1       | 3677NHUT    |
| 5        | UT 2 TON SUSPENSION KIT - CROSS OR PARALLEL   | 2       | 3668NHUT    |
| 6        | UT 3 TON SUSPENSION KIT - CROSS OR PARALLEL   | 3       | 9561NHUT    |

## LOWER HOOK BLOCKS SINGLE REEVED

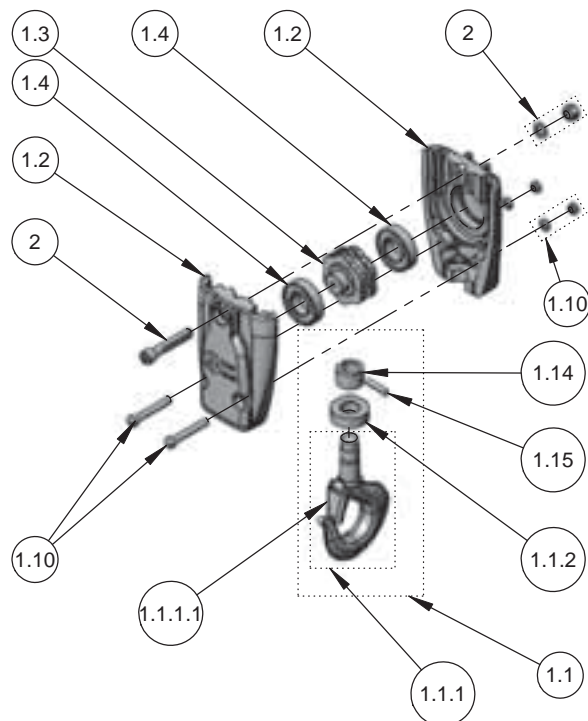


| Item No. | Description   | SINGLE-REEVED MODELS                        |                             |           | Qty. |
|----------|---|---|-----------------------------|-----------|------|
|          |   | A, A-2, AA, AA-2,<br>B, B-2, C, C-2, F, F-2 | J, J-2, L, L-2,<br>LL, LL-2 | RRS       |      |
| 1        | LOWER HOOK BLOCK ASSEMBLY-COMPLETE WITH LATCH TYPE HOOK | *28683                                      | *35651                      | *10001052 | 1    |
| 1.1      | LOWER HOOK WITH LATCH                                   | 28686                                       | 35611                       | 35612B    | 1    |
|          | LATCHLOK TYPE HOOK                                      | 28604                                       | 28604                       | 36681     |      |
| 1.1.1    | LATCH KIT   | 45661                                       | 45662                       | 45663     | 1    |
| 1.2      | LOWER HOOK BODY   | 45401B                                      | 35370                       | 45399B    | 1    |
| 1.3      | LOWER HOOK WASHER                                       | 945921                                      | 945921                      | N/A       | 1    |
| 1.4      | LOWER HOOK THRUST BEARING                               | 88485                                       | 88485                       | 88505     | 1    |
| 1.5      | LOWER HOOK NUT  | 982526                                      | 982526                      | 35369     | 1    |
| 1.6      | LOWER HOOK NUT PIN                                      | 983772                                      | 983772                      | 45946     | 1    |
| 1.7      | LOWER HOOK CHAIN BLOCK                                  | 28007                                       | 35026                       | 10001054  | 1    |
| 1.8      | LOWER HOOK CHAIN BLOCK PIN                              | 45943                                       | 35790                       | 45948     | 1    |

## LOWER HOOK BLOCKS DOUBLE & TRIPLE REEVED



**DOUBLE-REEVED**



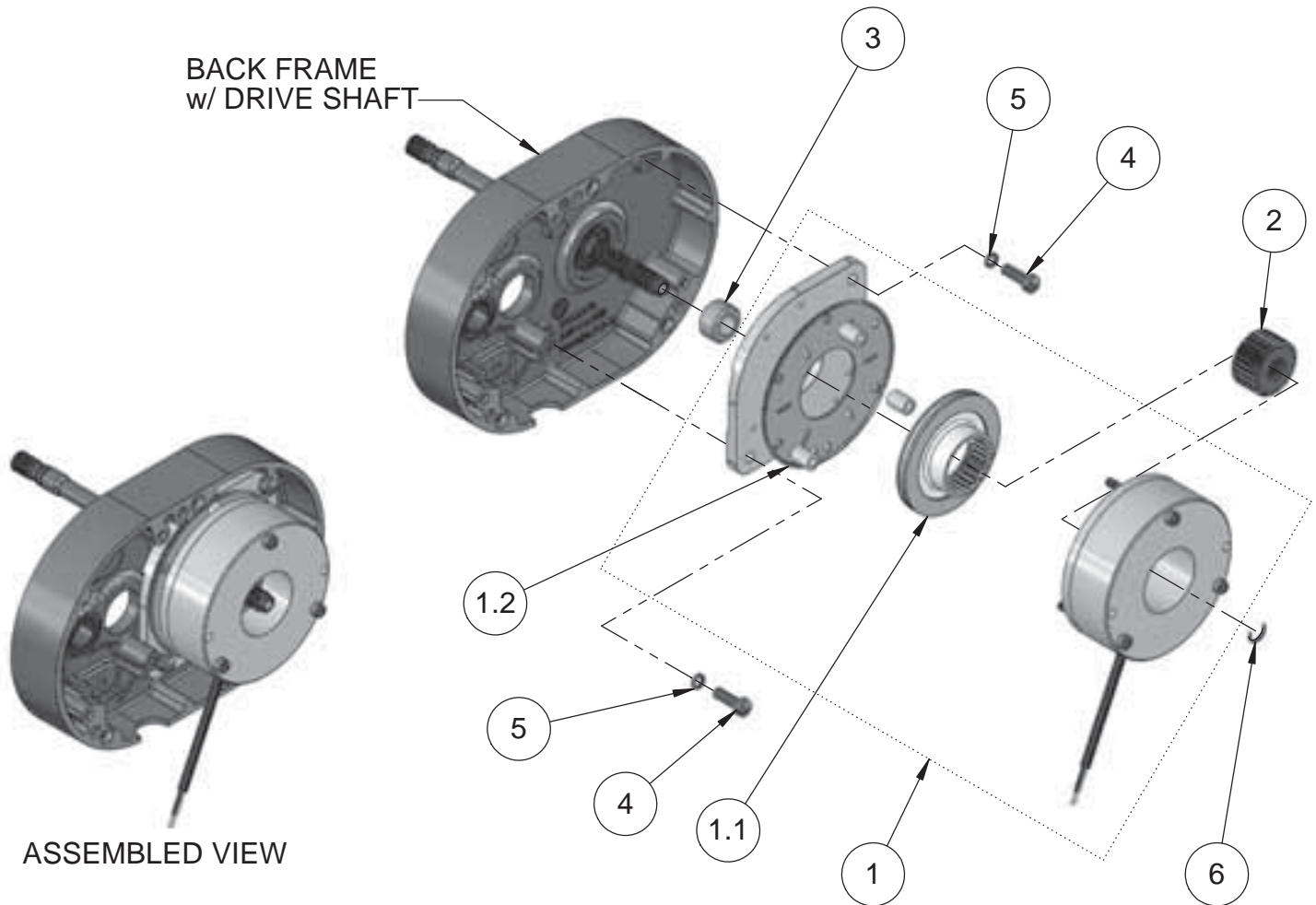
**TRIPLE-REEVED**

| Item No. | Description  | SINGLE-REEVED MODELS |                  | TRIPLE REEVED MODELS | Qty. |
|----------|--|----------------------|------------------|----------------------|------|
|          |  | E, E-2, H, H-2       | R, R-2, RR, RR-2 | RT, RT-2, RRT, RRT   |      |
| 1        | LOWER HOOK BLOCK ASSEMBLY-COMLETE WITH LATCH TYPE HOOK | *00000272B           | *00000277B       | *36607               | 1    |
| 1.1      | LOWER HOOK ASSEMBLY WITH LATCH AND BRG                 | 28665                | 35645            | 36606                | 1    |
|          | LATCHLOK TYPE HOOK ASSEMBLY WITH BRG                   | —                    | —                | —                    |      |
| 1.1.1    | LOWER HOOK WITH LATCH                                  | 28687B               | 35612B           | 36353B               | 1    |
|          | LATCHLOK TYPE HOOK                                     | 28603                | 36681            | *                    |      |
| 1.1.1.1  | LATCH KIT  | 45662                | 45663            | 45663                | 1    |
| 1.1.2    | LOWER HOOK THRUST BEARING                              | 88478                | 88505            | 88505                | 1    |
| 1.1.3    | LOWER HOOK COLLAR                                      | 45385                | 35369            | —                    | 1    |
| 1.1.4    | LOWER HOOK NUT   | —                    | —                | 36352                | 1    |
| 1.1.5    | LOWER HOOK PIN   | 45941                | 45946            | 983762               | 1    |
| 1.2      | HOOK BLOCK (ORDER IN PAIRS)                            | 00000271B            | 00000276B        | 36010B               | 2    |
| 1.3      | HOOK BLOCK SHEAVE                                      | 00000273             | 00000274         | 36351                | 1    |
| 1.4      | HOOK BLOCK SHEAVE BEARING                              | 88429                | 83674            | 83670                | 2    |
| 1.5      | HOOK BLOCK SCREW-LONG                                  | 982066               | 982374           | —                    | 2    |
| 1.6      | HOOK BLOCK SCREW-SHORT                                 | 986191               | 982370           | —                    | 1    |
| 1.7      | HOOK BLOCK LOCK WASHER                                 | 940802               | 940830           | —                    | 3    |
| 1.8      | HOOK BLOCK NUT   | 982514               | 982445           | —                    | 3    |
| 1.9      | HOOK BLOCK LABEL                                       | 00000766             | 00000766         | —                    | 2    |
| 1.10     | HOOK BLOCK SCREWS WITH NUTS AND LOCK WASHERS (2 EACH)  | —                    | —                | C245                 | 1    |
| 2        | DEAD END SCREW WITH NUT AND LOCK WASHER                | —                    | —                | C249                 | 1    |

\*Contact CM for Latchlok part number

## DC BRAKE - SINGLE MODELS

A, A-2, AA, AA-2, B, B-2, C, C-2, E, E-2, F, F-2, H & H-2



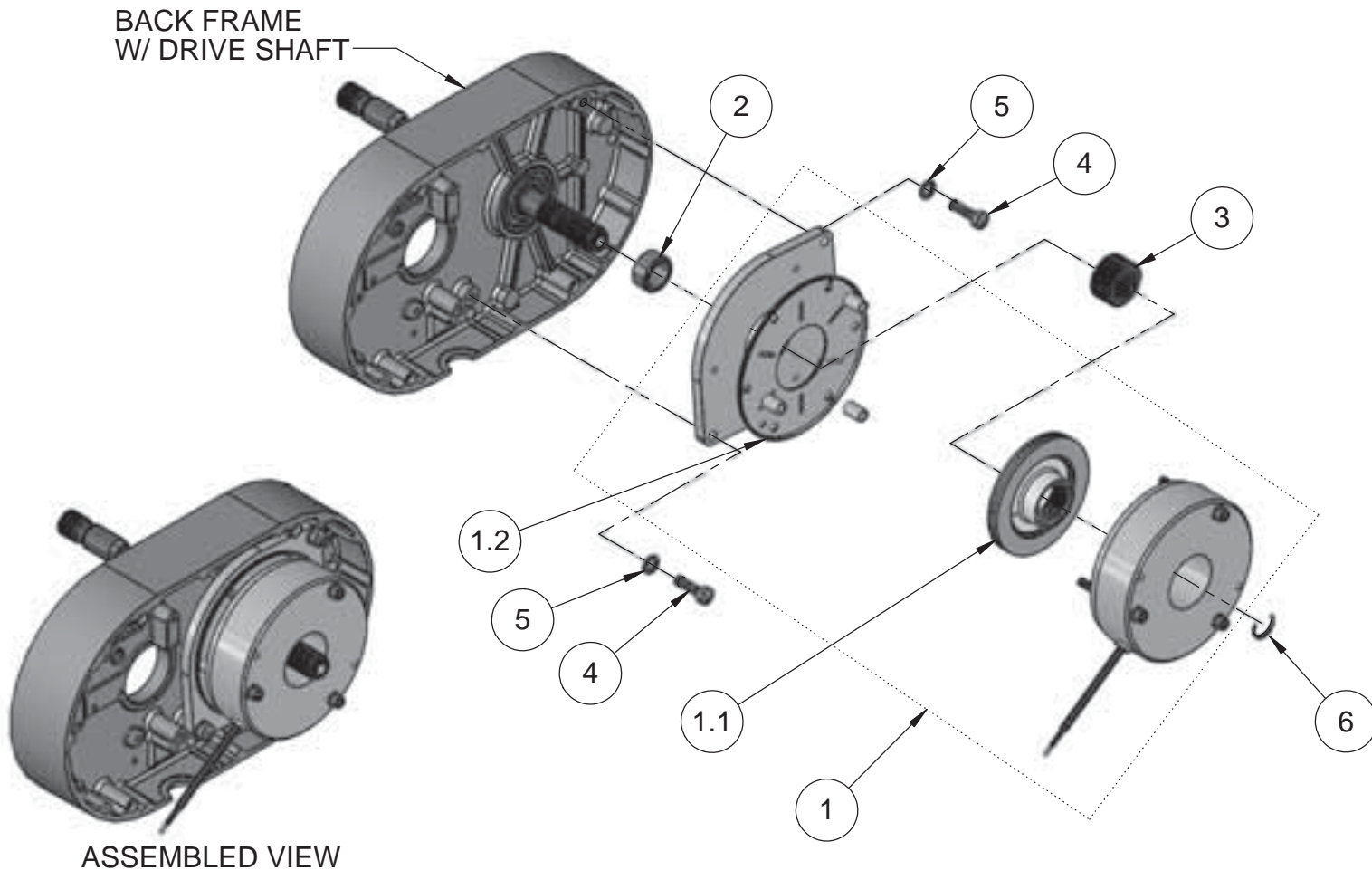
| BRAKE ASSEMBLY<br>ITEM 1 | Hoist Motor   | Brake Coil Voltage |
|--------------------------|---|--------------------|
| 10001243                 | 110/115-1-50/60   | 103VDC             |
| 10001244                 | 220/230-1-50/60<br>220/230-3-50/60<br>380/415/480-3-50/60 | 205VDC             |
| 10001245                 | 550/575-3-50/60   | 255VDC             |

| ITEM NO. | PART NUMBER | DESCRIPTION                       | QTY. |
|----------|-------------|-----------------------------------|------|
| 1        | SEE TABLE   | V1 LODESTAR SIZE 8                | 1    |
| 1.1      | 10001252    | V1 LODESTAR SIZE 8 ROTOR          | 1    |
| 1.2      | 10001251    | V1 LODESTAR SIZE 8 FRICTION PLATE | 1    |
| 2        | 00001430    | V1 LODESTAR SIZE 8 HUB            | 1    |
| 3        | 00001432    | HUB SPACER V1 DC BRAKE            | 1    |
| 4        | 982708      | SCREW 1/4-20 X .75" SL FIL HD     | 2    |
| 5        | 940802      | LOCK WASHER 1/4 x .109 X .062"    | 2    |
| 6        | 10409710    | ROTOR CLIP RETAINING RING         | 1    |



## DC BRAKE - SINGLE MODELS

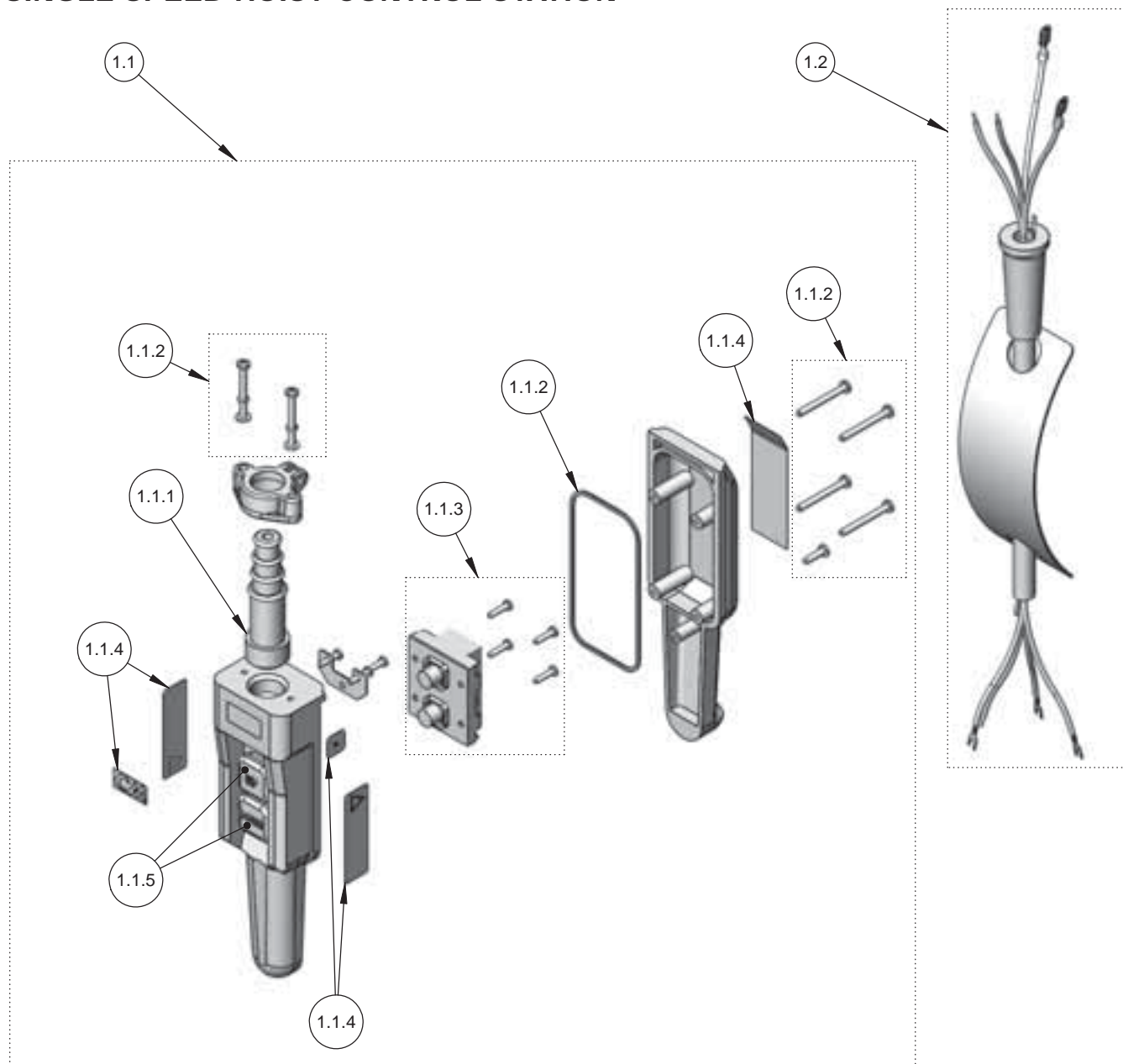
J, J-2, JJ, JJ-2, L, L-2, LL, LL-2, R, R-2, RR, RR-2, RRS, RT, RT-2, RRT & RRT-2



| Hoist Model   | Brake Assembly Item1 | Rotor Item 1.1 | Hoist Motor   | Brake Coil Voltage |
|---|----------------------|----------------|---|--------------------|
| J, J-2, L, L-2, R, R-2, RT, RT-2                      | 10001246             | 10001253       | 110/115-1-50/60   | 103VDC             |
|   | 10001247             | 10001253       | 220/230-1-50/60<br>220/230-3-50/60<br>380/415/480-3-50/60 | 205VDC             |
|   | 10001248             | 10001253       | 550/575-3-50/60   | 255VDC             |
| JJ, JJ-2, LL, LL-2,<br>RR, RR-2, RRS, RRT, &<br>RRT-2 | 10001249             | 00001429       | 220/230-3-50/60<br>380/415/480-3-50/60                    | 205VDC             |
|   | 10001250             | 00001429       | 550/575-3-50/60   | 255VDC             |

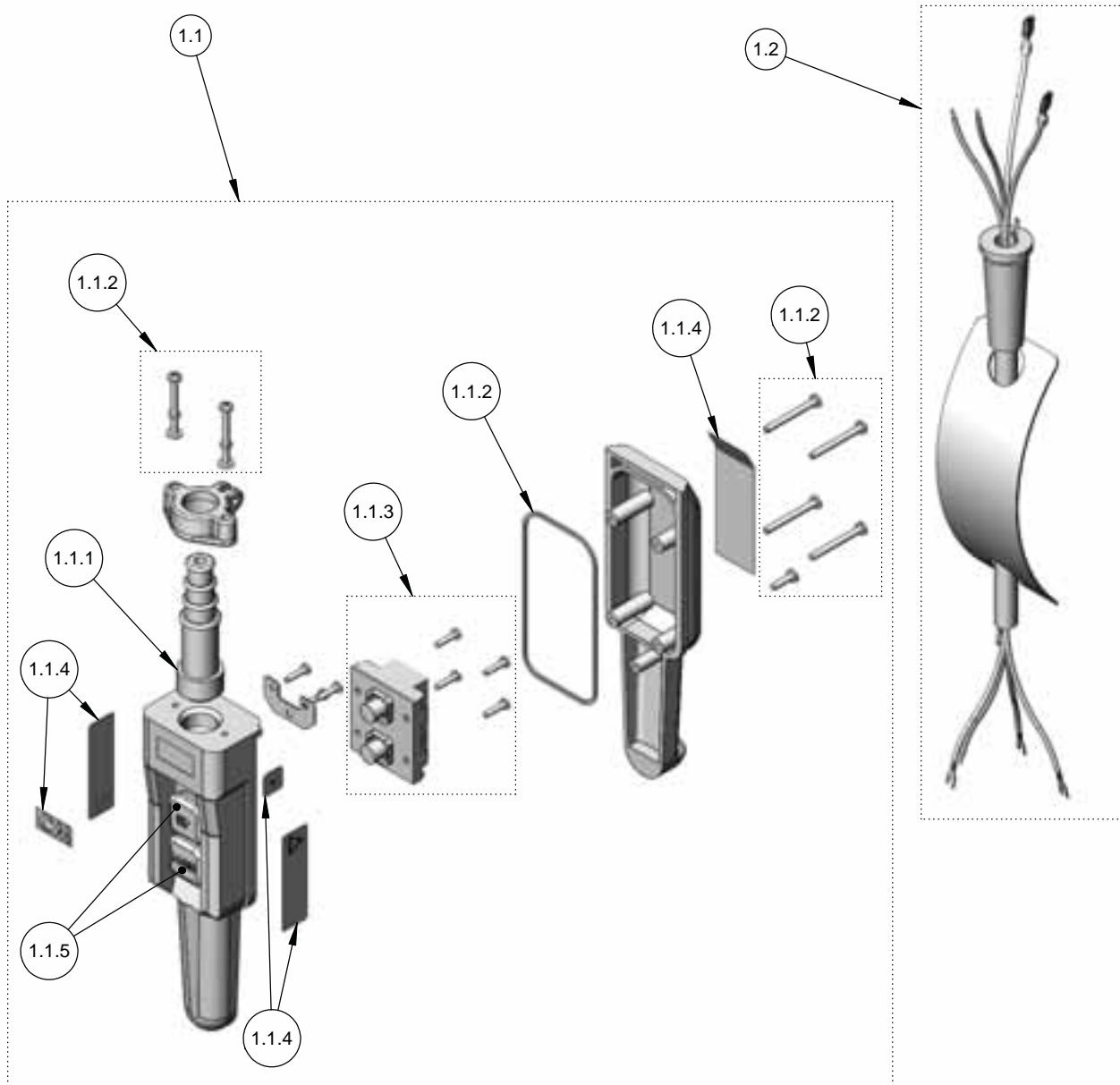
| ITEM NO. | PART NUMBER | DESCRIPTION                     | QTY. |
|----------|-------------|---------------------------------|------|
| 1        | SEE TABLE   | V2 LODESTAR SIZE 10 BRAKE       | 1    |
| 1.1      | 10001253    | V2 LODESTAR SIZE 10 ROTOR       | 1    |
| 1.2      | 00001437    | V2 LODESTAR FRICTION PLATE      | 1    |
| 2        | 00001433    | HUB SPACER V2 DC INTORQ BRAKE   | 1    |
| 3        | 00001431    | V2 LODESTAR SIZE 10 HUB         | 1    |
| 4        | 982709      | SCREW 5/16-18UNC-2A x 1"        | 2    |
| 5        | 945851      | LOCK WASHER 5/16 x .125 x .078" | 2    |
| 6        | 10409711    | ROTOR CLIP RETAINING RING       | 1    |

# COMPLETE CONTROL CORD AND STATION ASSEMBLY SINGLE SPEED HOIST CONTROL STATION



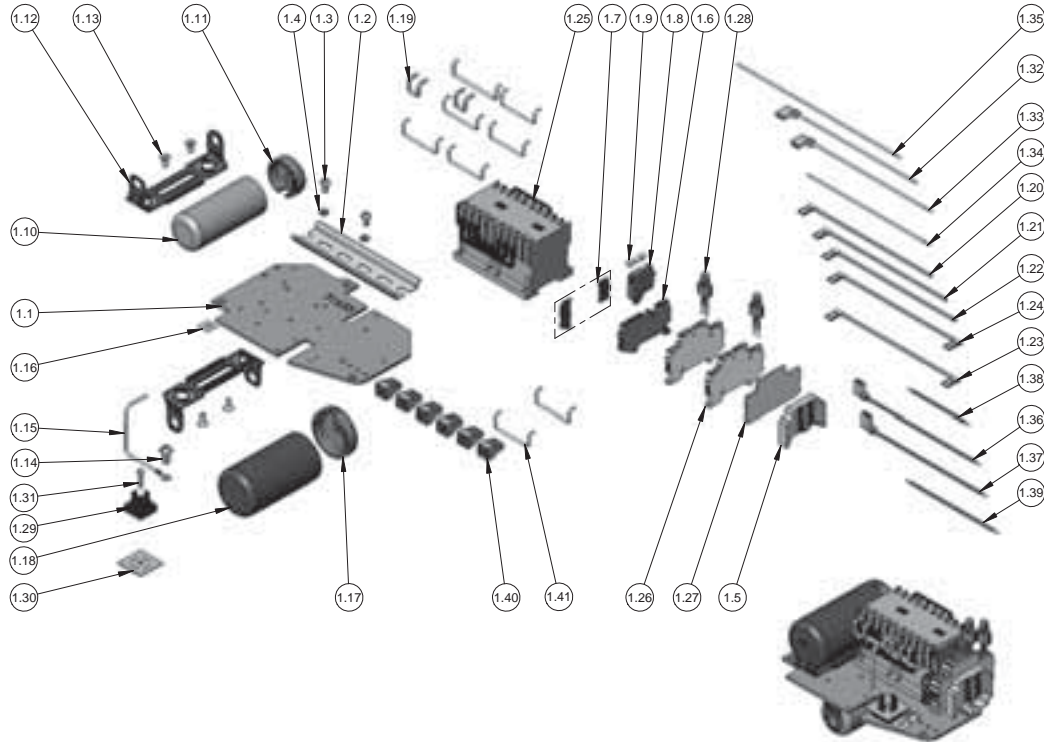
| ITEM NO. | PART NUMBER | DESCRIPTION  | QTY. |
|----------|-------------|--|------|
| 1        | 23606606    | STATION ASSEMBLY AND CONTROL CORD FOR 10 FOOT LIFT | 1    |
|          | 23606611    | STATION ASSEMBLY AND CONTROL CORD FOR 15 FOOT LIFT |      |
|          | 23606616    | STATION ASSEMBLY AND CONTROL CORD FOR 20 FOOT LIFT |      |
| 1.1      | 58272 2     | BUTTON CONTROL STATION                             | 1    |
| 1.1.1    | 58278       | GROMMET  | 1    |
| 1.1.2    | 58275       | HARDWARE KIT                                       | 1    |
| 1.1.3    | 58255       | 1-SPEED INSERT                                     | 1    |
| 1.1.4    | 58276       | WARNING LABEL KIT                                  | 1    |
| 1.1.5    | 58277       | BUTTON LABEL KIT                                   | 1    |
| 1.2      | 29353       | CONTROL CORD - 10 FOOT LIFT                        | 1    |
|          | 29353-15    | CONTROL CORD - 15 FOOT LIFT                        |      |
|          | 29353-20    | CONTROL CORD - 20 FOOT LIFT                        |      |

## COMPLETE CONTROL CORD AND STATION ASSEMBLY TWO SPEED HOIST CONTROL STATION



| ITEM NO. | PART NUMBER | DESCRIPTION  | QTY. |
|----------|-------------|--|------|
| 1        | 29348       | STATION ASSEMBLY AND CONTROL CORD FOR 10 FOOT LIFT | 1    |
|          | 29348-15    | STATION ASSEMBLY AND CONTROL CORD FOR 15 FOOT LIFT |      |
|          | 29348-20    | STATION ASSEMBLY AND CONTROL CORD FOR 20 FOOT LIFT |      |
| 1.1      | 58273 2     | BUTTON CONTROL STATION                             | 1    |
| 1.1.1    | 58278       | GROMMET  | 1    |
| 1.1.2    | 58275       | HARDWARE KIT                                       | 1    |
| 1.1.3    | 58256       | 2 - SPEED INSERT                                   | 1    |
| 1.1.4    | 58276       | WARNING LABEL KIT                                  | 1    |
| 1.1.5    | 58277       | BUTTON LABEL KIT                                   | 1    |
| 1.2      | 29349       | CONTROL CORD - 10 FOOT LIFT                        | 1    |
|          | 29349-15    | CONTROL CORD - 15 FOOT LIFT                        |      |
|          | 29349-20    | CONTROL CORD - 20 FOOT LIFT                        |      |

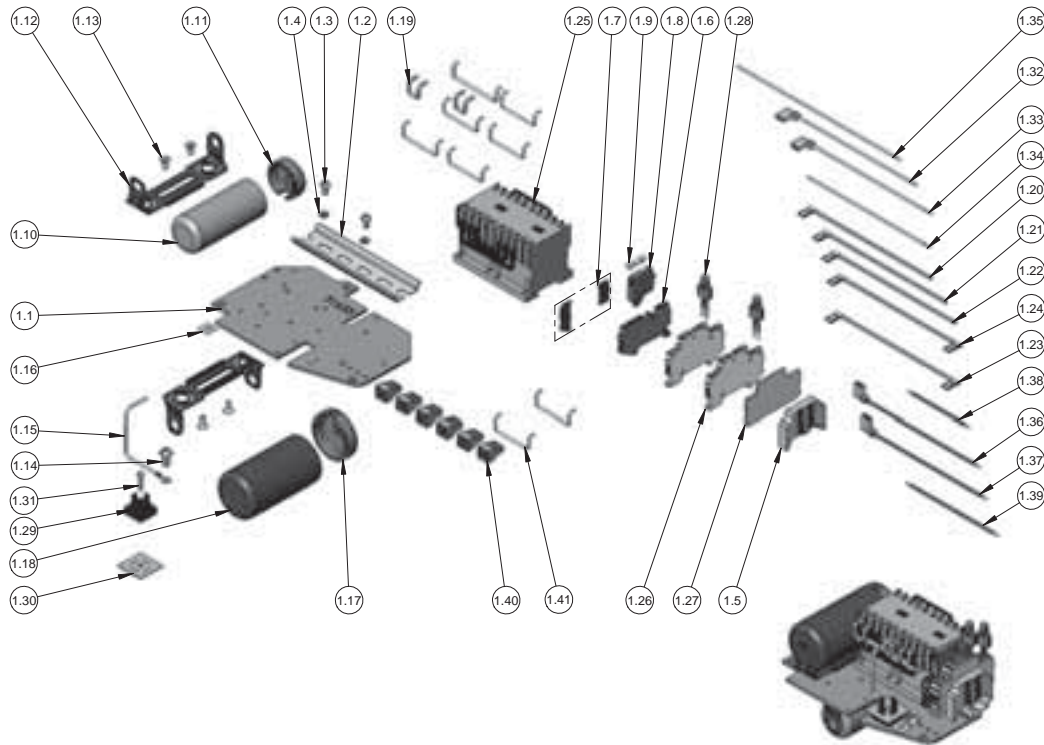
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE AND TRANSFORMER 110/115-1-50/60 MODELS A, AA, B, C, E, F & H



| CONTACTOR BKT S/A | REVERSING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|---------------------|-------------------|
| 00001675          | 28860               | 24 V              |
| 00001676          | 24797               | 48 V              |

| ITEM NO. | PART NUMBER | DESCRIPTION                   | QTY. |
|----------|-------------|-------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR PLATE S/A           | 1    |
| 1.1      | 31633       | CONTACTOR PLATE               | 1    |
| 1.2      | 29312       | DIN-RAIL 5.00" LONG           | 1    |
| 1.3      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL | 2    |
| 1.4      | 987873      | LOCK WASHER #10 ASA MEDIUM    | 2    |
| 1.5      | 909J13      | TERMINAL STRIP END CLAMP      | 1    |
| 1.6      | 29018       | FUSIBLE TERMINAL STRIP        | 1    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT  | 1    |
| 1.8      | 29019       | TERMINAL STRIP CARTRIDGE      | 1    |
| 1.9      | 00000393    | FUSE-5MM X 20MM-500MA         | 1    |
| 1.10     | 27716       | CAPACITOR                     | 1    |
| 1.11     | 29910       | CAPACITOR CAP                 | 1    |
| 1.12     | 27910       | CAPACITOR MOUNTING BRACKET    | 2    |
| 1.13     | 982696      | SCREW 10-32 UNF-2A X 3/8 LG   | 4    |
| 1.14     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"    | 1    |
| 1.15     | 27189       | JUMPER-G/Y-#16 AWG            | 1    |
| 1.16     | 20940       | GROUND LABEL                  | 1    |
| 1.17     | 27925       | SOLID STATE SWITCH CAP        | 1    |
| 1.18     | 27257       | REVERSE SWITCH                | 1    |
| 1.19     | 51845       | JUMPER                        | 2    |
| 1.20     | 27156       | JUMPER R14                    | 1    |
| 1.21     | 29911       | JUMPER R5                     | 1    |
| 1.22     | 29912       | JUMPER R6                     | 1    |
| 1.23     | 29913       | JUMPER R7                     | 1    |
| 1.24     | 29914       | JUMPER R8                     | 1    |
| 1.25     | SEE TABLE   | REVERSING CONTACTOR           | 1    |
| 1.26     | 00001506    | TERMINAL STRIP                | 2    |
| 1.27     | 00001507    | TERMINAL STRIP PARTITION      | 1    |
| 1.28     | 00000535    | SURGE SUPPRESSOR              | 2    |
| 1.29     | 70246       | RECTIFIER                     | 1    |
| 1.30     | 70274       | RECTIFIER INSULATOR           | 1    |
| 1.31     | 957854      | ROUND HEAD MACHINE SCREW      | 1    |
| 1.32     | 00001500    | B3-JUMPER                     | 1    |
| 1.33     | 00001501    | B4-JUMPER                     | 1    |
| 1.34     | 00001504    | JUMPER-B7                     | 1    |
| 1.35     | 00001502    | JUMPER-B1                     | 1    |
| 1.36     | 00000376    | B5 JUMPER                     | 1    |
| 1.37     | 00000205    | B6 JUMPER                     | 1    |
| 1.38     | 00000537    | B8 JUMPER                     | 1    |
| 1.39     | 00000538    | B9 JUMPER                     | 1    |
| 1.40     | 11782704    | CONNECTOR PUSHWIRE ORANGE     | 6    |
| 1.41     | 51847       | JUMPER                        | 8    |

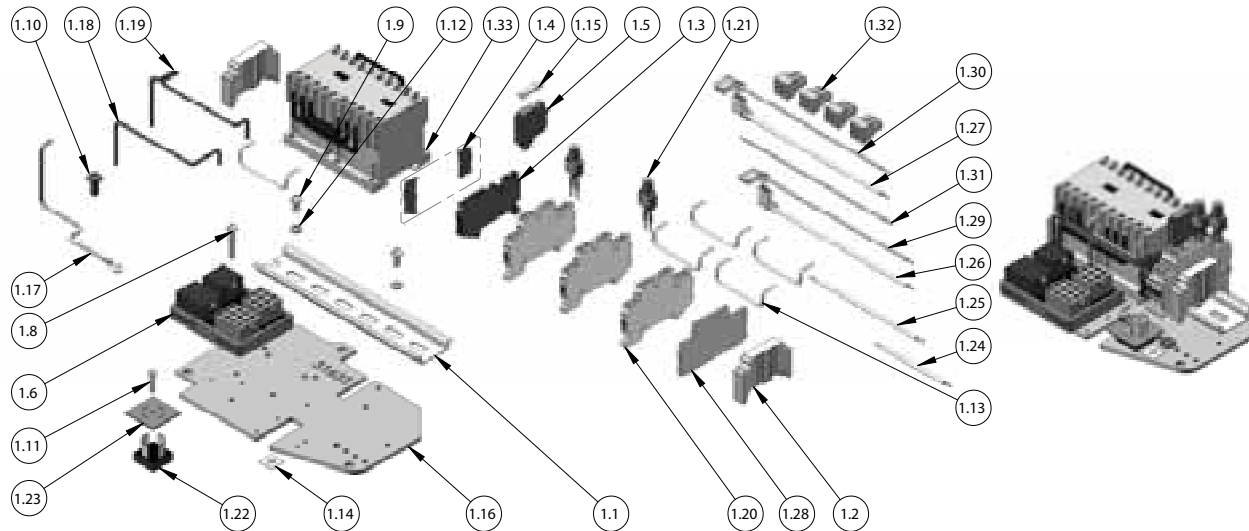
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE AND TRANSFORMER 110/115-1-50/60 MODELS A, AA, B, C, E, F & H



| CONTACTOR BKT S/A | REVERSING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|---------------------|-------------------|
| 00001677          | 28860               | 24 V              |
| 00001678          | 24797               | 48 V              |
| 00001679          | 24799               | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                                | QTY. |
|----------|-------------|--|------|
| 1        | SEE TABLE   | CONTACTOR PLATE S/A                        | 1    |
| 1.1      | 31633       | CONTACTOR PLATE                            | 1    |
| 1.2      | 29312       | DI1.3 982686 SCREW #10-32 UNF-2A X 3/8" SL | 2    |
| 1.3      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL              | 2    |
| 1.4      | 987873      | LOCK WASHER #10 ASA MEDIUM                 | 2    |
| 1.5      | 909J13      | TERMINAL STRIP END CLAMP                   | 1    |
| 1.6      | 29018       | FUSIBLE TERMINAL STRIP                     | 1    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT               | 1    |
| 1.8      | 29019       | TERMINAL STRIP CARTRIDGE                   | 1    |
| 1.9      | 00000393    | FUSE-5MM X 20MM-500MA                      | 1    |
| 1.10     | 27716       | CAPACITOR                                  | 1    |
| 1.11     | 29910       | CAPACITOR CAP                              | 1    |
| 1.12     | 27910       | CAPACITOR MOUNTING BRACKET                 | 2    |
| 1.13     | 982696      | SCREW 10-32 UNF-2A X 3/8 LG                | 4    |
| 1.14     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"                 | 1    |
| 1.15     | 27189       | JUMPER-G/Y-#16 AWG                         | 1    |
| 1.16     | 20940       | GROUND LABEL                               | 1    |
| 1.17     | 27925       | SOLID STATE SWITCH CAP                     | 1    |
| 1.18     | 27257       | REVERSE SWITCH                             | 1    |
| 1.19     | 51847       | JUMPER                                     | 8    |
| 1.20     | 51845       | JUMPER                                     | 2    |
| 1.21     | 27156       | JUMPER R14                                 | 1    |
| 1.22     | 29911       | JUMPER R5                                  | 1    |
| 1.23     | 29912       | JUMPER R6                                  | 1    |
| 1.24     | 29913       | JUMPER R7                                  | 1    |
| 1.25     | 29914       | JUMPER R8                                  | 1    |
| 1.26     | SEE TABLE   | REVERSING CONTACTOR                        | 1    |
| 1.27     | 00001506    | TERMINAL STRIP                             | 2    |
| 1.28     | 00001507    | TERMINAL STRIP PARTITION                   | 1    |
| 1.29     | 00000535    | SURGE SUPPRESSOR                           | 2    |
| 1.30     | 70246       | RECTIFIER                                  | 1    |
| 1.31     | 70274       | RECTIFIER INSULATOR                        | 1    |
| 1.32     | 957854      | ROUND HEAD MACHINE SCREW                   | 1    |
| 1.33     | 00001500    | B3-JUMPER                                  | 1    |
| 1.34     | 00001501    | B4-JUMPER                                  | 1    |
| 1.35     | 00001504    | JUMPER-B7                                  | 1    |
| 1.36     | 00001502    | JUMPER-B1                                  | 1    |
| 1.37     | 00000376    | B5 JUMPER                                  | 1    |
| 1.38     | 00000205    | B6 JUMPER                                  | 1    |
| 1.39     | 00000537    | B8 JUMPER                                  | 1    |
| 1.40     | 00000538    | B9 JUMPER                                  | 1    |
| 1.41     | 11782704    | CONNECTOR PUSHWIRE ORANGE                  | 7    |
| 1.42     | 29014       | TERMINAL STRIP                             | 1    |
| 1.43     | 00001503    | JUMPER-B2                                  | 1    |

# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 1-SPEED, DUAL VOLTAGE UNITS 220/230-380/415/460-3-50/60 MODELS A, AA, B, C, E, F & H

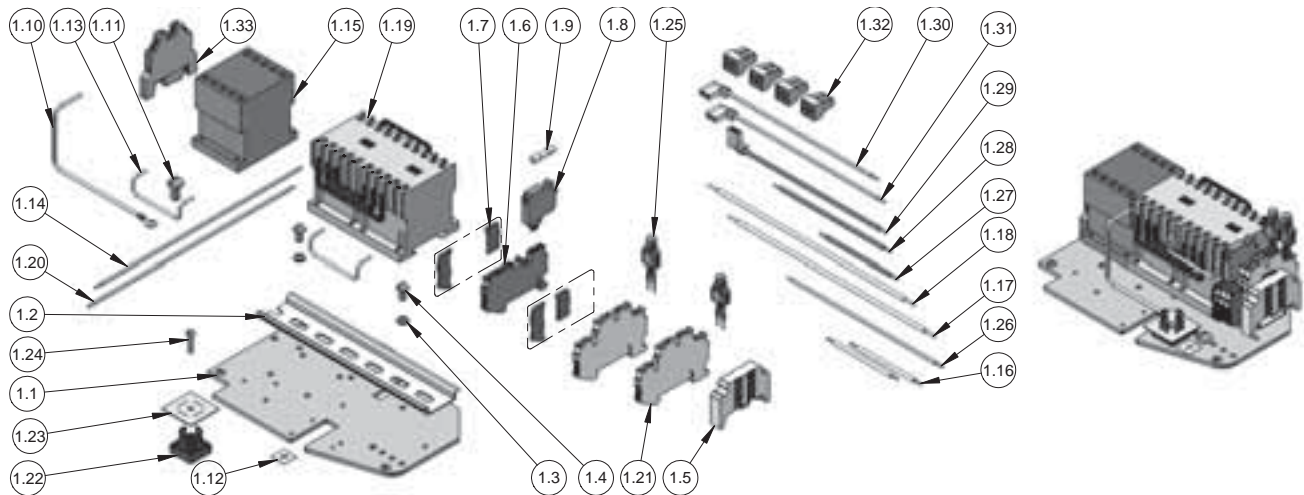


| CONTACTOR BKT S/A | REVERSING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|---------------------|-------------------|
| 00001680          | 28860               | 24 V              |
| 00001681          | 24797               | 48 V              |
| 00001682          | 24799               | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                   | QTY. |
|----------|-------------|-------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR BKT S/A BHSE        | 1    |
| 1.1      | 29010       | DIN-RAIL 6.50" LONG           | 1    |
| 1.2      | 909J13      | TERMINAL STRIP END CLAMP      | 2    |
| 1.3      | 29018       | FUSIBLE TERMINAL STRIP        | 1    |
| 1.4      | 00000398    | TERMINAL STRIP COVER SEGMENT  | 1    |
| 1.5      | 29019       | TERMINAL STRIP CARTRIDGE      | 1    |
| 1.6      | 10001233    | VOLTAGE CHANGE BOARD          | 1    |
| 1.8      | 987862      | SCREW #8-32UNC-2A X 1"        | 1    |
| 1.9      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL | 2    |
| 1.10     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"    | 1    |
| 1.11     | 957854      | SCREW #6-32 NC-2 X 5/8" ROUND | 1    |
| 1.12     | 987873      | LOCK WASHER #10 ASA MEDIUM    | 2    |
| 1.13     | 51847       | Jumper 14 AWG Black,          | 5    |
| 1.14     | 20940       | GROUND LABEL                  | 1    |
| 1.15     | 00000393    | FUSE-5MM X 20MM-500MA         | 1    |
| 1.16     | 31633       | CONTACTOR PLATE               | 1    |
| 1.17     | 27189       | JUMPER-G/Y-#16 AWG            | 1    |
| 1.18     | 00000750    | JUMPER WIRE                   | 1    |
| 1.19     | 00000751    | JUMPER WIRE                   | 1    |
| 1.20     | 00001506    | TERMINAL STRIP                | 3    |
| 1.21     | 00001505    | SURGE SUPPRESSOR              | 2    |
| 1.22     | 70246       | RECTIFIER                     | 1    |
| 1.23     | 70274       | RECTIFIER INSULATOR           | 1    |
| 1.24     | 00000537    | B8 JUMPER                     | 1    |
| 1.25     | 00000538    | B9 JUMPER                     | 1    |
| 1.26     | 00000376    | B5 JUMPER                     | 1    |
| 1.27     | 00000205    | B6 JUMPER                     | 1    |
| 1.28     | 00001507    | TERMINAL STRIP PARTITION      | 1    |
| 1.29     | 00001501    | B4-JUMPER                     | 1    |
| 1.30     | 00001500    | B3-JUMPER                     | 1    |
| 1.31     | 00001504    | JUMPER-B7                     | 1    |
| 1.32     | 11782704    | CONNECTOR PUSHWIRE ORANGE     | 4    |
| 1.33     | SEE TABLE   | REVERSING CONTACTOR           | 1    |



# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 2-SPEED UNITS 220/230-3-50/60 MODELS A-2, AA-2, B-2, C-2, E-2, F-2 & H-2

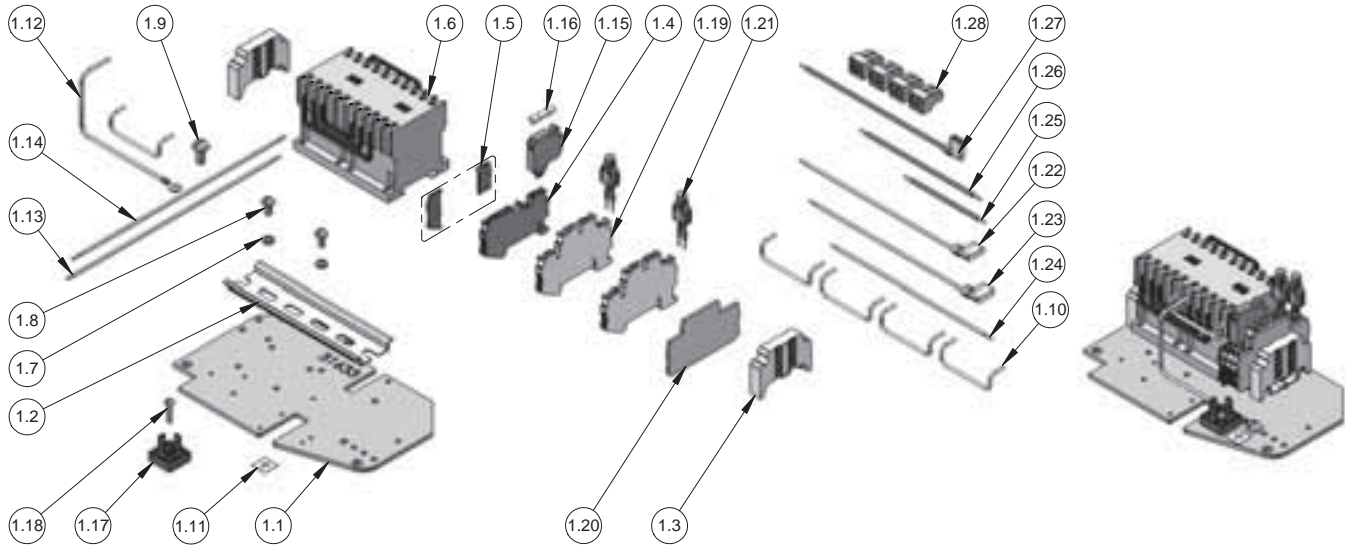


| CONTACTOR BKT S/A | REVERSING CONTACTOR | SPEED SELECTOR | SECONDARY VOLTAGE |
|-------------------|---------------------|----------------|-------------------|
| 00001683          | 28860               | 28878          | 24 V              |
| 00001684          | 24797               | 28871          | 48 V              |
| 00001685          | 24799               | 28870          | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                   | QTY. |
|----------|-------------|-------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR PLT S/A 2-SPEED     | 1    |
| 1.1      | 31633       | CONTACTOR PLATE               |      |
| 1.2      | 29010       | DIN-RAIL 6.50" LONG           | 1    |
| 1.3      | 987873      | LOCK WASHER #10 ASA MEDIUM    | 2    |
| 1.4      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL | 2    |
| 1.5      | 909J13      | TERMINAL STRIP END CLAMP      | 1    |
| 1.6      | 29018       | FUSIBLE TERMINAL STRIP        | 1    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT  | 2    |
| 1.8      | 29019       | TERMINAL STRIP CARTRIDGE      | 1    |
| 1.9      | 00000393    | FUSE-5MM X 20MM-500MA         | 1    |
| 1.10     | 27189       | JUMPER-G/Y-#16 AWG            | 1    |
| 1.11     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"    | 1    |
| 1.12     | 20940       | GROUND LABEL                  | 1    |
| 1.13     | 51847       | JUMPER                        | 6    |
| 1.14     | 00001503    | JUMPER-B2                     | 1    |
| 1.15     | SEE TABLE   | CONTACTOR                     | 1    |
| 1.16     | 51845       | JUMPER                        | 1    |
| 1.17     | 27609       | JUMPER                        | 1    |
| 1.18     | 27610       | JUMPER                        | 1    |
| 1.19     | SEE TABLE   | REVERSING CONTACTOR           | 1    |
| 1.20     | 00001502    | JUMPER-B1                     | 1    |
| 1.21     | 00001506    | TERMINAL STRIP                | 2    |
| 1.22     | 70246       | RECTIFIER                     | 1    |
| 1.23     | 70274       | RECTIFIER INSULATOR           | 1    |
| 1.24     | 957854      | ROUND HEAD MACHINE SCREW      | 1    |
| 1.25     | 00000535    | SURGE SUPPRESSOR              | 2    |
| 1.26     | 00001504    | JUMPER-B7                     | 1    |
| 1.27     | 00000537    | B8 JUMPER                     | 1    |
| 1.28     | 00000538    | B9 JUMPER                     | 1    |
| 1.29     | 00000205    | B6 JUMPER                     | 1    |
| 1.30     | 00001500    | B3-JUMPER                     | 1    |
| 1.31     | 00001501    | B4-JUMPER                     | 1    |
| 1.32     | 11782704    | CONNECTOR PUSHWIRE ORANGE     | 4    |
| 1.33     | 10001433    | EARTH GROUNDING BLOCK         | 1    |



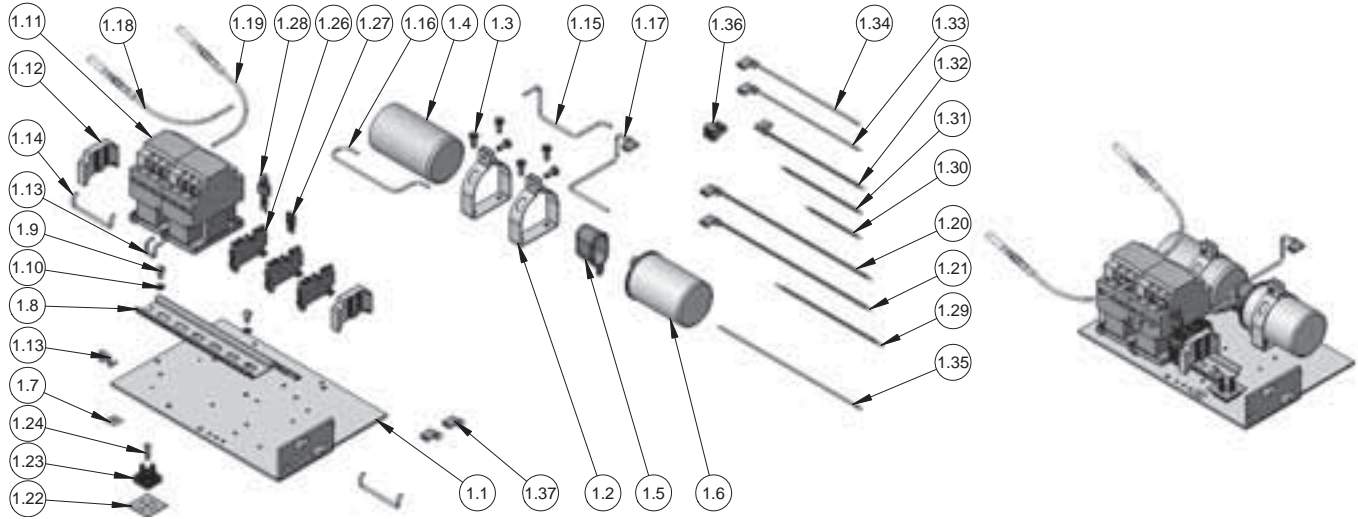
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 550/575-3-50/60 MODELS A, AA, B, C, E, F & H



| CONTACTOR BKT S/A | REVERSING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|---------------------|-------------------|
| 00001689          | 28860               | 24 V              |
| 00001690          | 24797               | 48 V              |
| 00001691          | 24799               | 110 V             |

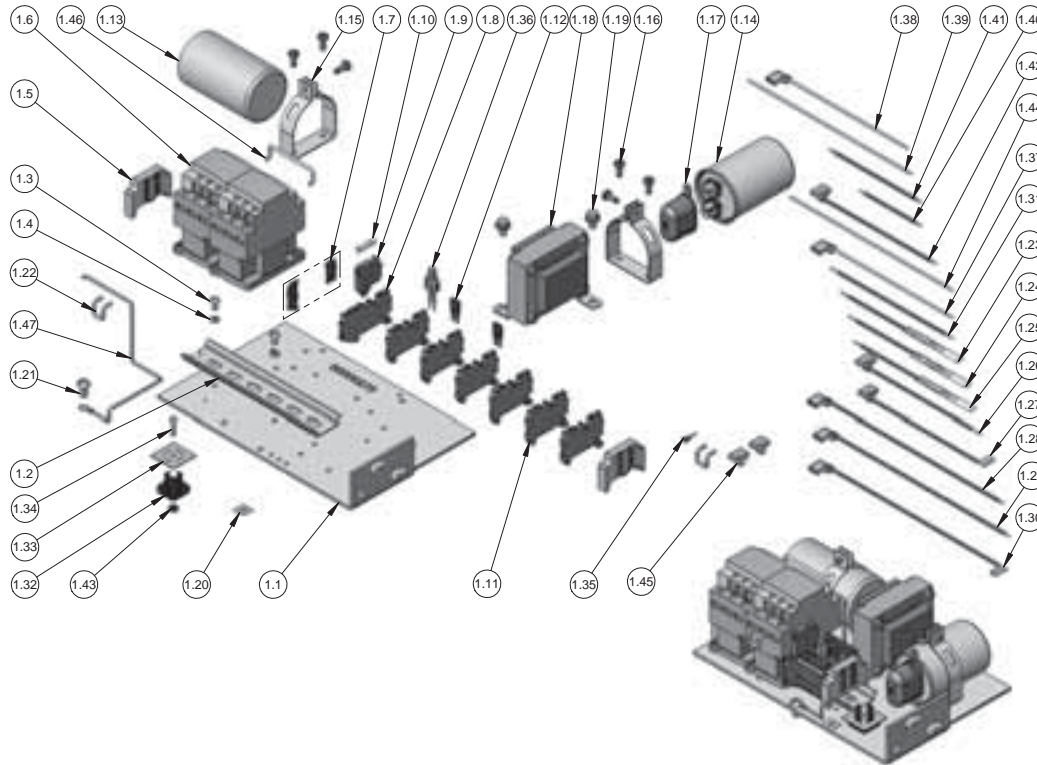
| ITEM NO. | PART NUMBER | DESCRIPTION                   | QTY. |
|----------|-------------|-------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR PLT S/A             | 1    |
| 1.1      | 31633       | CONTACTOR PLATE               | 1    |
| 1.2      | 29312       | DIN-RAIL 5.00" LONG           | 1    |
| 1.3      | 909J13      | TERMINAL STRIP END CLAMP      | 2    |
| 1.4      | 29018       | FUSIBLE TERMINAL STRIP        | 1    |
| 1.5      | 00000398    | TERMINAL STRIP COVER SEGMENT  | 1    |
| 1.6      | SEE TABLE   | REVERSING CONTACTOR           | 1    |
| 1.7      | 987873      | LOCK WASHER #10 ASA MEDIUM    | 2    |
| 1.8      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL | 2    |
| 1.9      | 987827      | SCREW 1/4-20 UNC-2A X 1/2"    | 1    |
| 1.10     | 51847       | JUMPER                        | 5    |
| 1.11     | 20940       | GROUND LABEL                  | 1    |
| 1.12     | 27189       | JUMPER-G/Y-#16 AWG            | 1    |
| 1.13     | 00001502    | JUMPER-B1                     | 1    |
| 1.14     | 00001503    | JUMPER-B2                     | 1    |
| 1.15     | 29019       | TERMINAL STRIP CARTRIDGE      | 1    |
| 1.16     | 00000393    | FUSE-5MM X 20MM-500MA         | 1    |
| 1.17     | 00001551    | RECTIFIER                     | 1    |
| 1.18     | 957854      | ROUND HEAD MACHINE SCREW      | 1    |
| 1.19     | 00001506    | TERMINAL STRIP                | 2    |
| 1.20     | 00001507    | TERMINAL STRIP PARTITION      | 1    |
| 1.21     | 00001505    | SURGE SUPPRESSOR              | 2    |
| 1.22     | 00001500    | B3-JUMPER                     | 1    |
| 1.23     | 00001501    | B4-JUMPER                     | 1    |
| 1.24     | 00001504    | JUMPER-B7                     | 1    |
| 1.25     | 00000537    | B8 JUMPER                     | 1    |
| 1.26     | 00000538    | B9 JUMPER                     | 1    |
| 1.27     | 00000205    | B6 JUMPER                     | 1    |
| 1.28     | 11782704    | CONNECTOR PUSHWIRE ORANGE     | 4    |

# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 110/115-1-50/60 MODELS J, L, R & RT



| ITEM NO. | PART NUMBER | DESCRIPTION                   | QTY. |
|----------|-------------|-------------------------------|------|
| 1        | 00001695    | CONTACTOR BRACKET S/A         | 1    |
| 1.1      | 00000278    | CONTACTOR BRACKET             | 1    |
| 1.2      | 35268       | CLAMP                         | 2    |
| 1.3      | 982873      | MACHINE SCREW PAN HEAD        | 6    |
| 1.4      | 35279       | START CAPACITOR               | 1    |
| 1.5      | 35285       | RUN CAPACITOR INSULATOR       | 1    |
| 1.6      | 35278       | CAPACITOR, RUN                | 1    |
| 1.7      | 20940       | GROUND LABEL                  | 1    |
| 1.8      | 29010       | DIN-RAIL 6.50" LONG           | 1    |
| 1.9      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL | 2    |
| 1.10     | 987873      | LOCK WASHER #10 ASA MEDIUM    | 2    |
| 1.11     | 28905       | REVERSING CONTACTOR           | 1    |
| 1.12     | 909J13      | TERMINAL STRIP END CLAMP      | 2    |
| 1.13     | 51845       | JUMPER                        | 2    |
| 1.14     | 51847       | JUMPER                        | 2    |
| 1.15     | 29034       | JUMPER (R10)                  | 1    |
| 1.16     | 29035       | JUMPER (R4)                   | 1    |
| 1.17     | 00000758    | JUMPER V2 1 PHASE (R9)        | 1    |
| 1.18     | 29036       | JUMPER (R2)                   | 1    |
| 1.19     | 29037       | JUMPER (R3)                   | 1    |
| 1.20     | 00000755    | JUMPER V2 1 PHASE (R7)        | 1    |
| 1.21     | 00000757    | JUMPER V2 1 PHASE (R6)        | 1    |
| 1.22     | 70274       | RECTIFIER INSULATOR           | 1    |
| 1.23     | 70246       | RECTIFIER                     | 1    |
| 1.24     | 957854      | ROUND HEAD MACHINE SCREW      | 1    |
| 1.25     | 982470      | HEX HEAD MACHINE NUT          | 1    |
| 1.26     | 29014       | TERMINAL STRIP                | 3    |
| 1.27     | 29047       | TERMINAL STRIP BRIDGE         | 1    |
| 1.28     | 00000535    | SURGE SUPPRESSOR              | 1    |
| 1.29     | 00000336    | JUMPER (R12)                  | 1    |
| 1.30     | 00000537    | B8 JUMPER                     | 1    |
| 1.31     | 00000538    | B9 JUMPER                     | 1    |
| 1.32     | 00000376    | B5 JUMPER                     | 1    |
| 1.33     | 00001500    | B3-JUMPER                     | 1    |
| 1.34     | 00001501    | B4-JUMPER                     | 1    |
| 1.35     | 00001503    | JUMPER-B2                     | 1    |
| 1.36     | 11782704    | CONNECTOR PUSHWIRE ORANGE     | 1    |
| 1.37     | 983197      | WIRING TERMINAL               | 2    |

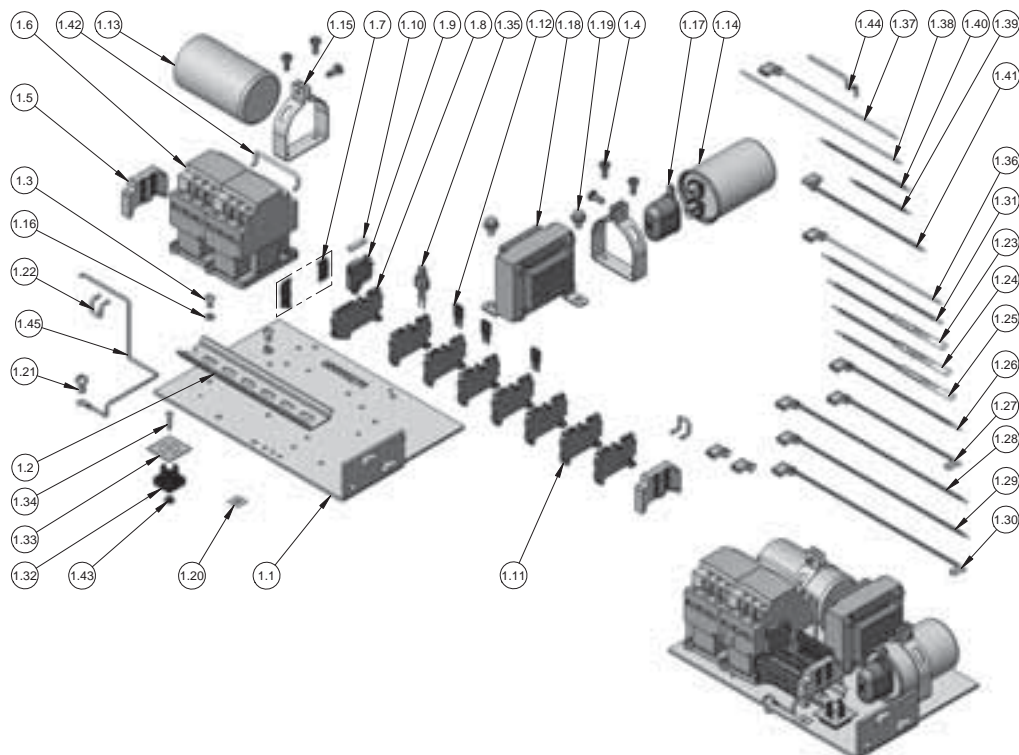
# CONTACTOR PLATE ASSEMBLY FOR USE WITH AC BRAKE AND TRANSFORMER 110/115-1-50/60 MODELS J, L, R & RT



| CONTACTOR BKT S/A | REVERSING CONTACTOR P/N | TRANSFORMER P/N | SECONDARY VOLTAGE |
|-------------------|-------------------------|-----------------|-------------------|
| 00001696          | 24791                   | 00000592T       | 24 V              |
| 00001697          | 28906                   | 00000593T       | 48 V              |
| 00001698          | 24791                   | 00000594T       | 110 V             |

| ITEM NO. | PART NUMBER   | DESCRIPTION                    | QTY. |
|----------|---------------|--------------------------------|------|
| 1        | SEE TABLE     | CONTACTOR BKT S/A              | 1    |
| 1.1      | 00000278      | CONTACTOR BRACKET              | 1    |
| 1.2      | 29010         | DIN-RAIL 6.50" LONG            | 1    |
| 1.3      | 982686        | SCREW #10-32 UNF-2A X 3/8" SL  | 2    |
| 1.4      | 987873        | LOCK WASHER #10 ASA MEDIUM     | 2    |
| 1.5      | 909J13        | TERMINAL STRIP END CLAMP       | 2    |
| 1.6      | SEE TABLE     | REVERSING CONTACTOR            | 1    |
| 1.7      | 00000398      | TERMINAL STRIP COVER SEGMENT   | 1    |
| 1.8      | 29018         | FUSIBLE TERMINAL STRIP         | 1    |
| 1.9      | 29019         | TERMINAL STRIP CARTRIDGE       | 1    |
| 1.10     | 00000393      | FUSE-5MM X 20MM-500MA          | 1    |
| 1.11     | 29014         | TERMINAL STRIP                 | 6    |
| 1.12     | 29047         | TERMINAL STRIP BRIDGE          | 2    |
| 1.13     | 35279         | START CAPACITOR                | 1    |
| 1.14     | 35278         | CAPACITOR, RUN                 | 1    |
| 1.15     | 35268         | CLAMP                          | 2    |
| 1.16     | 982873        | MACHINE SCREW PAN HEAD         | 6    |
| 1.17     | 35285         | RUN CAPACITOR INSULATOR        | 1    |
| 1.18     | SEE TABLE     | TRANSFORMER-V2-110/115 PRIMARY | 1    |
| 1.19     | 25861         | SCREW 1/4-20 UNC-2A X 3/8" HEX | 2    |
| 1.20     | 20940         | GROUND LABEL                   | 1    |
| 1.21     | 987827        | SCREW 1/4-20 UNC-2A X 1/2"     | 1    |
| 1.22     | 51845         | JUMPER                         | 2    |
| 1.23     | 29038         | JUMPER (R5)                    | 1    |
| 1.24     | 29037         | JUMPER (R3)                    | 1    |
| 1.25     | 29036         | JUMPER (R2)                    | 1    |
| 1.26     | 29034         | JUMPER (R10)                   | 1    |
| 1.27     | 29035         | JUMPER (R4)                    | 1    |
| 1.28     | 00000755      | JUMPER V2 1 PHASE (R7)         | 1    |
| 1.29     | 00000757      | JUMPER V2 1 PHASE (R6)         | 1    |
| 1.30     | 00000758      | JUMPER V2 1 PHASE (R9)         | 1    |
| 1.31     | 00000336      | JUMPER (R12)                   | 1    |
| 1.32     | 70246         | RECTIFIER                      | 1    |
| 1.33     | 70274         | RECTIFIER INSULATOR            | 1    |
| 1.34     | 957854        | ROUND HEAD MACHINE SCREW       | 1    |
| 1.35     | 982237        | DUAL ENTRY WIRE FERRULE        | 1    |
| 1.36     | 00000535      | SURGE SUPPRESSOR               | 1    |
| 1.37     | 00001501      | B4-JUMPER                      | 1    |
| 1.38     | 00001500      | B3-JUMPER                      | 1    |
| 1.39     | 00001737      | JUMPER 'B6'                    | 1    |
| 1.40     | 00000537      | B8 JUMPER                      | 1    |
| 1.41     | 00000538      | B9 JUMPER                      | 1    |
| 1.42     | 00000376      | B5 JUMPER                      | 1    |
| 1.43     | 982470        | HEX HEAD MACHINE NUT           | 1    |
| 1.44     | 00001503      | JUMPER-B2                      | 1    |
| 1.45     | 983197        | WIRING TERMINAL                | 2    |
| 1.46     | 51847         | JUMPER                         | 1    |
| 1.47     | GROUND JUMPER | JUMPER-G/Y-#16 AWG             | 1    |

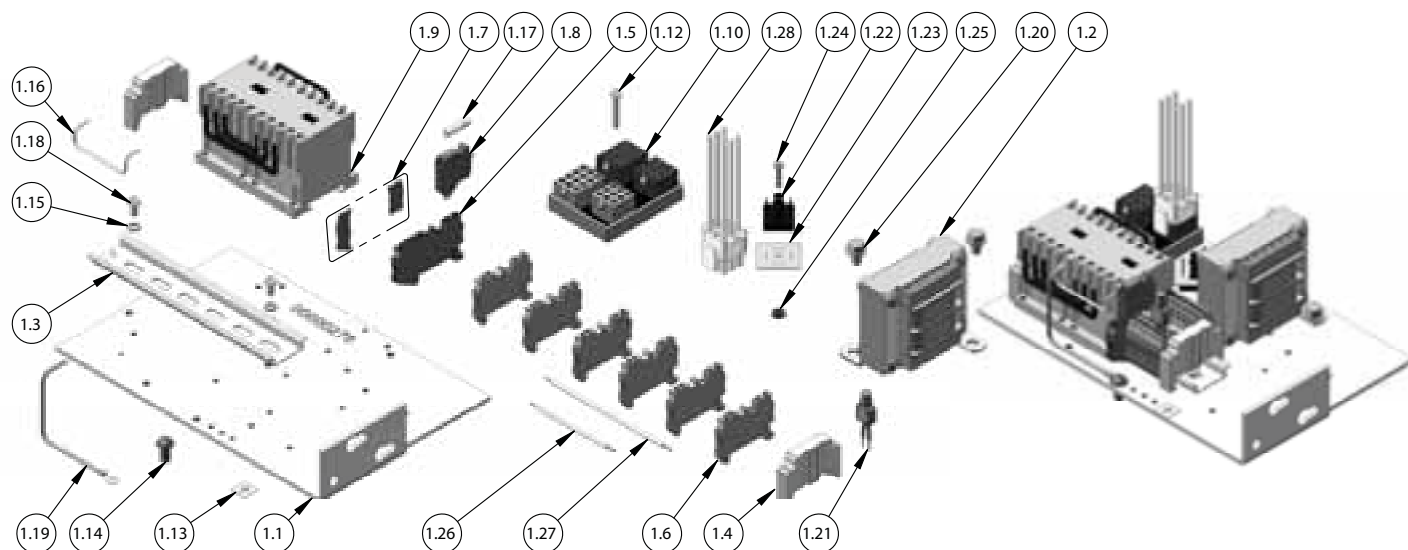
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 1-SPEED UNITS 220/230-1-50/60 MODELS J, L, R & RT



| CONTACTOR BKT S/A | REVERSING CONTACTOR P/N | TRANSFORMER P/N | SECONDARY VOLTAGE |
|-------------------|-------------------------|-----------------|-------------------|
| 00001698          | 24791                   | 00000594T       | 24 V              |
| 00001699          | 28906                   | 00000595T       | 48 V              |
| 00001700          | 28905                   | 00000596T       | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                    | QTY. |
|----------|-------------|--------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR BKT S/A              | 1    |
| 1.1      | 00000278    | CONTACTOR BRACKET              | 1    |
| 1.2      | 29010       | DIN-RAIL 6.50" LONG            | 1    |
| 1.3      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL  | 2    |
| 1.4      | 982873      | MACHINE SCREW PAN HEAD         | 6    |
| 1.5      | 909J13      | TERMINAL STRIP END CLAMP       | 2    |
| 1.6      | SEE TABLE   | REVERSING CONTACTOR            | 1    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT   | 1    |
| 1.8      | 29018       | FUSIBLE TERMINAL STRIP         | 1    |
| 1.9      | 29019       | TERMINAL STRIP CARTRIDGE       | 1    |
| 1.10     | 00000393    | FUSE-5MM X 20MM-500MA          | 1    |
| 1.11     | 29014       | TERMINAL STRIP                 | 7    |
| 1.12     | 29047       | TERMINAL STRIP BRIDGE          | 3    |
| 1.13     | 35279       | START CAPACITOR                | 1    |
| 1.14     | 35278       | CAPACITOR, RUN                 | 1    |
| 1.15     | 35268       | CLAMP                          | 2    |
| 1.16     | 987873      | LOCK WASHER #10 ASA MEDIUM     | 2    |
| 1.17     | 35285       | RUN CAPACITOR INSULATOR        | 1    |
| 1.18     | SEE TABLE   | TRANSFORMER-V2-230/460 PRIMARY | 1    |
| 1.19     | 25861       | SCREW 1/4-20 UNC-2A X 3/8" HEX | 2    |
| 1.20     | 20940       | GROUND LABEL                   | 1    |
| 1.21     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"     | 1    |
| 1.22     | 51845       | JUMPER                         | 2    |
| 1.23     | 29038       | JUMPER (R5)                    | 1    |
| 1.24     | 29037       | JUMPER (R3)                    | 1    |
| 1.25     | 29036       | JUMPER (R2)                    | 1    |
| 1.26     | 29034       | JUMPER (R10)                   | 1    |
| 1.27     | 29035       | JUMPER (R4)                    | 1    |
| 1.28     | 00000755    | JUMPER V2 1 PHASE (R7)         | 1    |
| 1.29     | 00000757    | JUMPER V2 1 PHASE (R6)         | 1    |
| 1.30     | 00000758    | JUMPER V2 1 PHASE (R9)         | 1    |
| 1.31     | 00000336    | JUMPER (R12)                   | 1    |
| 1.32     | 70246       | RECTIFIER                      | 1    |
| 1.33     | 70274       | RECTIFIER INSULATOR            | 1    |
| 1.34     | 957854      | ROUND HEAD MACHINE SCREW       | 1    |
| 1.35     | 00000535    | SURG SUPPRESSOR                | 1    |
| 1.36     | 00001501    | B4-JUMPER                      | 1    |
| 1.37     | 00001500    | B3-JUMPER                      | 1    |
| 1.38     | 00001737    | JUMPER 'B6'                    | 1    |
| 1.39     | 00000537    | B8 JUMPER                      | 1    |
| 1.40     | 00000538    | B9 JUMPER                      | 1    |
| 1.41     | 00000376    | B5 JUMPER                      | 1    |
| 1.42     | 51847       | JUMPER                         | 1    |
| 1.43     | 982470      | HEX HEAD MACHINE NUT           | 1    |
| 1.44     | 00000321    | JUMPER-R13                     | 1    |
| 1.45     | 27190       | JUMPER-G/Y-#16 AWG             | 1    |
| 1.46     | 983197      | WIRING TERMINAL                | 2    |

# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 1-SPEED, DUAL VOLTAGE UNITS 220/230-380/415/460-3-50/60 MODELS J, JJ, L, LL, R, RR, RT & RRT

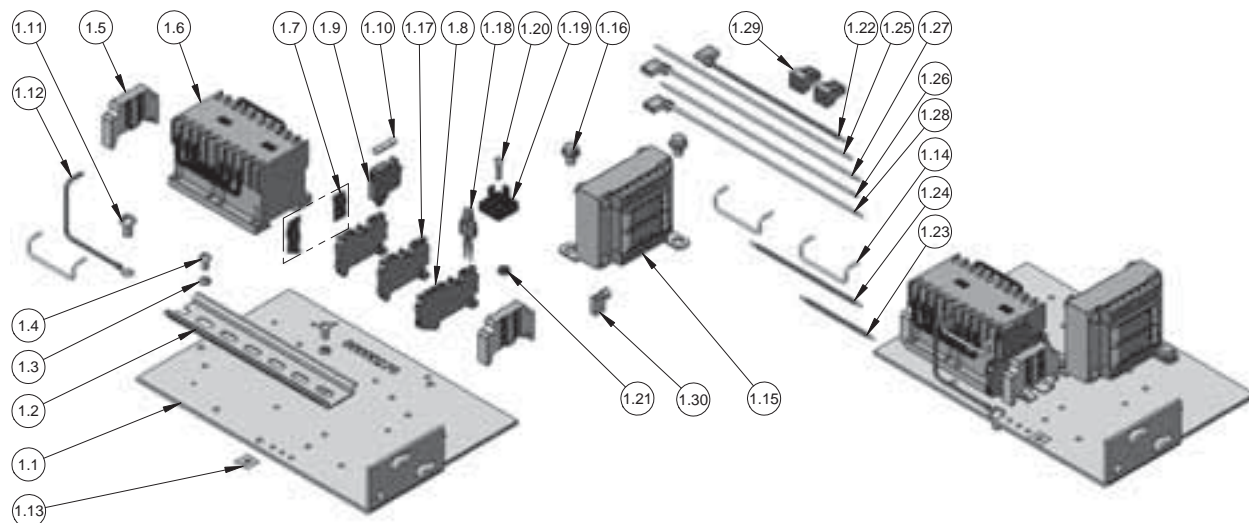


| CONTACTOR BKT S/A | TRANSFORMER | REVERSING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|-------------|---------------------|-------------------|
| 00001701          | 00000594T   | 28860               | 24 V              |
| 00001702          | 00000595T   | 24797               | 48 V              |
| 00001703          | 00000596T   | 24799               | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                    | QTY. |
|----------|-------------|--------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR BKT S/A BHSE         | 1    |
| 1.1      | 00000278    | CONTACTOR BRACKET              | 1    |
| 1.2      | SEE TABLE   | TRANSFORMER-V2-230/460         | 1    |
| 1.3      | 29010       | DIN-RAIL 6.50" LONG            | 1    |
| 1.4      | 909J13      | TERMINAL STRIP END CLAMP       | 2    |
| 1.5      | 29018       | FUSIBLE TERMINAL STRIP         | 1    |
| 1.6      | 29014       | TERMINAL STRIP                 | 6    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT   | 1    |
| 1.8      | 29019       | FUSIBLE TERMINAL STRIP         | 1    |
| 1.9      | SEE TABLE   | REVERSING CONTACTOR            | 1    |
| 1.10     | 27672       | VOLTAGE CHANGE BOARD           | 1    |
| 1.12     | 987862      | SCREW #8-32UNC-2A X 1"         | 1    |
| 1.13     | 20940       | GROUND LABEL                   | 1    |
| 1.14     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"     | 1    |
| 1.15     | 987873      | LOCK WASHER #10 ASA MEDIUM     | 2    |
| 1.16     | 51847       | JUMPER                         | 1    |
| 1.17     | 00000393    | FUSE-5MM X 20MM-500MA          | 1    |
| 1.18     | 982686      | SCREW #10-32 UNF-2A X 3/8" SL  | 2    |
| 1.19     | 27189       | JUMPER-G/Y-#16 AWG             | 1    |
| 1.20     | 25861       | SCREW 1/4-20 UNC-2A X 3/8" HEX | 2    |
| 1.21     | 00000535    | SURGE SUPPRESSOR               | 1    |
| 1.22     | 70246       | RECTIFIER                      | 1    |
| 1.23     | 70274       | RECTIFIER INSULATOR            | 1    |
| 1.24     | 957854      | SCREW #6-32 NC-2 X 5/8" ROUND  | 1    |
| 1.25     | 982470      | NUT #6-32 UNC-2A HEX MACHINE   | 1    |
| 1.26     | 00000537    | B8 JUMPER                      | 1    |
| 1.27     | 00000538    | B9 JUMPER                      | 1    |
| 1.28     | 00000204    | HARNESS V2/CONTACTOR           | 1    |



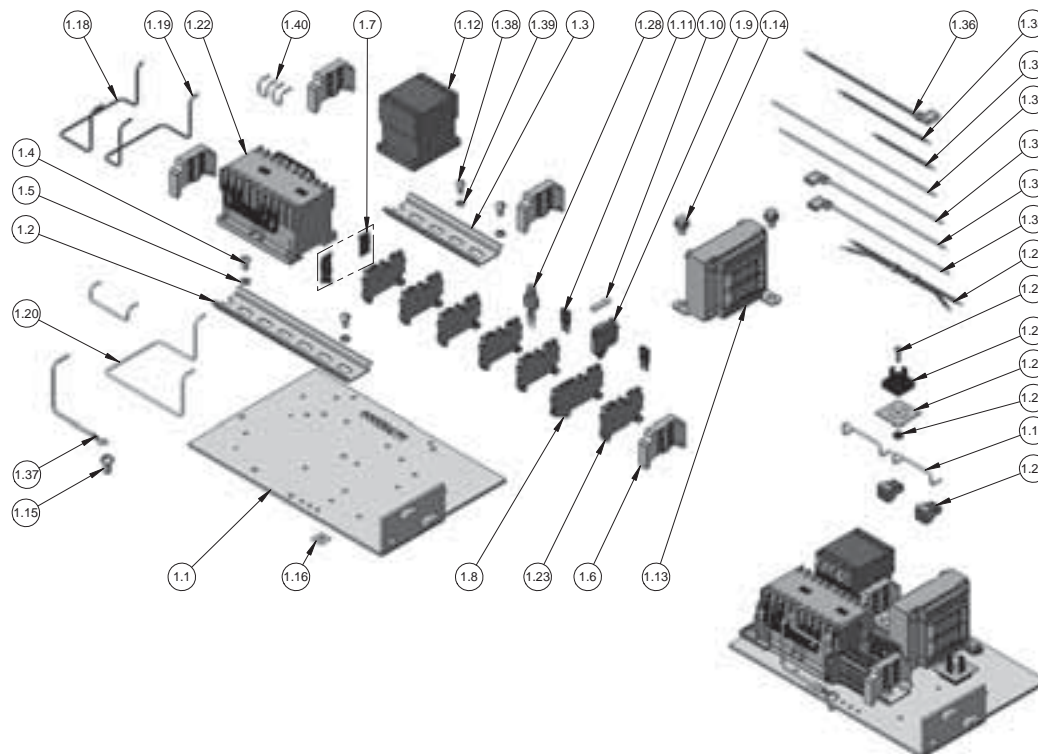
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 550/575-3-50/60 MODELS J, JJ, L, LL, R, RR, RT & RRT



| CONTACTOR BKT S/A | TRANSFORMER | REVERSING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|-------------|---------------------|-------------------|
| 00001710          | 00000597T   | 28860               | 24 V              |
| 00001711          | 00000598T   | 24797               | 48 V              |
| 00001712          | 00000599T   | 24799               | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                     | QTY. |
|----------|-------------|---------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR BKT S/A BHSE          | 1    |
| 1.1      | 00000278    | CONTACTOR BRACKET               | 1    |
| 1.2      | 29010       | DIN-RAIL 6.50" LONG             | 1    |
| 1.3      | 987873      | LOCK WASHER #10 ASA MEDIUM 2    |      |
| 1.4      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL   | 2    |
| 1.5      | 909J13      | TERMINAL STRIP END CLAMP        | 2    |
| 1.6      | SEE TABLE   | REVERSING CONTACTOR             | 1    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT 1  |      |
| 1.8      | 29018       | FUSIBLE TERMINAL STRIP          | 1    |
| 1.9      | 29019       | TERMINAL STRIP CARTRIDGE        | 1    |
| 1.10     | 00000393    | FUSE-5MM X 20MM-500MA           | 1    |
| 1.12     | 27189       | JUMPER-G/Y-#16 AWG              | 1    |
| 1.13     | 20940       | GROUND LABEL JUMPER-G/Y-#16 AWG | 1    |
| 1.14     | 51847       | JUMPER                          | 3    |
| 1.15     | SEE TABLE   | TRANSFORMER-V2-575V PRIMARY     | 1    |
| 1.16     | 25861       | SCREW 1/4-20 UNC-2A X 3/8" HEX  | 2    |
| 1.17     | 29014       | TERMINAL STRIP                  | 2    |
| 1.18     | 00001505    | SURGE SUPPRESSOR                | 1    |
| 1.19     | 00001551    | RECTIFIER                       | 1    |
| 1.20     | 957854      | ROUND HEAD MACHINE SCREW        | 1    |
| 1.21     | 982470      | HEX HEAD MACHINE NUT            | 1    |
| 1.22     | 00000376    | B5 JUMPER                       | 1    |
| 1.23     | 00000537    | B8 JUMPER                       | 1    |
| 1.24     | 00000538    | B9 JUMPER                       | 1    |
| 1.25     | 00001502    | JUMPER-B1                       | 1    |
| 1.26     | 00001503    | JUMPER-B2                       | 1    |
| 1.27     | 00001535    | JUMPER 'B4'                     | 1    |
| 1.28     | 00001536    | JUMPER 'B3'                     | 1    |
| 1.29     | 11782704    | CONNECTOR PUSHWIRE ORANGE       | 2    |
| 1.30     | 983197      | WIRING TERMINAL                 | 1    |

# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 2-SPEED UNITS 220/230-3-50/60 MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2 & RRT-2

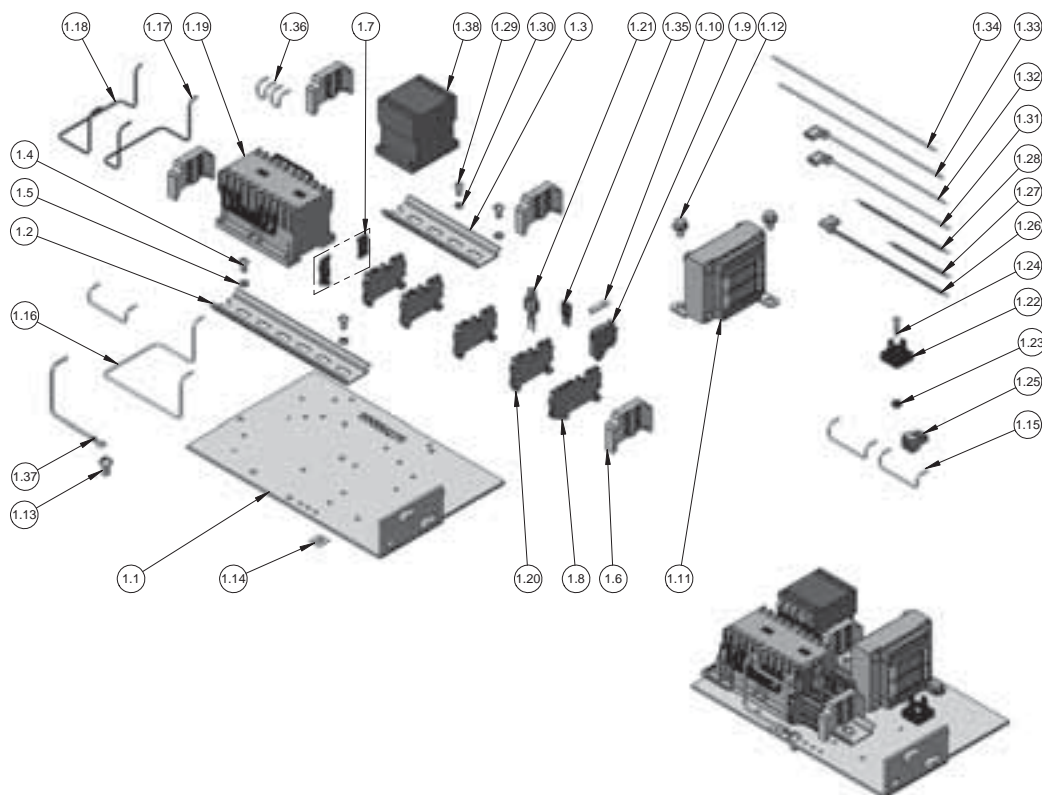


| CONTACTOR BKT S/A | TRANSFORMER | REVERSING CONTACTOR | SPEED SELECTING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|-------------|---------------------|---------------------------|-------------------|
| 00001704          | 00000594T   | 28860               | 28878                     | 24 V              |
| 00001705          | 00000595T   | 24797               | 28871                     | 48 V              |
| 00001706          | 00000596T   | 24799               | 28870                     | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                    | QTY. |
|----------|-------------|--------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR BKT S/A              | 1    |
| 1.1      | 00000278    | CONTACTOR BRACKET              | 1    |
| 1.2      | 29010       | DIN-RAIL 6.50" LONG            | 1    |
| 1.3      | 29009       | DIN-RAIL 4.50" LONG            | 1    |
| 1.4      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL  | 3    |
| 1.5      | 987873      | LOCK WASHER #10 ASA MEDIUM     | 3    |
| 1.6      | 909J13      | TERMINAL STRIP END CLAMP       | 4    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT   | 1    |
| 1.8      | 29018       | FUSIBLE TERMINAL STRIP         | 1    |
| 1.9      | 29019       | TERMINAL STRIP CARTRIDGE       | 1    |
| 1.10     | 00000393    | FUSE-5MM X 20MM-500MA          | 1    |
| 1.11     | 29047       | TERMINAL STRIP BRIDGE          | 2    |
| 1.12     | SEE TABLE   | CONTACTOR                      | 1    |
| 1.13     | SEE TABLE   | TRANSFORMER-V2-230/460         | 1    |
| 1.14     | 25861       | SCREW 1/4-20 UNC-2A X 3/8" HEX | 2    |
| 1.15     | 987827      | W 1/4-20 UNC-2A X 1/2"         | 1    |
| 1.16     | 20940       | GROUND LABEL                   | 1    |
| 1.17     | 51847       | JUMPER                         | 3    |
| 1.18     | 27652       | JUMPER (R4)                    | 1    |
| 1.19     | 27657       | JUMPER (R5)                    | 1    |
| 1.20     | 27736       | JUMPER (W5)                    | 1    |
| 1.21     | 00000327    | 'H5/H6' JUMPER HARNESS         | 1    |
| 1.22     | SEE TABLE   | REVERSING CONTACTOR            | 1    |
| 1.23     | 29014       | TERMINAL STRIP                 | 6    |
| 1.24     | 70246       | RECTIFIER                      | 1    |
| 1.25     | 70274       | RECTIFIER INSULATOR            | 1    |
| 1.26     | 957854      | ROUND HEAD MACHINE SCREW       | 1    |
| 1.27     | 982470      | HEX HEAD MACHINE NUT           | 1    |
| 1.28     | 00000535    | SURGE SUPPRESSOR               | 1    |
| 1.29     | 11782704    | CONNECTOR PUSHWIRE ORANGE      | 2    |
| 1.30     | 00001500    | B3-JUMPER                      | 1    |
| 1.31     | 00001501    | B4-JUMPER                      | 1    |
| 1.32     | 00001502    | JUMPER-B1                      | 1    |
| 1.33     | 00001503    | JUMPER-B2                      | 1    |
| 1.34     | 00000537    | B8 JUMPER                      | 1    |
| 1.35     | 00000538    | B9 JUMPER                      | 1    |
| 1.36     | 00000376    | B5 JUMPER                      | 1    |
| 1.37     | 27189       | GROUND JUMPER                  | 1    |
| 1.38     | 982683      | SCREW #8-32 UNC-2A X 3/8"      | 1    |
| 1.39     | 957844      | LOCK WASHER #8 ASA MEDIUM      | 1    |
| 1.40     | 27662       | JUMPER                         | 2    |



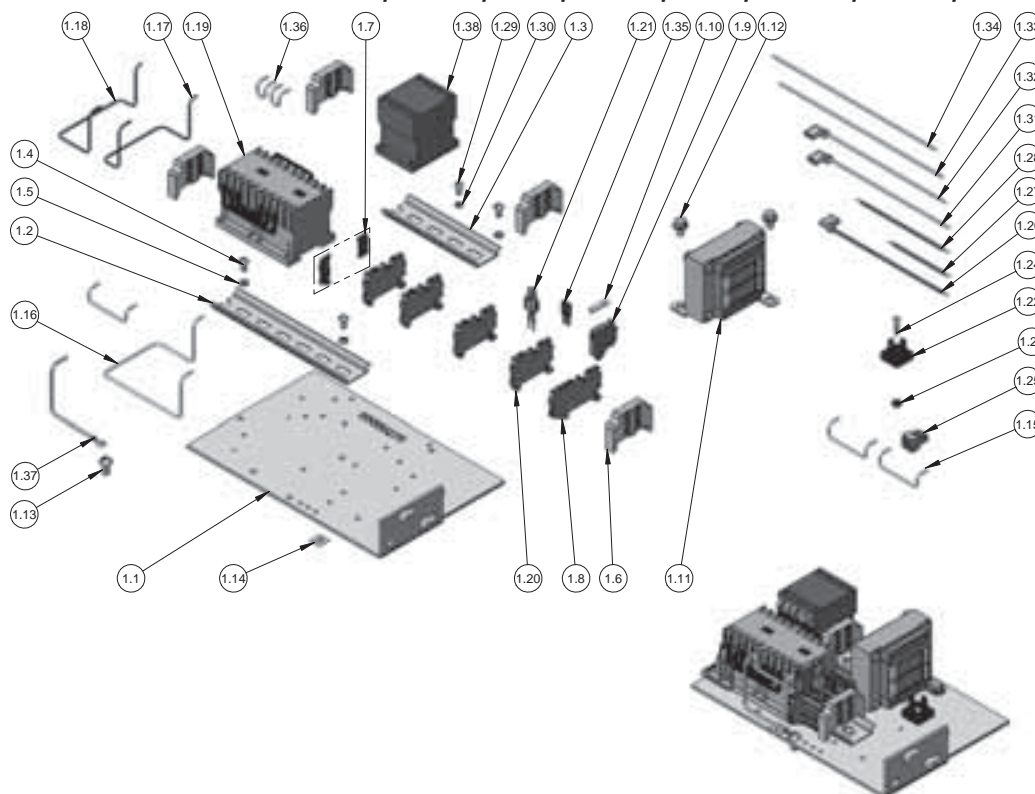
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 2-SPEED UNITS 380/415/460-3-50/60 MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2 & RRT-2



| CONTACTOR BKT S/A | TRANSFORMER | REVERSING CONTACTOR | SPEED SELECTING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|-------------|---------------------|---------------------------|-------------------|
| 00001707          | 00000594T   | 28860               | 28878                     | 24 V              |
| 00001708          | 00000595T   | 24797               | 28871                     | 48 V              |
| 00001709          | 00000596T   | 24799               | 28870                     | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                    | QTY. |
|----------|-------------|--------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR BKT S/A              | 1    |
| 1.1      | 00000278    | CONTACTOR BRACKET              | 1    |
| 1.2      | 29010       | DIN-RAIL 6.50" LONG            | 1    |
| 1.3      | 29009       | DIN-RAIL 4.50" LONG            | 1    |
| 1.4      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL  | 3    |
| 1.5      | 987873      | LOCK WASHER #10 ASA MEDIUM     | 3    |
| 1.6      | 909J13      | TERMINAL STRIP END CLAMP       | 4    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT   | 1    |
| 1.8      | 29018       | FUSIBLE TERMINAL STRIP         | 1    |
| 1.9      | 29019       | TERMINAL STRIP CARTRIDGE       | 1    |
| 1.10     | 00000393    | FUSE-5MM X 20MM-500MA          | 1    |
| 1.11     | SEE TABLE   | TRANSFORMER-V2-230/460         | 1    |
| 1.12     | 25861       | SCREW 1/4-20 UNC-2A X 3/8" HEX | 2    |
| 1.13     | 20940       | GROUND LABEL                   | 1    |
| 1.14     | 51847       | JUMPER                         | 3    |
| 1.15     | 27652       | JUMPER (W5)                    | 1    |
| 1.16     | 27657       | JUMPER (R4)                    | 1    |
| 1.17     | 27736       | JUMPER (R5)                    | 1    |
| 1.18     | SEE TABLE   | REVERSING CONTACTOR            | 1    |
| 1.19     | 29014       | TERMINAL STRIP                 | 6    |
| 1.20     | 00000535    | SURGE SUPPRESSOR               | 1    |
| 1.21     | 70246       | RECTIFIER                      | 1    |
| 1.22     | 982470      | HEX HEAD MACHINE NUT           | 1    |
| 1.23     | 957854      | ROUND HEAD MACHINE SCREW       | 1    |
| 1.24     | 11782704    | CONNECTOR PUSHWIRE ORANGE      | 2    |
| 1.25     | 00000376    | B5 JUMPER                      | 1    |
| 1.26     | 00000537    | B8 JUMPER                      | 1    |
| 1.27     | 00000538    | B9 JUMPER                      | 1    |
| 1.28     | 982683      | SCREW #8-32 UNC-2A X 3/8"      | 1    |
| 1.29     | 957844      | LOCK WASHER #8 ASA MEDIUM      | 1    |
| 1.30     | 27662       | JUMPER                         | 2    |
| 1.31     | 00001500    | B3-JUMPER                      | 1    |
| 1.32     | 00001501    | B4-JUMPER                      | 1    |
| 1.33     | 00001502    | JUMPER-B1                      | 1    |
| 1.34     | 00001503    | JUMPER-B2                      | 1    |
| 1.35     | 29047       | TERMINAL STRIP BRIDGE          | 1    |
| 1.36     | 27662       | JUMPER                         | 2    |
| 1.37     | 27189       | GROUND JUMPER                  | 1    |
| 1.38     | LC1K09      | CONTACTOR                      | 1    |

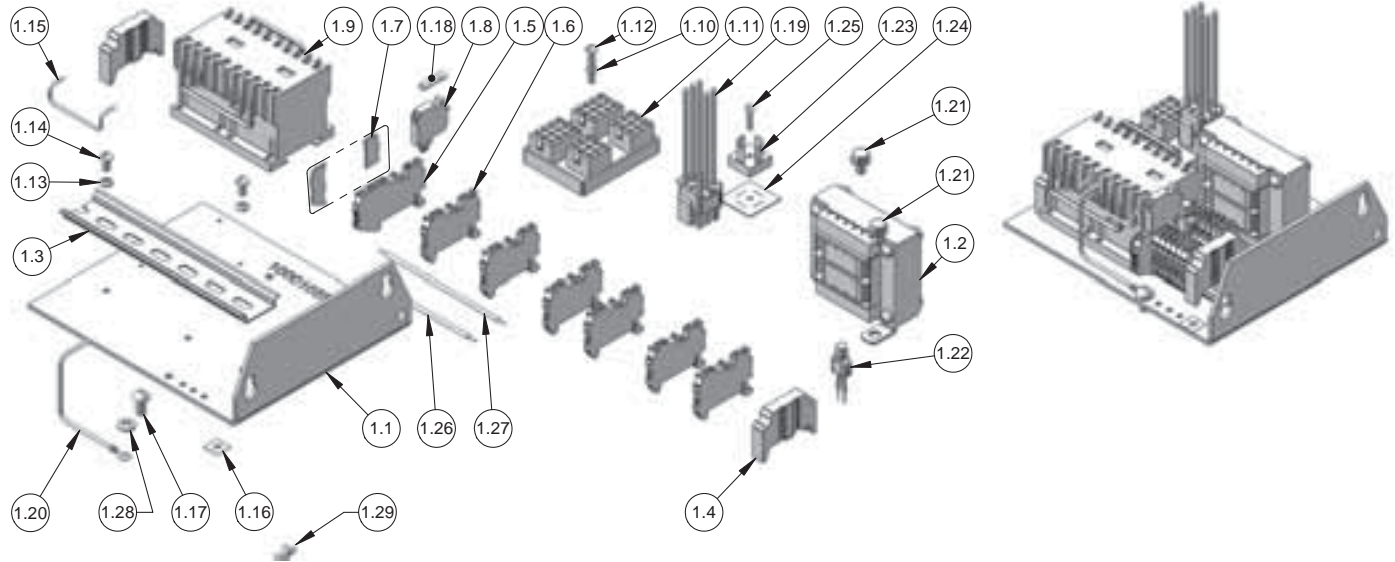
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 2-SPEED UNITS 550/575-3-50/60 MODELS J-2, JJ-2, L-2, LL-2, R-2, RR-2, RT-2, RRT-2



| CONTACTOR BKT S/A | TRANSFORMER | REVERSING CONTACTOR | SPEED SELECTING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|-------------|---------------------|---------------------------|-------------------|
| 00001713          | 00000597T   | 28860               | 28878                     | 24 V              |
| 00001714          | 00000598T   | 24797               | 28871                     | 48 V              |
| 00001715          | 00000599T   | 24799               | 28870                     | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                    | QTY. |
|----------|-------------|--------------------------------|------|
| 1        | SEE TABLE   | CONTACTOR BKT S/A              | 1    |
| 1.1      | 00000278    | CONTACTOR BRACKET              | 1    |
| 1.2      | 29010       | DIN-RAIL 6.50" LONG            | 1    |
| 1.3      | 29009       | DIN-RAIL 4.50" LONG            | 1    |
| 1.4      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL  | 3    |
| 1.5      | 987873      | LOCK WASHER #10 ASA MEDIUM     | 3    |
| 1.6      | 909J13      | TERMINAL STRIP END CLAMP       | 4    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT   | 1    |
| 1.8      | 29019       | TERMINAL STRIP CARTRIDGE       | 1    |
| 1.9      | 00000393    | FUSE-5MM X 20MM-500MA          | 1    |
| 1.10     | 29018       | FUSIBLE TERMINAL STRIP         | 1    |
| 1.11     | SEE TABLE   | CONTACTOR                      | 1    |
| 1.12     | SEE TABLE   | TRANSFORMER-V2-230/460         | 1    |
| 1.13     | 25861       | SCREW 1/4-20 UNC-2A X 3/8" HEX | 2    |
| 1.14     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"     | 1    |
| 1.15     | 20940       | GROUND LABEL                   | 1    |
| 1.16     | 51847       | JUMPER                         | 3    |
| 1.17     | 27662       | JUMPER                         | 2    |
| 1.18     | 27652       | JUMPER (R4)                    |      |
| 1.19     | 27657       | JUMPER (R5)                    | 1    |
| 1.20     | 27736       | JUMPER (W5)                    |      |
| 1.21     | SEE TABLE   | REVERSING CONTACTOR            | 1    |
| 1.22     | 29014       | TERMINAL STRIP                 | 6    |
| 1.23     | 00001551    | RECTIFIER                      | 1    |
| 1.24     | 957854      | ROUND HEAD MACHINE SCREW       | 1    |
| 1.25     | 982470      | HEX HEAD MACHINE NUT           | 1    |
| 1.26     | 00000376    | B5 JUMPER                      | 1    |
| 1.27     | 00000537    | B8 JUMPER                      | 1    |
| 1.28     | 00000538    | B9 JUMPER                      | 1    |
| 1.29     | 982683      | SCREW #8-32 UNC-2A X 3/8"      | 1    |
| 1.30     | 00001500    | B3-JUMPER                      | 1    |
| 1.31     | 00001501    | B4-JUMPER                      | 1    |
| 1.32     | 11782704    | CONNECTOR PUSHWIRE ORANGE      | 2    |
| 1.33     | 957844      | LOCK WASHER #8 ASA MEDIUM      | 1    |
| 1.34     | 27189       | GROUND JUMPER                  | 1    |
| 1.35     | 982683      | SCREW #8-32 UNC-2A X 3/8"      | 1    |
| 1.36     | 983197      | WIRING TERMINAL                | 1    |

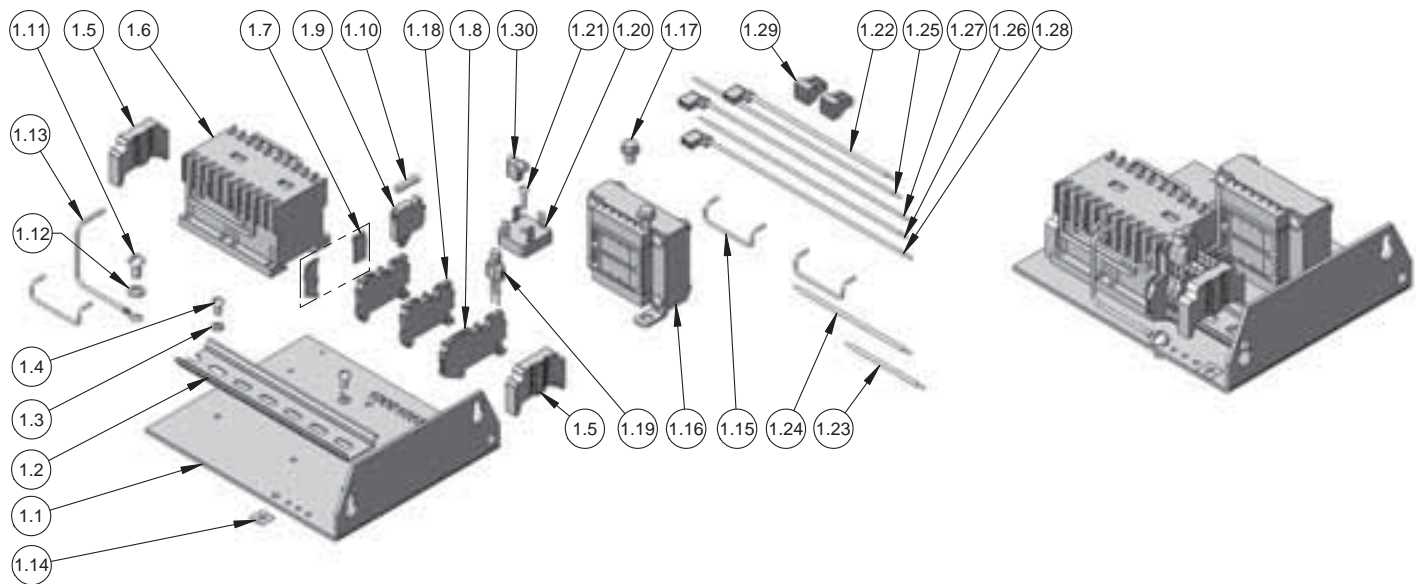
# CONTACTOR PLATE ASSEMBLY FOR USE WITH DC BRAKE 1-SPEED, DUAL VOLTAGE UNITS 220/230-380/415/460-3-50/60 MODELS: RRS



| CONTACTOR BKT S/A | TRANSFORMER | REVERSING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|-------------|---------------------|-------------------|
| 10001058          | 00000594T   | 28860               | 24 V              |
| 10001059          | 00000595T   | 24797               | 48 V              |
| 10001060          | 00000596T   | 24799               | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                    | QTY. |
|----------|-------------|--------------------------------|------|
| 1        | SEE TABLE   | CTRLS ASSY-DUAL VOLTAGE        | 1    |
| 1.1      | 10001055    | CONTACTOR CONTROLS BRACKET     | 1    |
| 1.2      | SEE TABLE   | TRANSFORMER-V2-230/460 PRIMARY | 1    |
| 1.3      | 29010       | DIN-RAIL 6.50" LONG            | 1    |
| 1.4      | 909J13      | TERMINAL STRIP END CLAMP       | 2    |
| 1.5      | 29018       | FUSEIBLE TERMINAL STRIP        | 1    |
| 1.6      | 29014       | TERMINAL STRIP                 | 6    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT   | 1    |
| 1.8      | 29019       | TERMINAL STRIP CARTRIDGE       | 1    |
| 1.9      | SEE TABLE   | REVERSING CONTACTOR            | 1    |
| 1.10     | 957844      | LOCK WASHER                    | 1    |
| 1.11     | 10001233    | VOLTAGE CHANGE BOARD           | 1    |
| 1.12     | 987862      | SCREW #8-32UNC-2A X 1"         | 1    |
| 1.13     | 987873      | LOCK WASHER #10 ASA MEDIUM     | 2    |
| 1.14     | 982686      | SCREW #10-32 UNF-2A X 3/8" SL  | 2    |
| 1.15     | 51847       | JUMPER                         | 1    |
| 1.16     | 20940       | GROUND LABEL                   | 1    |
| 1.17     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"     | 1    |
| 1.18     | 00000393    | FUSE-5MM X 20MM-500MA          | 1    |
| 1.19     | 00001733    | HARNESS V2/CONTACTOR           | 1    |
| 1.20     | 27189       | JUMPER-G/Y-#16 AWG             | 1    |
| 1.21     | 25861       | SCREW 1/4-20 UNC-2A X 3/8" HEX | 2    |
| 1.22     | 00000535    | SURGE SUPPRESSOR               | 1    |
| 1.23     | 70246       | RECTIFIER                      | 1    |
| 1.24     | 70274       | INSULATOR, RECTIFIER           | 1    |
| 1.25     | 957854      | SCREW #6-32 NC-2 X 5/8" ROUND  | 1    |
| 1.26     | 00000537    | B8 JUMPER                      | 1    |
| 1.27     | 00000538    | B9 JUMPER                      | 1    |
| 1.28     | 982226      | LOCK WASHER 1/4 X .109 X .062" | 1    |
| 1.29     | 983197      | WIRING TERMINAL                | 1    |

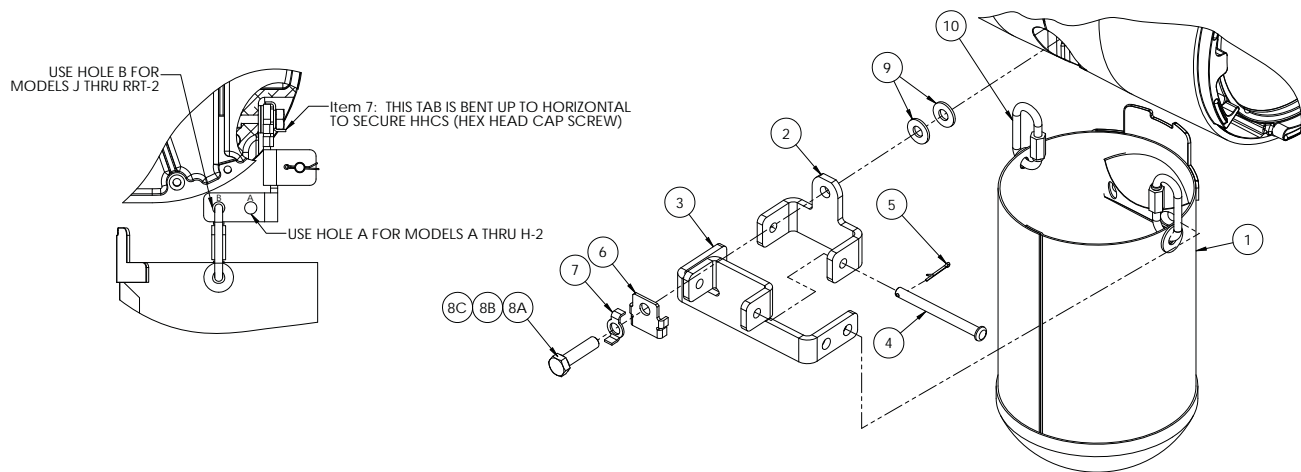
## CONTACTOR PLATE ASSEMBLY 550/575-3-50/60 FOR USE WITH DC BRAKE MODELS: RRS



| CONTACTOR BKT S/A | TRANSFORMER | REVERSING CONTACTOR | SECONDARY VOLTAGE |
|-------------------|-------------|---------------------|-------------------|
| 10001061          | 00000597T   | 28860               | 24 V              |
| 10001062          | 00000598T   | 24797               | 48 V              |
| 10001063          | 00000599T   | 24799               | 110 V             |

| ITEM NO. | PART NUMBER | DESCRIPTION                    | QTY. |
|----------|-------------|--------------------------------|------|
| 1        | SEE TABLE   | CTRLS ASSY-575V                | 1    |
| 1.1      | 10001055    | CONTACTOR CONTROLS BRACKET     | 1    |
| 1.2      | 29010       | DIN-RAIL 6.50" LONG            | 1    |
| 1.3      | 987873      | LOCK WASHER #10 ASA MEDIUM     | 2    |
| 1.4      | 982686      | SCREW #10-32 UNF-2A X 3/8" SL  | 2    |
| 1.5      | 909J13      | TERMINAL STRIP END CLAMP       | 2    |
| 1.6      | SEE TABLE   | REVERSING CONTACTOR            | 1    |
| 1.7      | 00000398    | TERMINAL STRIP COVER SEGMENT   | 1    |
| 1.8      | 29018       | FUSEIBLE TERMINAL STRIP        | 1    |
| 1.9      | 29019       | TERMINAL STRIP CARTRIDGE       | 1    |
| 1.10     | 00000393    | FUSE-5MM X 20MM-500MA          | 1    |
| 1.11     | 987827      | SCREW 1/4-20 UNC-2A X 1/2"     | 1    |
| 1.12     | 982226      | LOCK WASHER 1/4 X .109 X .062" | 1    |
| 1.13     | 27189       | JUMPER-G/Y-#16 AWG             | 1    |
| 1.14     | 20940       | GROUND LABEL                   | 1    |
| 1.15     | 51847       | JUMPER                         | 3    |
| 1.16     | SEE TABLE   | TRANSFORMER-V2-575V PRIMARY    | 1    |
| 1.17     | 25861       | SCREW 1/4-20 UNC-2A X 3/8" HEX | 2    |
| 1.18     | 29014       | TERMINAL STRIP                 | 2    |
| 1.19     | 00001505    | SURGE SUPPRESSOR               | 1    |
| 1.20     | 00001551    | RECTIFIER                      | 1    |
| 1.21     | 957854      | SCREW #6-32 NC-2 X 5/8" ROUND  | 1    |
| 1.22     | 00000376    | B5 JUMPER                      | 1    |
| 1.23     | 00000537    | B8 JUMPER                      | 1    |
| 1.24     | 00000538    | B9 JUMPER                      | 1    |
| 1.25     | 00001502    | JUMPER-B1                      | 1    |
| 1.26     | 00001503    | JUMPER-B2                      | 1    |
| 1.27     | 00001535    | JUMPER 'B4'                    | 1    |
| 1.28     | 00001536    | JUMPER 'B3'                    | 1    |
| 1.29     | 11782704    | CONNECTOR PUSHWIRE ORANGE      | 2    |
| 1.30     | 983197      | WIRING TERMINAL                | 1    |

## 5" METAL AND FABRIC CHAIN CONTAINER INSTALLATION INSTRUCTIONS

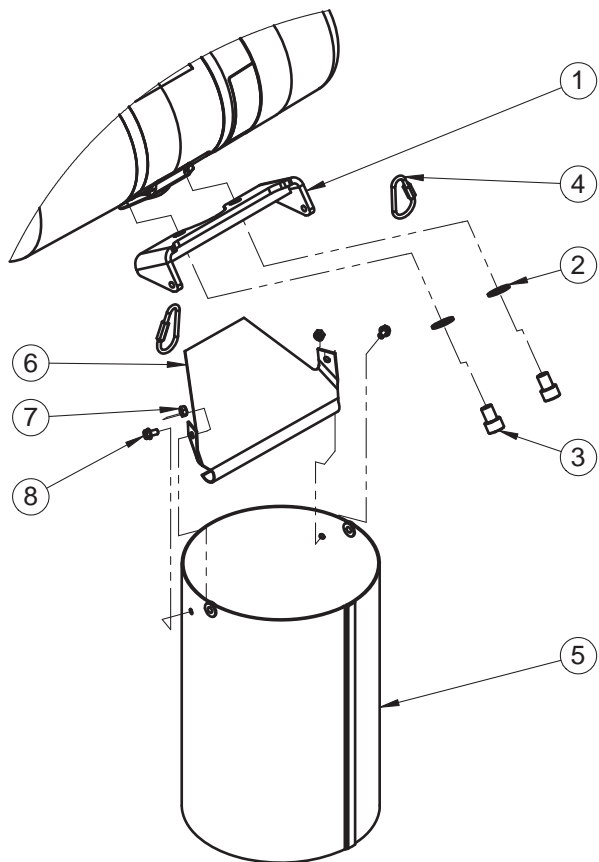
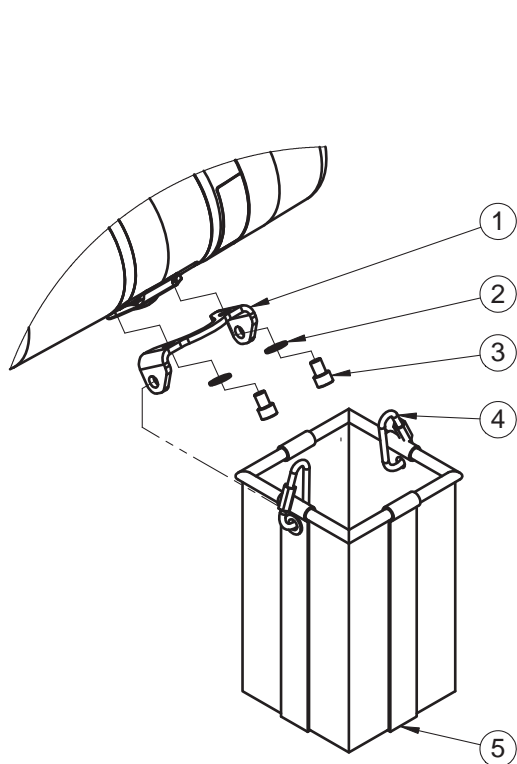


CHAIN CONTAINER BUCKET LENGTH VS. MODEL AND LIFT (TABLE A)

| A THRU C2<br>& F THRU F-2 | E, E-2, H,<br>&H-2 | J THRU<br>LL-2 | R THRU<br>RR-2 | RT THRU<br>RRT-2 | BUCKET<br>LENGTH<br>(INCHES) | METAL<br>CONTAINER<br>PART<br>NUMBERS | FABRIC<br>CONTAINER<br>PART<br>NUMBERS |
|---------------------------|--------------------|----------------|----------------|------------------|------------------------------|---------------------------------------|--|
| LIFT IN FEET              |                    |                |                |                  | —                            | —                                     | —                                      |
| 10                        | 5 -                | —              | —              | —                | 8                            | 2450                                  | 3813PNH                                |
| 10 - 20                   | 5 - 10             | 10             | 5              | —                | 11                           | 2451                                  | 3814PNH                                |
| 20 - 30                   | 10 - 15            | 10 - 15        | 5 - 7.5        | 5                | 14                           | 2452                                  | 3810PNH                                |
| 30 - 40                   | 15 - 20            | 15 - 20        | 7.5 - 10       | 5 - 6.3          | 17                           | 2453                                  | 3815PNH                                |
| 40 - 50                   | 20 - 25            | 20 - 25        | 10 - 12.5      | 6.3 - 8.3        | 20                           | 2454                                  | 3816PNH                                |
| 50 - 60                   | 25 - 30            | 25 - 30        | 12.5 - 15      | 8.3 - 10         | 23                           | 2455                                  | 3811PNH                                |
| 60 - 90                   | 30 - 45            | 30 - 40        | 15 - 20        | 10 - 13.3        | 31                           | 2456                                  | 3817PNH                                |
| 90 - 100                  | 45 - 50            | 40 - 60        | 20 - 30        | 13.3 - 20        | 36                           | 2457                                  | 3812PNH                                |
| 100 - 140                 | 50 - 70            | 60 - 90        | 30 - 45        | 20 - 30          | 48                           | 2458                                  | 3818PNH                                |

| ITEM NO. | PART NUMBER | DESCRIPTION   | QTY. |
|----------|-------------|---|------|
| 1        | 24650       | CHAIN CONTAINER BUCKET/BAG  | 1    |
| -        |             | CHAIN CONTAINER KIT 5" DIAMETER (CONSIST OF THE BELOW ITEMS)  | 1    |
| 2        |             | UPPER BRACKET   | 1    |
| 3        |             | LOWER BRACKET   | 1    |
| 4        |             | PIN CLEVIS  | 1    |
| 5        |             | COTTER PIN-1/16 X 3/4 LG  | 1    |
| 6        |             | ADAPTER (V2) FOR MODELS J THRU RRT-2  | 1    |
| 7        |             | SCREW HEAD RETAINER   | 1    |
| 8A       |             | HHCS 5/16-18 UNC-2A X 1 1/4<br>USE ONLY ON HOIST WITH SERIAL # BEGINNING WITH "NL"<br>MODELS J THRU RRT AND WJ & WR | 1    |
| 8B       |             | HHCS 1/4-20 UNC-2A X 1 1<br>USE ONLY ON MODELS A THRU H-2   | 1    |
| 8C       |             | HHCS 5/16-18 UNC-2A X 1<br>USE ONLY ON HOIST WITH SERIAL # BEGINNING WITH "L" OR "LW" MODELS J-RRT AND WJ & WR      | 1    |
| 9        |             | WASHER 5/16 X 11/16 X .065 SAE<br>USED ONLY ON HOIST WITH SERIAL # BEGINNING WITH "NL"                              | 2    |
| 10       |             | QUICK LINK  | 2    |

# RRS METAL AND FABRIC CHAIN CONTAINER INSTALLATION INSTRUCTION



| CANVAS CHAIN CONTAINER<br>BUCKET LENGTH VS LIFT |                      |
|---|----------------------|
| Lift in Feet                                    | Canvas Container Kit |
| 20  | 10001562             |
| 30  | 10001568             |
| 40  | 10001569             |
| 50  | 10001570             |
| 60  | 10001571             |

| METAL CHAIN CONTAINER<br>BUCKET LENGTH VS LIFT |                      |
|--|----------------------|
| Lift in Feet                                   | Canvas Container Kit |
| 30   | 10001563             |
| 55   | 10001564             |
| 80   | 10001565             |
| 105  | 10001566             |
| 130  | 10001567             |

| Item # | Description             | Metal Kit Part #                                 | Qty. | Canvas Kit Part #                                   | Qty. |
|--------|-------------------------|--|------|---|------|
| 1      | CHAIN CONTAINER BRACKET | SEE TABLE FOR<br>PART NUMBER<br>BASED<br>ON LIFT | 1    | SEE TABLE<br>FOR PART<br>NUMBER<br>BASED<br>ON LIFT | 1    |
| 2      | WASHER                  |  | 2    |   | 2    |
| 3      | SOCHET HEAD CAP SCREW   |  | 2    |   | 2    |
| 4      | QUICK LINK              |  | 2    |   | 2    |
| 5      | CHAIN CONTAINER         |  | 1    |   | 1    |
| 6      | CHAIN CONTAINER RAMP    |  | 1    |   | -    |
| 7      | RAMP NUT                |  | 2    |   | -    |
| 8      | RAMP HEX BOLT           |  | 2    |   | -    |



## LUBRICANTS

| Part Number for Packaged Lubricants<br>Used in the Lodestar Electric Chain Hoists<br>(Refer to page 21 for Lubrication Instructions) |                   |  |
|--|-------------------|--|
| Lubricant Usage  | Type of Lubricant | Part Numbers and Packaged Quantity of Lubricants |
| Hoist Gears  | Grease (Special)  | Models A to H uses 28605                         |
|  |                   | Model J to RRT excluding RRS uses 28617          |
|  |                   | Model RRS uses 1 each of both 28605 and 28617    |
| Load Chain   | Oil               | 28608 for 1 Pint Can<br>28619 for 1 Gal Can      |
| Limit Switch Shaft Threads   | *Oil              | "3 in 1" or Light Machine Oil-obtain locally     |
| Lower Hook Thrust Bearing  | *Oil              | Heavy Machine Oil obtain locally                 |

\*These oils are not furnished by CM in Packaged Quantities. When ordering lubricants, specify the type of lubricant, part number and packages quantity required.

Touch-up Paints for Lodestar Electric Chain Hoists:

Hoist Order \*(1) case (12-12 oz. Aerosol Cans) of Black Touch-up paints Part Number 84189.

Hoist Order \*(1) case (12-12 oz. Aerosol Cans) of Orange Touch-Up paint Part Number 84190.

\*Touch-up paints are only available in case quantities.

**NOTE:** When painting hoists, also order warning labels, identification labels, etc. that may be coated during painting.

## RECOMMENDED SPARE PARTS

To insure continued service of the Lodestar Hoist, the following is a list of parts that are recommended to be kept on hand at all times to replace parts that have worn or failed.

| Part Description                                     | Models A-H                  | Models J-RRT                | Model RRS                   | Qty Required for Each Hoist |
|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Limit Switch Kit                                     | 31631                       | 31636 (excludes RRS)        | 31636                       | 1                           |
| Solid State Reverse Switch (Single Phase Units Only) | 27257                       | 35499                       | n/a                         | 1                           |
| Start Capacitor (Single Phase Units Only)            | 27716                       | 35279                       | n/a                         | 1                           |
| Run Capacitor (Single Phase Units Only)              | -                           | 35278                       | n/a                         |                             |
| Transformer  | SEE CONTACTOR PLATE SECTION | SEE CONTACTOR PLATE SECTION | SEE CONTACTOR PLATE SECTION | 0 or 1                      |
| Control Station Hardware Kit w/ Gasket               | SEE CONTROLS SECTION        | SEE CONTROLS SECTION        | SEE CONTROLS SECTION        | 1                           |
| Control Station Button Insert Kit                    | SEE CONTROLS SECTION        | SEE CONTROLS SECTION        | SEE CONTROLS SECTION        | 1                           |
| Contactor  | SEE CONTACTOR PLATE SECTION | SEE CONTACTOR PLATE SECTION | SEE CONTACTOR PLATE SECTION | 1                           |
| Fuse - 500mA   | 00000393                    | 00000393                    | 00000393                    |                             |
| Speed Selector Relay (2-Speed Units Only)            | SEE CONTACTOR PLATE SECTION | SEE CONTACTOR PLATE SECTION | SEE CONTACTOR PLATE SECTION | 1                           |
| CM Terminal Pin-Extraction Tool (Dual Voltage Only)  | 27163                       | 27163                       | 27163                       | 1                           |
| Suspension Bolts                                     | 987554                      | 36846                       | 10001047/82638              | 2(1 EA RRS)                 |



## This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a guide for writing. There are no margins, text, or other markings on the paper.

# WARRANTY

## WARRANTY AND LIMITATION OF REMEDY AND LIABILITY

A. Seller warrants that its products and parts, when shipped, and operating (including installation, construction and start-up), when performed, will meet applicable specifications, will be of good quality and will be free from defects in material and workmanship. All claims for defective mechanical components under this warranty must be made in writing immediately upon discovery and in any event, within three (3) years from shipment of the applicable item unless Seller specifically assumes installation, construction or start-up responsibility. All claims for defective mechanical components when Seller assumes installation, construction or start-up responsibility and all claims for defective work must be made in writing immediately upon discovery and in any event, within three (3) years from completion of the applicable work by Seller, provided; however, all claims for defective mechanical components must be made in writing no later than (42) months after shipment. All claims for defective electrical components under this warranty must be made in writing immediately upon discovery and in any event, within one (1) year from shipment of the applicable item unless Seller specifically assumes installation, construction or start-up responsibility. All claims for defective electrical components when Seller assumes installation, construction or start-up responsibility and all claims for defective work must be made in writing immediately upon discovery and in any event, within one (1) year from completion of the applicable work by Seller, provided; however, all claims for defective electrical components must be made in writing no later than eighteen (18) months after shipment. Defective items must be held for Seller's inspection and returned to the original f.o.b. point upon request. THE 'FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY THIRD PARTY WITH RESPECT TO ANY GOOD, WHETHER IN CONTRACT, TORT OR OTHER THEORY OF LAW, FOR LOSS OF PROFITS OR LOSS OF USE, OR FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, DIRECT OR INDIRECT DAMAGES, HOWSOEVER CAUSED.

B. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product, part or work at either the original f.o.b. point of delivery or at Seller's authorized service station nearest Buyer; or (ii) refund an equitable portion of the purchase price. All claims are to be submitted in accordance with our published warranty process.

C. This warranty is contingent upon Buyer's proper maintenance and care of Seller's products, and does not extend to normal wear and tear. Seller reserves the right to void warranty in event of Buyer's use of inappropriate materials or application in the course of repair or maintenance, or if Seller's products have been dismantled prior to submission to Seller for warranty inspection at Seller's authorized service station.

D. Seller shall not be liable for any damage, injury or loss arising out of the use of the goods if, prior to such damage, injury or loss, such goods are: (i) damaged or misused following Seller's delivery to the carrier; (ii) not maintained, inspected, or used in compliance with applicable law and Seller's written instructions and recommendations; (iii) installed, repaired, altered or modified without compliance with such laws, instructions or recommendations; or (4) repaired with parts or accessories other than those supplied by CMCO.

E. The foregoing is Seller's only obligation and Buyer's exclusive remedy for breach of warranty and is Buyer's exclusive remedy hereunder by way of breach of contract, tort, strict liability or otherwise. Any action for breach of this agreement must be commenced within one (1) year after the cause of action has accrued.



COLUMBUS McKINNON  
CORPORATION

FAMILY OF BRANDS



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# OPERATING, MAINTENANCE & PARTS MANUAL

## ELECTRIC CHAIN HOIST VARIABLE FREQUENCY DRIVE SUPPLEMENT

# CM<sup>®</sup> LODESTAR<sup>®</sup>

Before installing hoist, fill in the information below.

Model Number \_\_\_\_\_

Serial No. \_\_\_\_\_

Purchase Date \_\_\_\_\_

Voltage \_\_\_\_\_

Rated Load \_\_\_\_\_

### RATED LOADS 1/8 TO 3 TONNES 125 KG TO 3000 KG

Follow all instructions and warning for inspecting,  
maintaining and operating this hoist.

The use of any hoist presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before using this hoist, each operator should become thoroughly familiar with all warnings, instructions and recommendations in this manual. **Retain this manual for future reference and use.**

Forward this manual to operator. Failure to operate equipment as directed in manual may cause injury.



**FOREWORD**

This manual contains important information to help you properly install, operate and maintain your hoist for maximum performance, economy and safety.

Please study its contents thoroughly before putting your hoist into operation. By practicing correct operating procedures and by carrying out the recommended preventive maintenance suggestions, you will experience long, dependable and safe service. After you have completely familiarized yourself with the contents of this manual, we recommend that you carefully file it for future reference.

The information herein is directed to the proper use, care and maintenance of the hoist and does not comprise a handbook on the broad subject of rigging.

Rigging can be defined as the process of lifting and moving heavy loads using hoists and other mechanical equipment. Skill acquired through specialized experience and study is essential to safe rigging operations. For rigging information, we recommend consulting a standard textbook on the subject.

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## ELECTROMOTIVE IMPULSE® •G+ MINI ADJUSTABLE FREQUENCY DRIVES

Through a special arrangement with Electromotive Systems, a Magnatek Company, the Impulse •G+ Mini adjustable frequency drives have been mounted inside most Columbus McKinnon (CM®) chain hoists. This manual contains information on the adjustable frequency drives and it should be used in conjunction with the manual supplied with the hoist.

### DISCLAIMER OF WARRANTY

Electromotive Systems hereafter referred to as Company, assumes no responsibility for improper programming of a drive by untrained personnel. A drive should only be programmed by a trained technician who has read and understands the contents of this manual. Improper programming of a drive can lead to unexpected, undesirable, or unsafe operation or performance of the drive. This may result in damage to equipment or personal injury. We shall not be liable for economic loss, property damage, or other consequential damages or physical injury sustained by the purchaser or by any third party as a result of such programming. We neither assume nor authorize any other person to assume any other liability in connection with the sale or use of this product.

### WARNING

Improper programming of a drive can lead to unexpected, undesirable, or unsafe operation or performance of the drive.

#### TO AVOID INJURY:

Drive must only be programmed by trained personnel.

### GENERAL

Refer to hoist manual for Safety Precautions, Hoist Safety is up to you, Forward, General Information, Accessories and Installation of the hoist. However, when installing the hoist, be sure it is protected from the following conditions:

- Extreme cold and heat. Use only within the ambient temperature range: 14 to 122°F (-10 to +50°C).
- Rain, moisture.
- Oil sprays, splashes.
- Salt spray.
- Direct sunlight (Avoid using outdoors).
- Corrosive gases (e.g. sulfurous gas) or liquids.
- Dust or metallic particles in the air.
- Physical shock, vibration.
- Magnetic noise. (Example: welding machines, power devices, etc.).
- High humidity.
- Radioactive substances.
- Combustibles: thinner, solvents, etc.

### POWER SUPPLY AND ELECTRICAL CONNECTIONS

Follow the power supply and electrical connections under the Installation Instructions of the hoist manual. Hoists supplied with the Electromotive adjustable frequency drives are to be connected to 220 volt - 3 phase - 50 hertz, 208-240 volt - 3 phase - 60 hertz, 380-415 volt - 3 phase - 50 hertz or 440-480 volt - 3 phase - 60 hertz power supply. Before connecting the hoist to the power supply, check that the power to be used agrees with that shown on the hoist identification plate. Hoists with drives are **not** dual voltage.

The hoist should be connected to a branch circuit which complies with the requirements of the National Electrical Code and applicable local codes.

It is recommended that a line of adequate capacity be run directly from the power supply to the hoist to prevent having problems with low voltage and circuit overloads.

The hoist must be supplied with adequate electrical power in order to operate properly. For proper operation, the voltage, (measured at the end of the standard power cord with the hoist operating in the ↑ (UP) direction with full load) must be as indicated in the following table:

| NOMINAL POWER SUPPLY | MINIMUM RUNNING VOLTAGE |
|----------------------|-------------------------|
| 230-3-60             | 200                     |
| 460-3-60             | 415                     |
| 220-3-50             | 200                     |
| 380-3-50             | 365                     |
| 415-3-50             | 399                     |

#### Signs of inadequate electrical power (low voltage) are:

- Noisy hoist operations due to brake chattering.
- Dimming of lights or slowing of motors connected to the same circuit.
- Heating of the hoist motor and other internal components as well as heating of the wires and connectors in the circuit feeding the hoists.
- Failure of the hoist to lift the load due to motor stalling.
- Blowing of fuses or tripping of circuit breakers.

To avoid these low voltage problems, the hoist must be connected to an electrical power supply system that complies with the National Electric Code and applicable local codes. This system must be sized based on the full load current of the hoist and it must have a disconnecting means, overcurrent protection (slow blow fuses or inverse-time type circuit breakers) and provisions for grounding the hoist.

For grounding of the hoist, the power cord includes a grounding conductor (green wire). Furthermore, the suspension system on which the hoist is mounted must also be permanently grounded.

### WARNING

Failure to properly ground the hoist presents the danger of electric shock.

#### TO AVOID INJURY:

Permanently ground the hoist as instructed in this manual.

Low voltage can also be caused by using an undersize extension cord to supply power to the hoist. Refer to the hoist manual to determine the size of the wires in the extension cord.

## **WARNING**

Failure to provide a proper power supply system for the hoist may cause damage and offers the potential for a fire.

### **TO AVOID INJURY:**

Provide the hoist with a overcurrent protected power supply system per the National Electrical Code and applicable local codes as instructed in this manual.

Remember, operation with low voltage can void the CM repair/replacement policy. When in doubt about any of the electrical requirements, consult a qualified electrician.

Always disconnect the power from the power supply system and lockout/tagout disconnecting means before servicing the hoist.

## **WARNING**

Working in or near exposed energized electrical equipment presents the danger of electric shock.

### **TO AVOID INJURY:**

Disconnect power and lockout/tagout disconnecting means before removing cover or servicing this equipment.

**NOTE: The brake coil voltage must be the same as the hoist line voltage. This must be a consideration when ordering a repair brake coil.**

## **OPERATING INSTRUCTIONS**

Follow the operating instructions in the hoist manual and use the following:

The hoist is supplied with dynamic braking resistors. During normal hoist operation these resistors get very hot (300°F or more). These resistors must never be touched while the hoist is in operation. They should be allowed to cool to room temperature before inspection or servicing the hoist.

## **WARNING**

Dynamic braking resistors get very hot during normal hoist operation.

### **TO AVOID INJURY:**

Never touch the dynamic braking resistors while the hoist is in operation. Allow resistors to cool before servicing.

1. The adjustable frequency drives are programmed on a per order basis (see Speed Control Methods on page 23) to provide:
  - a. 1 step control. In this method, the hoist can be operated as a normal single speed hoist. Depress the up or down push button and the hoist speed will gradually increase to the rated speed of the hoist.
  - b. 2 step control. In this method, the hoist can be operated as a normal two speed hoist. Partially depress the up or down push button for slow speed operation and fully depress the button for fast speed operation.
  - c. 3 step control. In this method, the hoist can be operated as a normal three speed operation. Partially depress the up or down push button for slow speed operation. Depress the button to the intermediate position for second speed operation and fully depress the button for fast speed operation. The hoist speed gradually increases to the next speed point.

- d. 2 step infinitely variable control. Partially depress the up or down push button and the speed of the hoist will gradually increase to the slow speed point. Fully depress the button and the speed of the hoist will gradually increase to fast speed operation. Slowly release or depress the up or down push button and the hoist will operate at a speed between the preset speed points.
- e. 3 step infinitely variable control. Partially depress the up or down push button and the speed of the hoist will gradually increase to the slow speed point. Depress the button to the intermediate position and the speed of the hoist will gradually increase to the second speed. Fully depressing the button will cause the hoist to gradually increase to fast speed. Slowly release or depress the up or down push button and the hoist will operate at a speed between the preset speed points.

## **SAFETY PROCEDURES**

Refer to the hoist manual and:

1. When preparing to lift a load, be sure that the attachments to the hook are firmly seated in hook saddle. Avoid off center loading of any kind, especially loading on the point of hook.
2. When lifting, raise the load only enough to clear the floor or support and check to be sure that the attachments to the hook and load are firmly seated. Continue lift only after you are assured the load is free of all obstructions.
3. Do not load hoist beyond the rated capacity shown on hoist identification plate. Overload can cause immediate failure of some load-carrying part or create a defect causing subsequent failure at less than rated capacity. When in doubt, use the next larger capacity hoist.
4. Do not use this or any other overhead materials handling equipment for lifting persons.
5. Stand clear of all loads and avoid moving a load over the heads of other personnel. Warn personnel of your intention to move a load in their area.
6. Do not leave the load suspended in the air unattended.
7. Permit only qualified personnel to operate unit.
8. Do not wrap the load chain around the load and hook onto itself as a choker chain. Doing this will result in:
  - a. The loss of the swivel effect of the hook which could mean twisted chain and a jammed liftwheel.
  - b. The upper limit switch, on certain hoists, is by-passed and the load could hit the hoist.
  - c. The chain could be damaged at the hook.

9. On two and three part reeved hoists, check for twists in the load chain. A twist can occur if the lower hook block has been capsized between the strands of chain. Reverse the capsize to remove twist.

## **WARNING**

Allowing the load to bear against the hook latch and/or hook tip can result in loss of load.

### **TO AVOID INJURY:**

Do not allow the load to bear against the hook latch and/or hook tip. Apply load to hook bowl or saddle only.

10. Do not allow the load to bear against the hook latch. The latch is to help maintain the hook in position while the chain is slack before taking up slack chain.
11. Take up a slack load chain carefully and start load easily to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower the load and remove the excess load.
12. Do not allow the load to swing or twist while hoisting.
13. Never operate the hoist when flammable materials or vapors are present. Electrical devices produce arcs or sparks that can cause a fire or explosion.
14. STAY ALERT! Watch what you are doing and use common sense. Do not use the hoist when you are tired, distracted or under the influence of drugs, alcohol or medication causing diminished control.

## **INSPECTION AND MAINTENANCE**

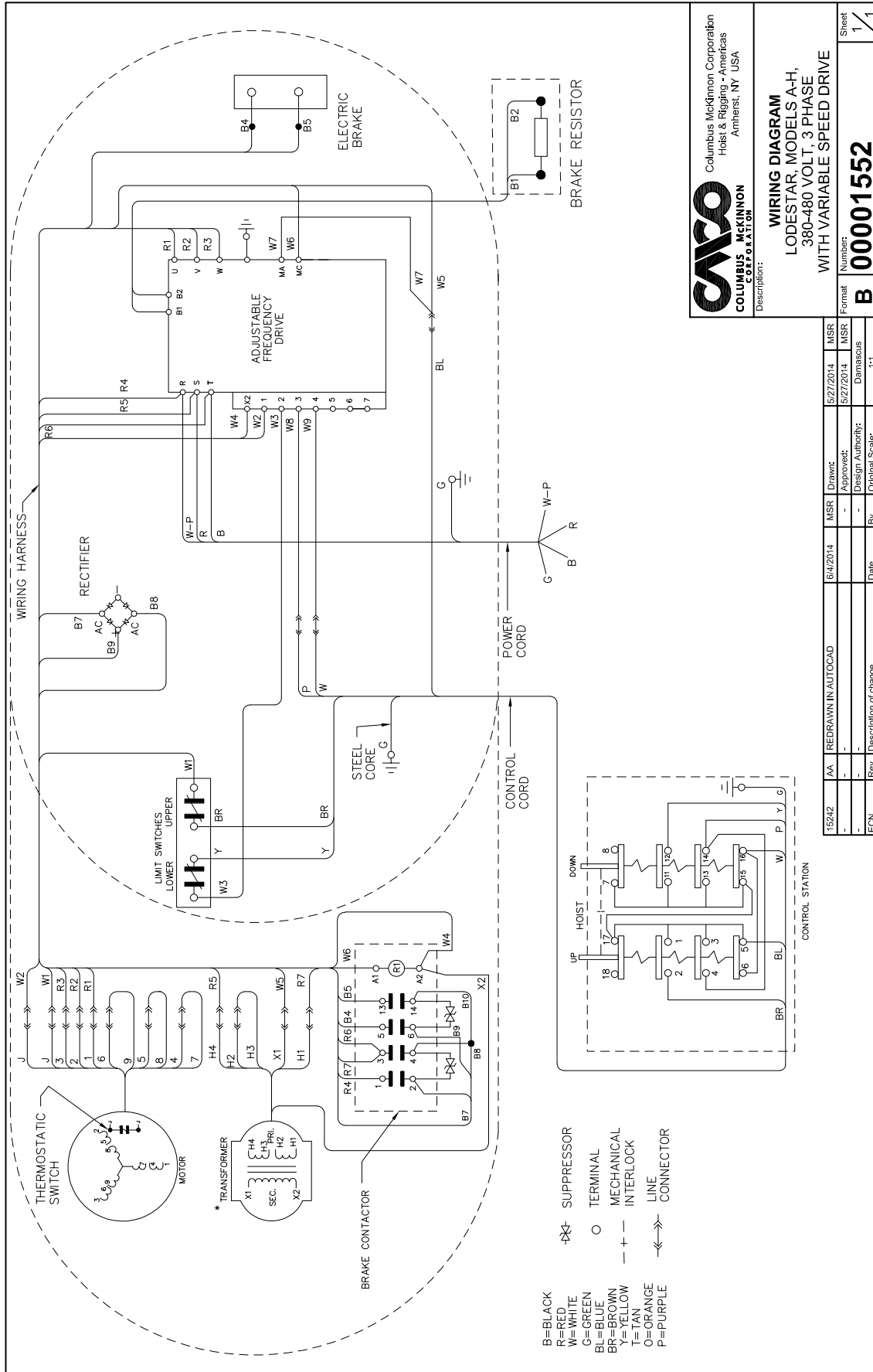
Refer to the hoist manual and in addition, periodically check wiring connections to the drive to make sure they are tight.

| TORQUE SPECIFICATIONS            |              |
|----------------------------------|--------------|
| CHAIN CONTAINER BRACKET SCREWS   | 20-50 FT*LBF |
| BRAKING RESISTOR MOUNTING SCREWS | 15-18 IN*LBF |
| #6 SCREWS                        | 6-9 IN*LBF   |
| #8 SCREWS                        | 15-18 IN*LBF |
| #10 SCREWS                       | 25-30 IN*LBF |

\*Refer to Manual 00001996 for all other torque values



# **WIRING DIAGRAM** **LODESTAR MODELS A-H 380-480 VOLT 3 PHASE WITH VARIABLE SPEED DRIVE**



**COLUMBUS MCKINNON CORPORATION**  
 Hoist & Rigging - Americas  
 Amherst, NY USA

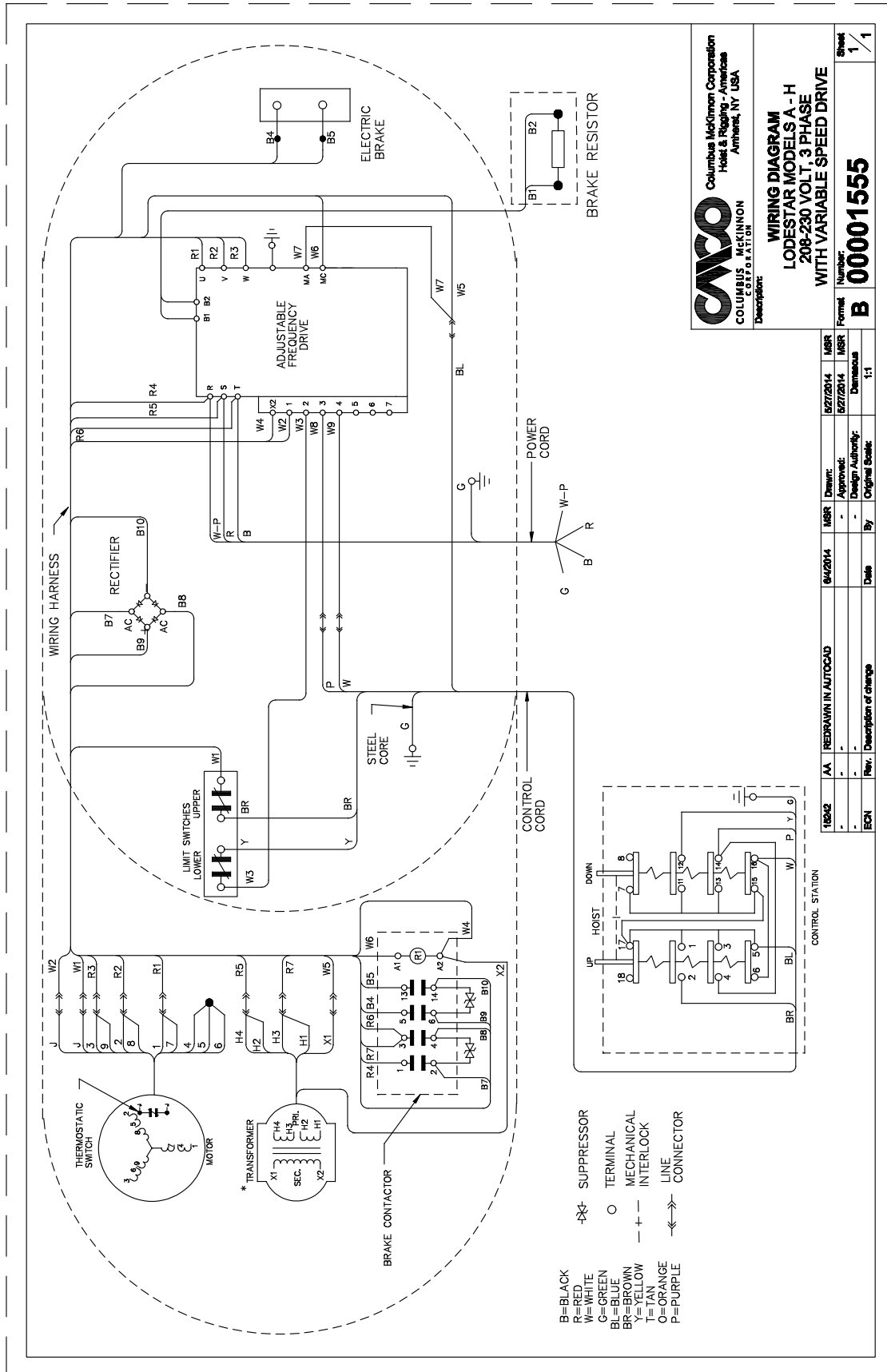
**WIRING DIAGRAM**  
 LODESTAR, MODELS A-H,  
 380-480 VOLT, 3 PHASE,  
 WITH VARIABLE SPEED DRIVE


|        |          |
|--------|----------|
| Sheet  | 1 / 1    |
| Number | B        |
| Format | 00001552 |

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| 15242 | AA | REDRAWN IN AUTOCAD | 6/4/2014 | MSR | Drawn            | 5/27/2014 | MSR      | Sheet  | 1 / 1    |
| -     | -  | -                  | -        | -   | Approved         | 5/27/2014 | MSR      | Number | B        |
| -     | -  | -                  | -        | -   | Design Authority | -         | Danacous | Format | 00001552 |
| -     | -  | -                  | -        | -   | Original Scale   | -         | 1:1      | Sheet  | 1 / 1    |

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|-----|------|-----------------------|------|----|----------------|-----|
| ECN | Rev. | Description of change | Date | By | Original Scale | 1:1 |
|-----|------|-----------------------|------|----|----------------|-----|

# **WIRING DIAGRAM** **LODESTAR MODELS A-H 208-230 VOLT 3 PHASE WITH VARIABLE SPEED DRIVE**





Columbus McKinnon Corporation  
 Hoist & Rigging - Americas  
 Amherst, NY, USA

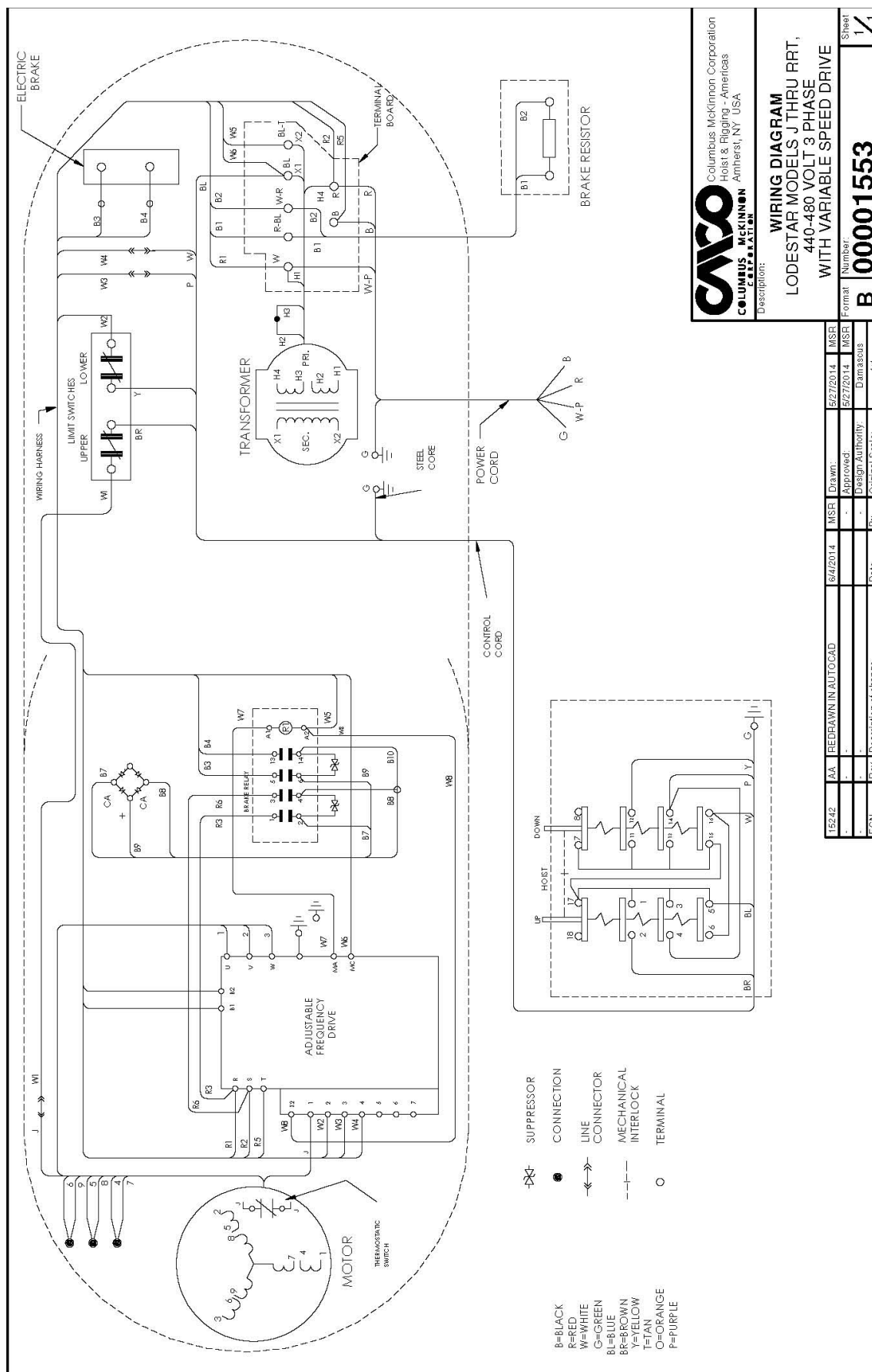
**WIRING DIAGRAM**  
**LODESTAR MODELS A - H**  
**208-230 VOLT, 3 PHASE**  
**WITH VARIABLE SPEED DRIVE**

Number  
**B 00001555**

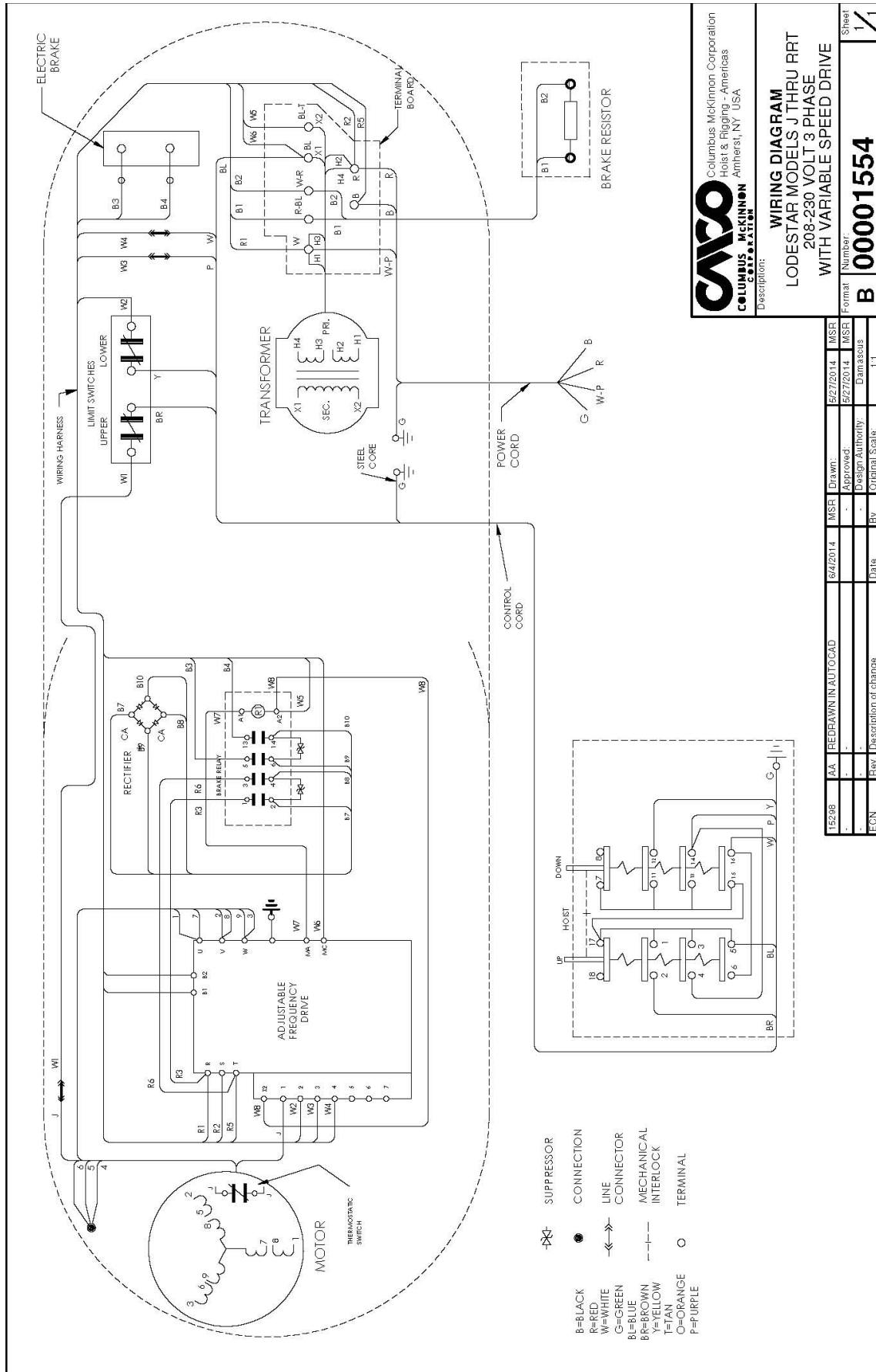
Sheet  
**1 / 1**

| Rev.  | Date      | By  | Design Authority | Drawn | MSR | MSR | 1:1 |
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| 16242 | 8/4/2014  | MSR | MSR              | MSR   | MSR | MSR | 1:1 |
| 16242 | 8/27/2014 | MSR | MSR              | MSR   | MSR | MSR | 1:1 |
| 16242 | 8/27/2014 | MSR | MSR              | MSR   | MSR | MSR | 1:1 |

## LODESTAR MODELS J THRU RRT, 440-480 VOLT 3 PHASE WITH VARIABLE SPEED DRIVE



# **WIRING DIAGRAM** **LODESTAR MODELS J THRU RRT, 208-230 VOLT 3 PHASE WITH VARIABLE SPEED DRIVE**



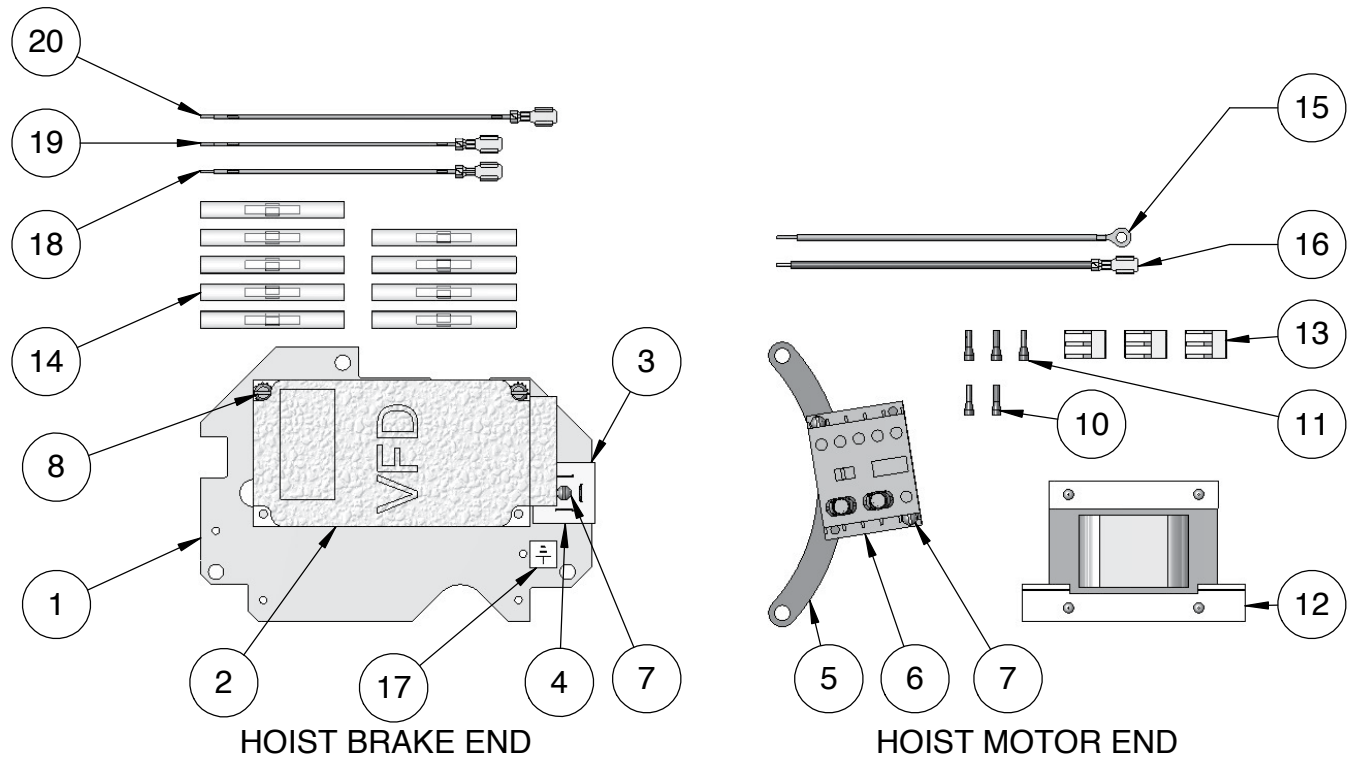
Columbus McKinnon Corporation  
 Hoist & Rigging - Americas  
 Amherst, NY USA

**WIRING DIAGRAM**  
 LODESTAR MODELS J THRU RRT  
 208-230 VOLT 3 PHASE  
 WITH VARIABLE SPEED DRIVE

Format: **B** Number: **00001554** Sheet: **1/1**

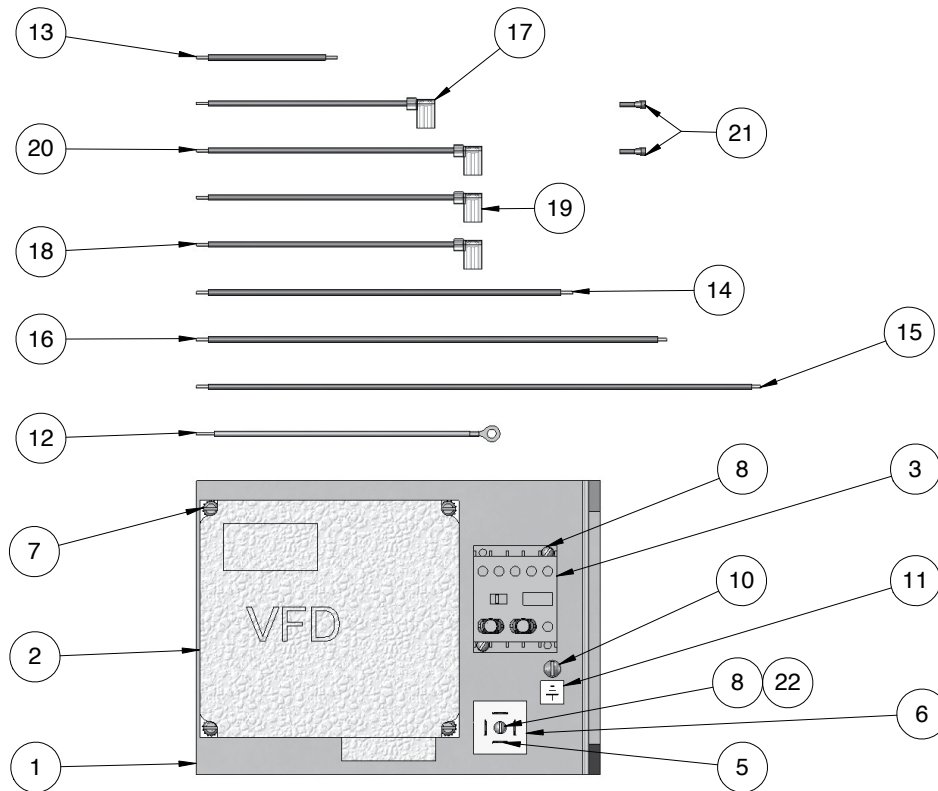
| Rev | Description of change | Date     | By  | Original Scale | Design Authority | MSR       | MSR | MSR       |
|-----|-----------------------|----------|-----|----------------|------------------|-----------|-----|-----------|
| 1   | Initial               | 6/4/2014 | MSR | 1:1            | MSR              | 5/27/2014 | MSR | 5/27/2014 |
| 2   | Redrawn in AutoCAD    | 6/4/2014 | MSR | 1:1            | MSR              | 5/27/2014 | MSR | 5/27/2014 |
| 3   | Revised               | 6/4/2014 | MSR | 1:1            | MSR              | 5/27/2014 | MSR | 5/27/2014 |

## V1 CONTACTOR PLATE ASSEMBLIES



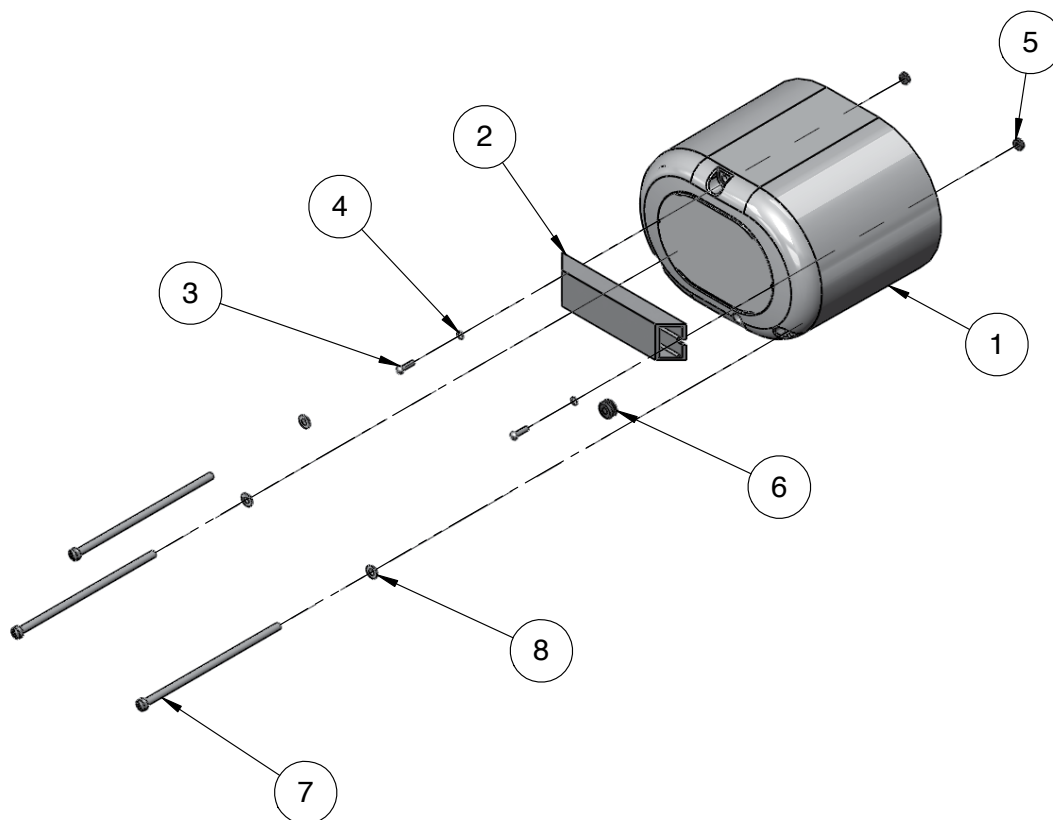
| ITEM NO.  | PART NUMBER | DESCRIPTION                   | QTY      |
|-----------|-------------|-------------------------------|----------|
| 1         | 28968       | AFD BRACKET                   | 1        |
| 2         | 38953       | VFD G+MINI, 1/2 HP            | 1        |
|           | 38954       | VFD 3/4HP 460V                | 1        |
| 3         | 70246       | RECTIFIER                     | 1        |
| 4         | 70274       | INSULATOR, RECTIFIER          | 1        |
| 5         | 28969       | BRAKE RELAY BRACKET           | 1        |
| 6         | 35928       | MAINLINE CONTACTOR            | 1        |
| 7         | 957854      | SCREW #6-32 NC-2 X 5/8" ROUND | 3        |
| 8         | 987378      | SCREW #8-32 UNC-2A X 1/2"     | 2        |
| 9         | 00000535    | SURGE SUPPRESSOR              | 2        |
| 10        | 982233      | ALTECH DIN SERIES SINGLE WIRE | 2        |
| 11        | 982234      | ALTECH DIN SERIES SINGLE WIRE | 3        |
| 12        | 27771       | TRANSFORMER                   | 1        |
| 13        | 11782704    | CONNECTOR PUSHWIRE ORANGE     | 3        |
| 14        | 982158      | LINE CONNECTOR                | 9        |
| 15        | 27686       | JUMPER (G-Y)                  | 1        |
| 16        | 00001729    | JUMPER (R7)                   | 1        |
| 17        | 20940       | GROUND LABEL                  | 1        |
| 18        | 28086       | JUMPER (T)                    | 1        |
| 19        | 28087       | JUMPER (T)                    | 1        |
| 20        | 28090       | JUMPER (T)                    | 1        |
| NOT SHOWN | 00001558    | V1 230V VFD WIRING HARNESS    | 1        |
|           | 00001557    | V1 460V VFD WIRING HARNESS    | 1        |
| NOT SHOWN | 10001109    | THERMAL CONDUCTIVE PASTE      | AS REQ'D |

## V2 AND RRS CONTACTOR PLATE ASSEMBLIES



| ITEM NO.  | PART NUMBER | DESCRIPTION                   | QTY      |
|-----------|-------------|-------------------------------|----------|
| 1         | 10001056    | RRS VFD CONTROLS BRACKET      | 1        |
|           | 00000339    | V2 VFD CONTROLS BRACKET       | 1        |
| 2         | 38955       | VFD 1HP 230V                  | 1        |
|           | 38956       | VFD 1HP 406V                  | 1        |
|           | 38957       | VFD 2HP230V                   | 1        |
|           | 38992       | VFD 5HP 460V                  | 1        |
| 3         | 35928       | BRAKE CONTACTOR               | 1        |
| 4         | 00000535    | SURGE SUPPRESSOR - 230V       | 2        |
|           | 00001505    | SURGE SUPPRESSOR - 460V       | 2        |
| 5         | 70246       | RECTIFIER                     | 1        |
| 6         | 70274       | INSULATOR, RECTIFIER          | 1        |
| 7         | 987378      | SCREW #8-32 UNC-2A X 1/2"     | 4        |
| 8         | 957854      | SCREW #6-32 NC-2 X 5/8" ROUND | 3        |
| 9         | 957855      | LOCKWASHER                    | 2        |
| 10        | 982686      | SCREW #10-32 UNF-2A X 3/8" SL | 1        |
| 11        | 20940       | GROUND LABEL                  | 1        |
| 12        | 27686       | JUMPER (G-Y)                  | 1        |
| 13        | 28091       | JUMPER (R3)                   | 1        |
| 14        | 28096       | JUMPER (W7)                   | 1        |
| 15        | 00001741    | JUMPER (W8)                   | 1        |
| 16        | 00001742    | JUMPER (R6)                   | 1        |
| 17        | 00000375    | B7 JUMPER                     | 1        |
| 18        | 00001743    | JUMPER (B8)                   | 1        |
| 19        | 00001744    | JUMPER (B9)                   | 1        |
| 20        | 00001745    | JUMPER (B10)                  | 1        |
| 21        | 982233      | ALTECH DIN SERIES SINGLE WIRE | 2        |
| 22        | 982470      | HEX HEAD MACHINE NUT          | 1        |
| NOT SHOWN | 00001556    | WIRING HARNESS V2 CE          | 1        |
| NOT SHOWN | 10001109    | THERMAL CONDUCTIVE PASTE      | AS REQ'D |

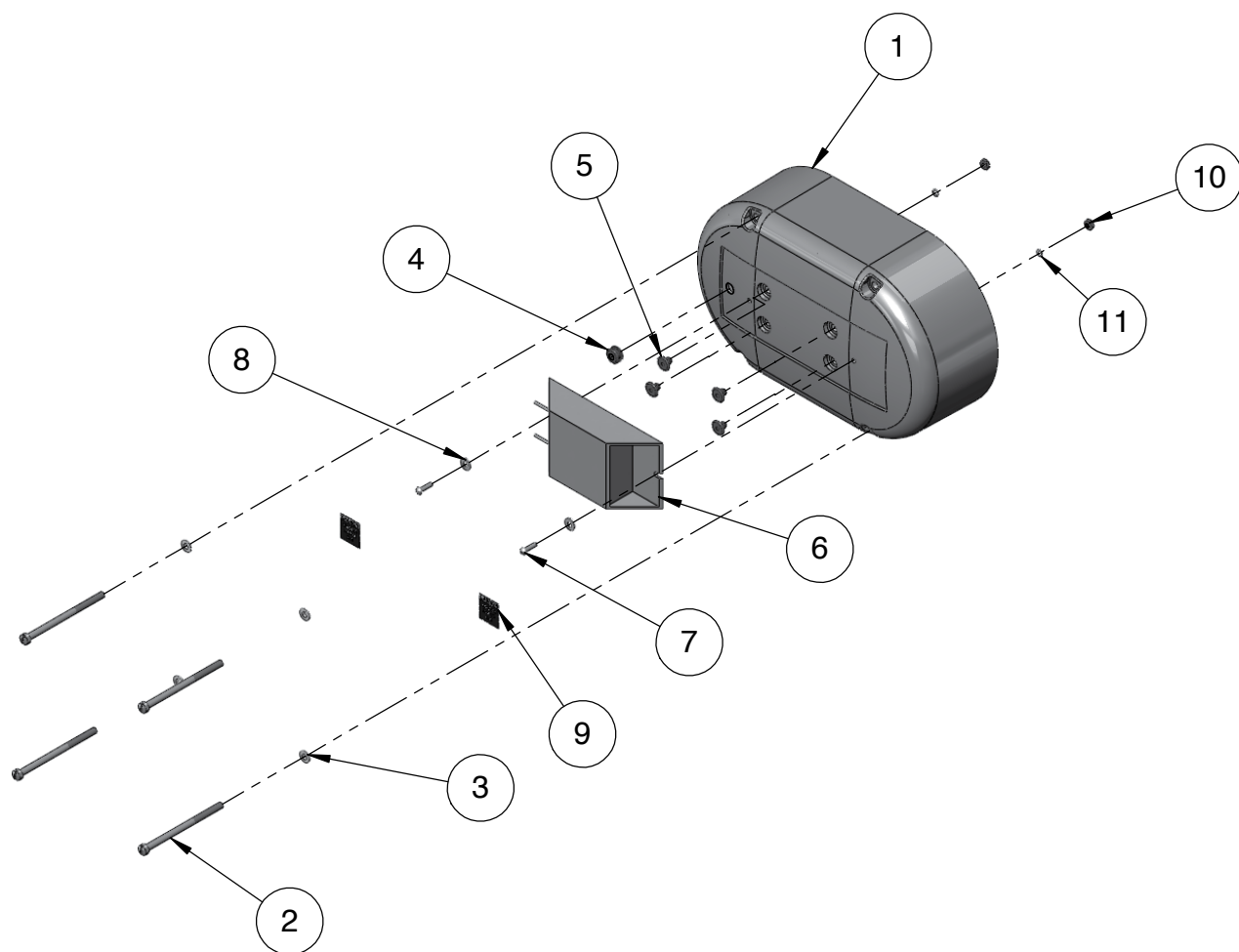
## V1 BRAKE END COVER DETAIL



| ITEM NO. | PART NUMBER | DESCRIPTION                        | QTY |
|----------|-------------|------------------------------------|-----|
| 1        | 27025       | COVER                              | 1   |
| 2        | 28958       | DYNAMIC BRAKING RESISTOR - 250 OHM | 1   |
|          | 28959       | DYNAMIC BRAKING RESISTOR - 500 OHM | 1   |
| 3        | 982537      | SLOTTED ROUND HEAD SCREW-#8-32     | 2   |
| 4        | 957844      | LOCKWASHER                         | 2   |
| 5        | 982472      | NUT #8-32 UNC-2B 11/32 X 1/8       | 2   |
| 6        | 28731       | GROMMET, BUNA-N #9307K38           | 1   |
| 7        | 87325       | SCREW 1/4-20 X 6.5" SL FIL HD      | 3   |
| 8        | 982251      | WASHER - .252 ID X .19 WALL        | 3   |

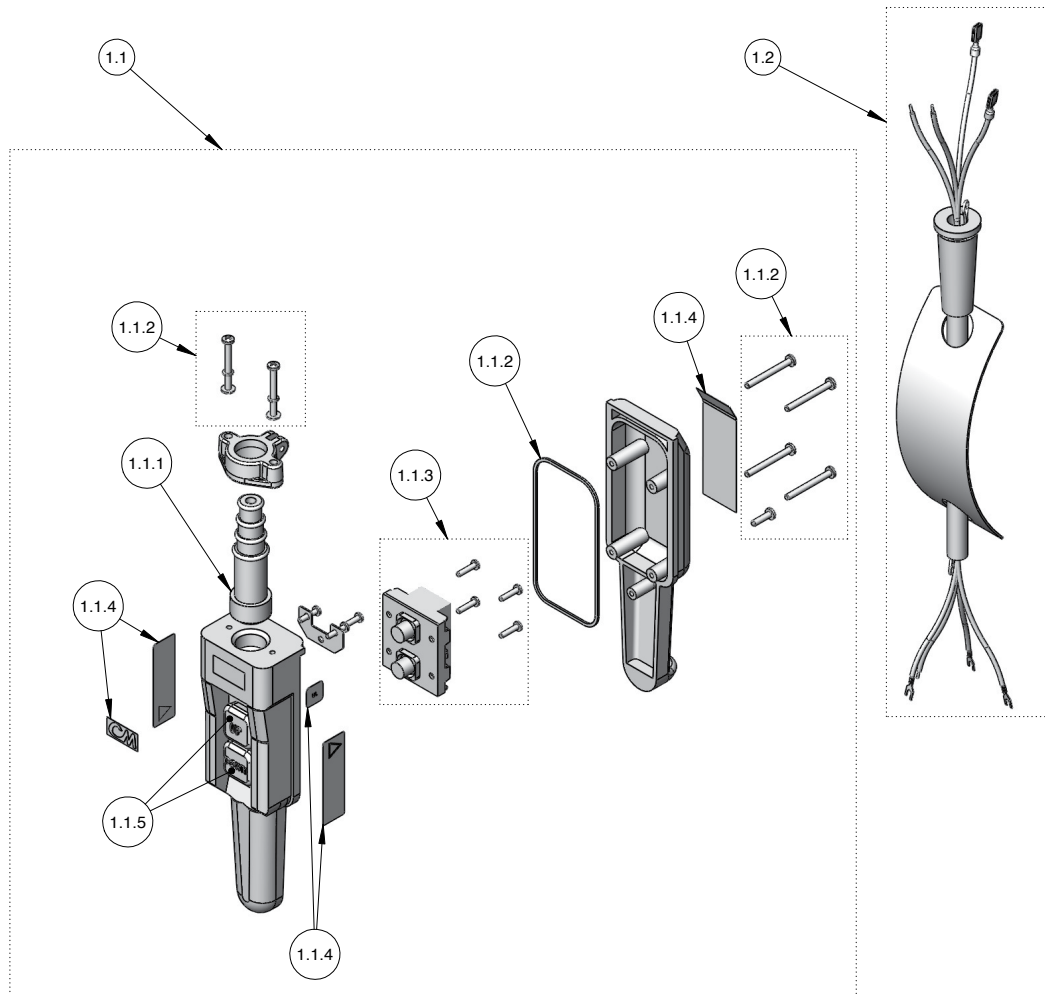


## V2 AND RRS BRAKE END COVER DETAIL



| ITEM NO. | PART NUMBER | DESCRIPTION                         | QTY |
|----------|-------------|-------------------------------------|-----|
| 1        | 35262       | CVR BACK FRAME MOD. J THRU RRT      | 1   |
| 2        | 968752      | SCREW BRAKE COVER                   | 4   |
| 3        | 982251      | WASHER - .252 ID X .19 WALL         | 4   |
| 4        | 28731       | GROMMET 1/4ID X 3/16 PANEL THK      | 1   |
| 5        | 00000574    | HOLE PLUG                           | 4   |
| 6        | 28960       | DYNAMIC BRAKING RESISTOR - 150 OHMS | 1   |
|          | 28961       | DYNAMIC BRAKING RESISTOR - 250 OHMS | 1   |
| 7        | 982537      | SLOTTED ROUND HEAD SCREW-#8-32      | 2   |
| 8        | 982210      | WASHER - #10                        | 2   |
| 9        | 27024NH     | WARNING LABEL                       | 2   |
| 10       | 982472      | NUT #8-32 UNC-2B 11/32 X 1/8        | 2   |
| 11       | 957844      | LOCKWASHER                          | 2   |

## COMPLETE CONTROL CORD AND STATION ASSEMBLY VFD, 3-SPEED HOIST CONTROL STATION












| ITEM NO. | PART NUMBER | DESCRIPTION  | QTY |
|----------|-------------|--|-----|
| 1        | 28079       | STATION ASSEMBLY AND CONTROL CORD FOR 10 FOOT LIFT | 1   |
|          | 28080       | STATION ASSEMBLY AND CONTROL CORD FOR 15 FOOT LIFT |     |
|          | 28081       | STATION ASSEMBLY AND CONTROL CORD FOR 20 FOOT LIFT |     |
| 1.1      | 58296       | 2 BUTTON CONTROL STATION                           | 1   |
| 1.1.1    | 58278       | GROMMET  | 1   |
| 1.1.2    | 58275       | HARDWARE KIT                                       | 1   |
| 1.1.3    | 57803       | 1-SPEED INSERT                                     | 1   |
| 1.1.4    | 58276       | WARNING LABEL KIT                                  | 1   |
| 1.1.5    | 58277       | BUTTON LABEL KIT                                   | 1   |
| 1.2      | 28076       | CONTROL CORD - 10 FOOT LIFT                        | 1   |
|          | 28077       | CONTROL CORD - 15 FOOT LIFT                        |     |
|          | 28078       | CONTROL CORD - 20 FOOT LIFT                        |     |





## KEYPAD LED AND BUTTON FUNCTIONS

Some of the keypad buttons, whose functions are described below, are dual-purpose. The dual-purpose keys have one function when used in a view-only mode and another function when used in a programming mode.:





### KEYS AND DISPLAYS ON THE LED OPERATOR

| NO. | DISPLAY   | NAME              | FUNCTION  |
|-----|---|-------------------|---|
| 1   |    | Data Display Area | Displays the frequency reference, parameter number, etc.  |
| 2   |    | ESC Key           | Return to the previous menu (before ENTER Key is pressed), or cursor position   |
| 3   |    | RESET Key         | Moves the cursor to the right. Resets the drive to clear a fault situation  |
| 4   |    | RUN Key           | Pressing the key initiates the RUN command when LOCAL mode operation is selected.<br><br>Starts the auto-tuning process.  |
| 5   |    | Up Arrow Key      | Scrolls up to select next parameter group or parameter settings. It also increases the value of the blinking digit of a parameter setting.  |
| 6   |    | Down Arrow Key    | Scrolls down to select next parameter group or parameter settings. It also decreases the value of the blinking digit of a parameter setting.  |
| 7   |    | STOP Key          | Stops the drive by initiating a base block STOP command.<br><br><b>Note: Stop priority circuit.</b>   |
| 8   |  | ENTER Key         | Selects modes or parameters. Displays each parameter's set value. By pressing this key again, the set value is stored.  |
| 9   |  | LO/RE Key         | Pressing the key once displays support phone number 866-624-7378.<br><br>Pressing the key again shows control method, motion and reference speed.<br><br>Pressing the key again will show RESET. Pressing the ENTER Key afterwards will reset the maintenance timers. |

### LO/RE LED AND RUN LED INDICATIONS

| NO. | LED   | Lit  | Flashing  | Flashing Quickly  | OFF  |
|-----|---|--|---|---|--|
| 10  |  | During run.  | During deceleration to stop.<br><br>When a run command is input and frequency is 0. | During deceleration at a fast stop.<br><br>During stop by interlock operation | During stop.   |
| 11  |  | When run command is selected from LED operator (LOCAL) | —   | —   | Run command is selected from device other than LED operator (REMOTE) |

## FUNCTION LEDS

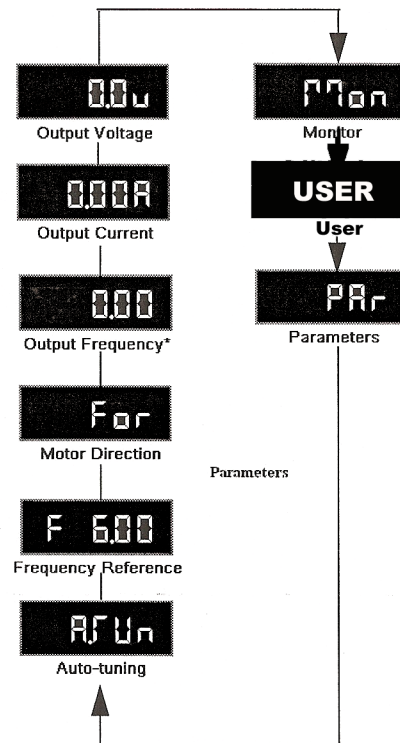
| NO. | Display   | Lit                                      | Flashing  | OFF                               |
|-----|---|--|---|-----------------------------------|
| 12  |  | When the drive detects an alarm or error | When an alarm occurs<br>OPE detected<br>When a fault or error occurs during Auto-Tuning | Normal state (no fault or alarm)  |
| 13  |  | When the REVERSE command is given        | —   | When the FORWARD command is given |
| 14  |  | Drive Ready Auto-Tuning                  | —   | Programming Mode                  |
| 15  |  | Displays output frequency (Hz)           | —   | —                                 |

## PARAMETERS

There are hundreds of parameters, organized by function group, that determine how the drive functions. These parameters are programmed in the drive's software as measurable values or options-both of which will be referred to in this manual as settings. While some of these parameters are associated with one setting, others are tied to a number of possible settings.

The IMPULSE•G+ Mini is configured for a specific hoist or trolley. If you find it necessary to change the initial settings, it is recommended that you only allow qualified system technicians to program the drive. This can be accomplished by using the Password and Access Level features. The factory must be contacted.

## IMPULSE•G+ MINI STRUCTURE OF PARAMETERS



### Frequency Reference Setting

Sets/Displays the drive operation speed (Hz).

### Output Frequency Monitor

Displays the output frequency (Hz.) at which the drive is currently operating. This is a monitor only function; the operator cannot change the displayed value by use of the keypad.

### Output Current Monitor

Displays the level of output current (Amps) that the drive is currently producing. This is a monitor only function; the operator cannot change the displayed value by use of the keypad.

### Monitor Selection

Pressing ENTER allows access to the various Monitor parameters. These are monitor-only functions; the operator cannot change the displayed value. Accessible during run command. See pages 18 thru 21 for complete listing of all monitor parameters.

### \*Parameter Programming

Selects or reads data using parameter settings. Data is displayed by pressing the ENTER key, and can be changed by pressing the “up arrow” or “down arrow” keys. Any changes can be saved by again pressing the ENTER key. Pressing the ESC key exits the programming mode.

### Output Voltage Monitor

Displays the level of output voltage to the motor. This is a monitor only function: The operator cannot change the displayed value by use of the keypad.

### User

Allows for quick access to parameters that can be programmed by operator.

**\*Note: All programming parameters are password protected, except those stored in user function..**

## MONITOR PARAMETERS

| PARAMETER CODE | NAME                | FUNCTION                            | UNITS |
|----------------|---------------------|-------------------------------------|-------|
| <b>MONITOR</b> |                     |                                     |       |
| U01.01         | Frequency Reference | Frequency Reference                 | Hz    |
| U01.02         | Output Frequency    | Inverter Output Frequency           | Hz    |
| U01.03         | Output Current      | Inverter Output current             | A     |
| U01.04         | Control method      | Displays the value of A01.02        | —     |
| U01.05         | Motor Speed         | Motor Speed (OLV only)              | —     |
| U01.06         | Output Voltage      | Inverter Output Voltage (Reference) | V     |
| U01.07         | DC Bus Voltage      | DC Bus Voltage (Measured)           | V     |
| U01.08         | Output Power        | Inverter Output Power (Calculated)  | HP    |
| U01.09         | Motor Torque        | Motor Torque (OLV only)             | %     |
| U01.10         | Input Terminal      | Status Input Terminal Status        | —     |

### U01.10



- ☐ Digital Input Terminal S1 Enabled
- ☐ Digital Input Terminal S2 Enabled
- ☐ Digital Input Terminal S3 Enabled
- ☐ Digital Input Terminal S4 Enabled
- ☐ Digital Input Terminal S5 Enabled
- ☐ Digital Input Terminal S6 Enabled
- ☐ Digital Input Terminal S7 Enabled

|        |                        |                        |   |
|--------|------------------------|------------------------|---|
| U01.11 | Output Terminal Status | Output Terminal Status | — |
|--------|------------------------|------------------------|---|

### U01.11



- ☐ Multi-Function Digital Output Terminal MA, MB, MC Enabled
- ☐ Multi-Function Digital Output Terminal P1 Enabled
- ☐ Multi-Function Digital Output Terminal P2 Enabled

|        |                         |                  |   |
|--------|-------------------------|------------------|---|
| U01.12 | Inverter Control Status | Operation Status | — |
|--------|-------------------------|------------------|---|

### U01.12



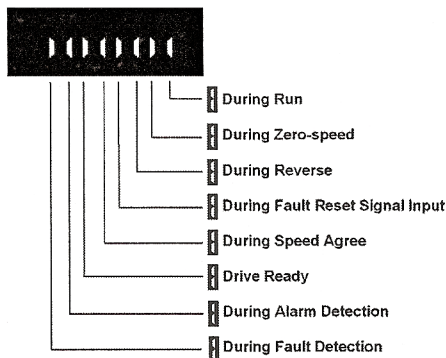
- ☐ During Run
- ☐ During Zero-speed
- ☐ During Reverse
- ☐ During Fault Reset Signal Input
- ☐ During Speed Agree
- ☐ Drive Ready
- ☐ During Alarm Detection
- ☐ During Fault Detection



## MONITOR PARAMETERS

| PARAMETER CODE | NAME                              | FUNCTION                          | UNITS   |
|----------------|-----------------------------------|-----------------------------------|---------|
| <b>MONITOR</b> |                                   |                                   |         |
| U01.13         | Elapsed Time                      | Elapsed Time                      | hours   |
| U01.14         | Flash ID                          | Flash ROM software ID number      | --      |
| U01.15         | Terminal A1 Level                 | External Terminal input level     | V       |
| U01.16         | Terminal A2 Level                 | External Terminal input level     | V/mA    |
| U01.20         | Output Frequency after Soft Start | ---                               | Hz      |
| U01.28         | Software CPU                      | ---                               | --      |
| U01.34         | OPE Detection Parameter           | Parameter OPE detected            | const # |
| U01.39         | Memobus Communications Error      | Displays content of MEMOBUS error | --      |

### U01.39



| PARAMETER CODE     | NAME                                       | FUNCTION                                       | UNITS |
|--------------------|--|--|-------|
| U01.52             | Maintenance Timer                          |  | hr    |
| U01.54             | Pulse Monitor                              | Displays the pulse train input RP Frequency    | --    |
| <b>FAULT TRACE</b> |  |  |       |
| U02.01             | Current Fault Displays Current fault --    |  |       |
| U02.02             | Last Fault Displays last fault detected -- |  |       |
| U02.03             | Frequency Reference @ Fault                | Frequency reference when fault was detected    | Hz    |
| U02.04             | Output Frequency @ Fault                   | Output frequency when fault was detected       | Hz    |
| U02.05             | Output Current @ Fault                     | Output current when fault was detected         | A     |
| U02.06             | Motor Speed @ Fault (OLV Only)             | Motor speed when fault was detected            | Hz    |
| U02.07             | Output Voltage @ Fault                     | Output voltage when fault was detected         | V     |
| U02.08             | DC Bus Voltage @ Fault                     | DC Bus voltage when fault was detected         | V     |
| U02.09             | Output Power @ Fault                       | Output power when fault was detected           | kW    |
| U02.11             | Input Terminal Status @ Fault              | Input terminal status when fault was detected  | --    |
| U02.12             | Output Terminal Status @ Fault             | Output terminal status when fault was detected | --    |

## MONITOR PARAMETERS

| PARAMETER CODE       | NAME                                      | FUNCTION   | UNITS |
|----------------------|---|--|-------|
| <b>FAULT TRACE</b>   |   |  |       |
| U02.13               | Operation Status @ Fault                  | Inverter status before fault was detected                    | --    |
| U02.14               | Elapsed Time @ Fault                      | Elapsed time when fault was detected                         | hr    |
| U02.15               | Speed Reference During Soft Start @ Fault | Speed reference during soft start at previous fault          | %     |
| U02.16               | Motor q-Axis Current During Fault         | ---  | --    |
| U02.17               | Motor d-Axis Current During Fault         | ---  | --    |
| <b>FAULT HISTORY</b> |   |  |       |
| U03.01               | Last Fault                                | Displays most recent fault --                                |       |
| U03.02               | Fault Message 2                           | Displays second most recent fault                            | --    |
| U03.03               | Fault Message 3                           | Displays third most recent fault                             | --    |
| U03.04               | Fault Message 4                           | Displays fourth most recent fault                            | --    |
| U03.05               | Fault Message 5                           | Displays fifth most recent fault                             | --    |
| U03.06               | Fault Message 6                           | Displays sixth most recent fault                             | --    |
| U03.07               | Fault Message 7                           | Displays seventh most recent fault                           | --    |
| U03.08               | Fault Message 8                           | Displays eighth most recent fault                            | --    |
| U03.09               | Fault Message 9                           | Displays ninth most recent fault                             | --    |
| U03.10               | Fault Message 10                          | Displays tenth most recent fault                             | --    |
| U03.11               | Elapsed Time 1                            | Elapsed time of most recent fault                            | --    |
| U03.12               | Elapsed Time 2                            | Elapsed time of second most recent fault                     | --    |
| U03.13               | Elapsed Time 3                            | Elapsed time of third most recent fault                      | --    |
| U03.14               | Elapsed Time 4                            | Elapsed time of fourth most recent fault                     | --    |
| U03.15               | Elapsed Time 5                            | Elapsed time of fifth most recent fault                      | --    |
| U03.16               | Elapsed Time 6                            | Elapsed time of sixth most recent fault                      | --    |
| U03.17               | Elapsed Time 7                            | Elapsed time of seventh most recent fault                    | --    |
| U03.18               | Elapsed Time 8                            | Elapsed time of eighth most recent fault                     | --    |
| U03.19               | Elapsed Time 9                            | Elapsed time of ninth most recent fault                      | --    |
| U03.20               | Elapsed Time 10                           | Elapsed time of tenth most recent fault                      | --    |
| U03.21               | Accumulated Operations                    | Displays the number of FWD and REV Commands                  | --    |
| U03.22               | U03.21 Rollovers                          | Increments when U03.21 reaches 65535. U03.21 is set to zero. | --    |
| U03.23               | Overload/Load Check Count                 | Displays the number of OL1, OL2 and LC faults                | --    |
| <b>MAINTENANCE</b>   |   |  |       |
| U04.01               | Cumulative Operation Time                 |  | hr    |
| U04.03               | Cooling Fan Operation Time                |  | hr    |
| U04.04               | Cooling Fan Maintenance                   |  | %     |
| U04.05               | Capacitor Maintenance                     |  | %     |
| U04.06               | Soft Charge Bypass Relay Maintenance      |  | %     |
| U04.07               | IGTB Maintenance                          |  | %     |
| U04.08               | Heatsink Temperature                      |  | --    |

## MONITOR PARAMETERS

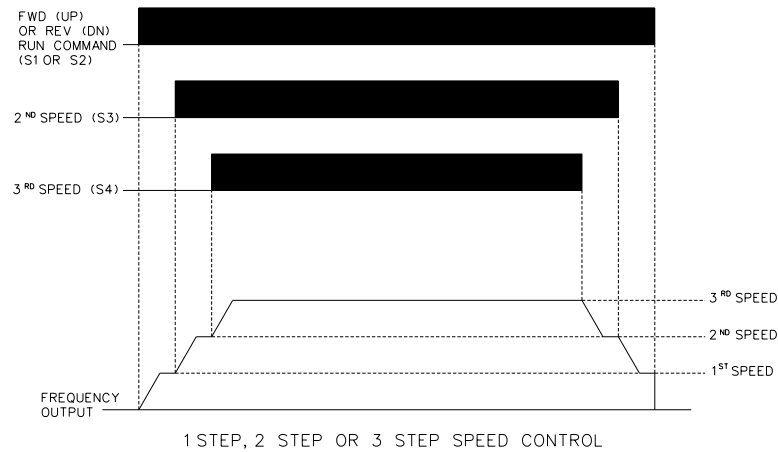
| PARAMETER CODE               | NAME                                 | FUNCTION  | UNITS |
|------------------------------|--------------------------------------|---|-------|
| <b>MAINTENANCE</b>           |                                      |   |       |
| U04.09                       | LED Check                            | Lights all segments of the LED to verify that the display is working properly |       |
| U04.10                       | kWh: Lower 4 Digits                  |   | --    |
| U04.11                       | kWh: Upper 5 Digits                  |   | --    |
| U04.12                       | CPU Resources Used                   |   | --    |
| U04.13                       | Peak Hold Current                    |   | --    |
| U04.14                       | Peak Hold Output Frequency           |   | --    |
| U04.16                       | Motor Overload (oL1) Detection Level |   | --    |
| U04.17                       | Motor Overload (oL2) Detection Level |   | --    |
| U04.18                       | Frequency Reference Source Selection |   | --    |
| U04.19                       | Frequency Reference Memobus          |   | --    |
| U04.20                       | Output Frequency Reference (decimal) |   | --    |
| U04.21                       | Run Command Selection Results        |   | --    |
| U04.22                       | Memobus Communication Reference      |   | --    |
| U04.23                       | Not Used                             |   | --    |
| <b>MOTOR CONTROL MONITOR</b> |                                      |   |       |
| U06.01                       | Motor Secondary Current (Iq)         |   | %     |
| U06.02                       | Motor Excitation Current (Id)        |   | %     |
| U06.03                       | ASR Input                            |   | %     |
| U06.04                       | ASR Output                           |   | %     |
| U06.05                       | Output Voltage Reference (Vq)        |   | %     |
| U06.06                       | Output Voltage Reference (Vd)        |   | %     |
| U06.07                       | ACR (q) Output                       |   | %     |
| U06.08                       | ACR (d) Output                       |   | %     |
| U06.20                       | Frequency Reference Bias (Up/Down2)  |   | %     |
| U06.21                       | Offset Frequency                     |   | %     |
| U06.36                       | GAIA Communication Error             |   | --    |
| U06.37                       | LUNA Communication Error             |   | --    |
| U06.38                       | Option Card Error                    |   | --    |

## IMPULSE G+MINI ADJUSTABLE FREQUENCY DRIVE SPECIFICATIONS

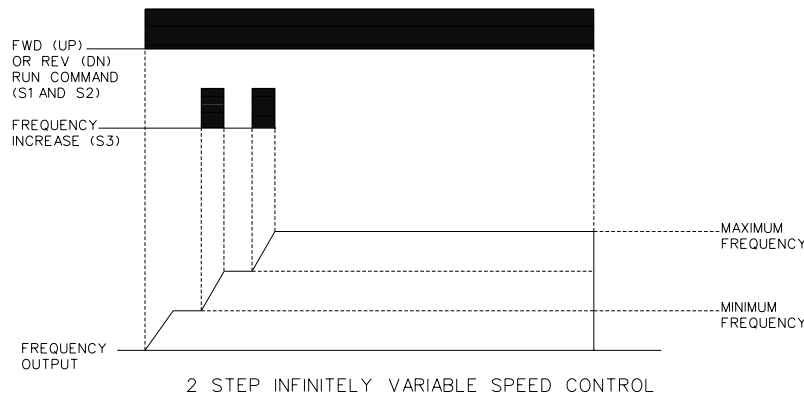
| Specification                              | Specification Value and Information for all Models  |
|--|---|
| Certification                              | UL, cUL, CE, TÜV, RoHS  |
| Rated input power supply volts & frequency | 3-phase 200~240V or 380~480V: 50/60 Hz  |
| Allowable input voltage fluctuation        | +10% or -15% of nominal   |
| Allowable input frequency fluctuation      | ±5% of nominal  |
| Control method                             | Fully digital; sine-wave, pulse-width-modulated   |
| Maximum output voltage (VAC)               | Max output voltage 3-phase, 200~240V; 380~480V (proportional to input voltage).                   |
| Rated frequency (Hz)                       | Up to twice motor nameplate RPM (Swift-Lift) 60 Hz standard (150 Hz, consult factory)             |
| Output speed control range                 | 40:1 -V/f, 100:1 - Open Loop Vector (OLV)   |
| Output frequency accuracy                  | 0.01%-with digital reference command<br>0.1%-with analog reference command; 10 bits/10V           |
| Frequency reference resolution             | Digital: 0.01 Hz; analog: 0.03 Hz (at 60 Hz)  |
| Output frequency resolution                | 0.01 Hz   |
| Overload capacity                          | 150% of rated output current of the drive for 1 minute  |
| Remote frequency reference sources         | 0-10VDC (2K $\Omega$ ); $\pm$ 10VDC serial (RS-485)   |
| Accel/decel times                          | 0.0 to 25.5 seconds - 1 set; 0.0 to 6000.0 - 3 sets;<br>8 parameters are independently adjustable |
| Braking torque                             | 150% or more with dynamic braking   |
| Motor overload protection                  | UL recognized electronic thermal overload relay: field-programmable                               |
| Overcurrent protection level               | 200% of drive rated current   |
| Circuit protection                         | Ground fault and blown-fuse protection  |
| Overvoltage protection level               | Approximately 410VDC (230V Class), 820VDC (460V Class)  |
| Undervoltage protection level              | Approximately 190VDC (230V Class), 380VDC (460V Class)  |
| Heatsink overtemperature                   | Thermostat trips at 184 - 249°F (90 -121°C) dependent on drive capacity                           |
| Torque limit selection                     | Separate functions for FORWARD, REVERSE, REGEN.; all selectable from 0-300%                       |
| Stall prevention                           | Separate functions for accel, decel, at-speed and constant horsepower region                      |
| Other protection features                  | Lost output phase, failed-oscillator, mechanical overload and internal braking transistor         |
| DC bus voltage indication                  | Charge LED is on until DC bus voltage drops below 50VDC   |
| Location                                   | Indoors; requires protection from moisture, corrosive gases and liquids                           |
| Ambient operating temperature              | 14° to 122°F (-10° to 50°C) for open chassis  |
| Storage temperature                        | -4° to 140°F (-20° to 60°C)   |
| Humidity                                   | 95% relative; noncondensing   |
| Vibration                                  | 1G less than 20 Hz; 0.2 G for 20-55 Hz  |
| Elevation                                  | 3300 Ft. (1000M) or less  |
| Memobus                                    | RS485/422 Max 115.2 Kbps  |

## SPEED CONTROL METHODS

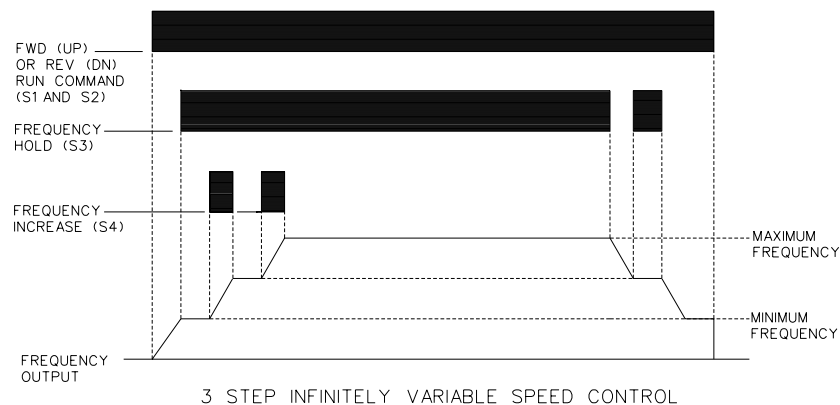
The IMPULSE.G+Mini provides 1-step, 2-step or 3-step Multi-Step control methods. For each input that is energized, the drive begins to operate at the corresponding frequency. If 1, 2 or 3-step is desired, then the frequency reference for the 1st, 2nd or 3rd step will be set at the maximum desired speed of operation.



In addition to discrete speed control, true infinitely variable speed control can be configured. The IMPULSE.G+ Mini has two ways in which infinitely variable control can be configured, 2-Step Infinitely Variable and 3-Step Infinitely Variable control. Sample timing diagrams for both methods are given.



Note: Above figures shown with stopping method set for immediate stop (as in hoist applications), the frequency output is immediately set to zero and the hoist brake will immediately close when the run command is removed. With the stopping method set for ramp to stop (as in trolley applications), the trolley speed will ramp down to minimum frequency before the trolley brake (if provided) closes.



NOTE:

ABOVE FIGURES SHOWN WITH STOPPING METHOD SET FOR IMMEDIATE STOP (AS IN HOIST APPLICATIONS). THE FREQUENCY OUTPUT IS IMMEDIATELY SET TO ZERO AND THE HOIST BRAKE WILL IMMEDIATELY CLOSE WHEN THE RUN COMMAND IS REMOVED. WITH THE STOPPING METHOD SET FOR RAMP TO STOP (AS IN TROLLEY APPLICATIONS), THE TROLLEY SPEED WILL RAMP DOWN TO MINIMUM FREQUENCY BEFORE THE TROLLEY BRAKE (IF PROVIDED) CLOSES.

## FACTORY SETTINGS OF PARAMETERS

| CONTROL                    | PARAMETER                  | SETTING                 |
|----------------------------|----------------------------|-------------------------|
| 1 step, 2 step and 3 step  | B05.01 (Acceleration Time) | 3.0 Sec.                |
|                            | B05.02 (Deceleration Time) | 3.0 Sec.                |
|                            | B01.01 (First Speed)       | 10 Hz.                  |
|                            | B01.02 (Second Speed)      | over 10 Hz. thru 60 Hz. |
|                            | B01.03 (Third Speed)       | over 10 Hz. thru 60 Hz. |
|                            | A01.04                     | 01                      |
| 2 step infinitely variable | B05.01 (Acceleration Time) | 3.0 Sec.                |
|                            | B05.02 (Deceleration Time) | 3.0 Sec.                |
|                            | B01.01 (First Speed)       | 10 Hz.                  |
|                            | B01.03 (Maximum Speed)     | 60 Hz.                  |
|                            | A01.04                     | 03                      |
| 3 step infinitely variable | B05.01 (Acceleration Time) | 3.0 Sec.                |
|                            | B05.02 (Deceleration Time) | 3.0 Sec.                |
|                            | B01.01 (First Speed)       | 10 Hz.                  |
|                            | B01.03 (Maximum Speed)     | 60 Hz.                  |
|                            | A01.04                     | 04                      |

### NOTE:

1. Standard factory setting for control is 3 Step Infinitely Variable.
2. B01.01, B05.01 and B05.02 can be accessed and changed using the user functions A02.01, A02.02 and A02.03. The other parameters have been factory set and pass word protected and should not be reset without authorization by EMS and/or CM.

## FACTORY SETTINGS OF PARAMETERS

| FAULT CODE                           | FAULT OR INDICATOR NAME/DESCRIPTION  | CORRECTIVE ACTION   |
|--------------------------------------|--|---|
| <b>BB</b> (flashing) Base Block      | <b>External Base Block Indicator.</b> The flashing base block signal is the result of a multi function input in the terminal strip. The base block indicates that the drive's IGBTs have been disabled. The motor will begin coasting when the base block input is received. If a <b>RUN</b> command is still present when the <b>BB</b> signal is removed, the output voltage will be restored to the previous operating level and operation will continue at the previously commanded frequency. | 1. Check constants H01.01 through H01.07 for proper programming.<br>2. Check terminal status. (U01.10)  |
| <b>BE0</b> (flashing) Brake Ans Lost | <b>Brake Answer back signal is lost during run.</b> While running, the multi-function input brake answer back is lost.   | 1. Check brake answer back circuit.<br>2. Check terminal status. (U01.10).  |
| <b>BE4</b> (flashing) Brake Answer 1 | <b>Brake Answer-Back, Brake Not Released.</b> At Start, Brake Answer-back is not input within predetermined time (C08.04) after electric brake release command is output-Electric brake not released.  | 1. Check brake answer back circuit.<br>2. Increase the value of C08.04.<br>3. Check terminal status. (U01.10).  |
| <b>BE5</b> (flashing) Brake Answer 2 | <b>Brake Answer-Back, At Stop.</b> At Stop, Brake Answer-back signal is not removed within predetermined time (C08.11) after electric brake release command is removed-Electric brake not closed.  | 1. Check brake answer back circuitries<br>2. increase the value of C08.11 time.   |
| <b>CALL</b> (flashing)               | <b>Serial Communication Transmission Error.</b> Control data is not received correctly after power supply is turned ON for 2 sec.  | 1. Check serial device connections.<br>2. Ensure drive is properly programmed for serial communication.   |
| <b>CE</b> Memobus Com Err            | <b>MEMOBUS/Modbus Communication Error.</b> Serial communications data corrupted.   | 1. Check serial connections. (R+, R-, S+ & S-).<br>2. Check H05.01 through H05.03 for proper programming.   |
| <b>CF</b> Control Fault              | <b>Control Fault.</b> A torque limit was reached for 3 seconds or longer while in open Loop Vector   | 1. Perform auto tune.<br>2. Check motor parameters  |
| <b>C0F</b>                           | <b>Current Offset Fault.</b> The drive automatically adjusts the current offset, the calculated value exceeded the allowable setting range.  | 1. Press reset.<br>2. Check brake.<br>3. Check brake contact.   |
| <b>CPF02</b>                         | <b>A/D Conversion Error.</b> An A/D conversion error occurred.   | 1. Cycle power to drive.<br>2. Ensure that the control board terminals and wiring are shielded from electrical noise.<br>3. Check resistance of potentiometer.<br>4. Replace the drive. |
| <b>CPF03</b>                         | <b>PWM Data Error.</b> There is a problem with the PWM data.   | 1. Cycle power to the drive.<br>2. Replace the control board.   |
| <b>CPF06</b>                         | <b>EEPROM Data Error.</b> There is an error in the data saved to EEPROM.   | 1. Cycle power to the drive.<br>2. If the problem continues, replace the drive.   |
| <b>CPF07</b>                         | <b>Terminal Board Communications Error.</b> A communication error occurred at the terminal board.  | 1. Cycle power to the drive.<br>2. Check connections on the control board.  |
| <b>CPF08</b>                         | <b>EEPROM Serial Communications Fault.</b> EEPROM communications are not functioning properly.   | 1. Cycle power to the drive.<br>2. If the problem continues, replace the drive.   |
| <b>CPF11</b>                         | <b>RAM Fault.</b>  | 1. Cycle power to the drive.<br>2. Replace the drive.   |
| <b>CPF12</b>                         | <b>FLASH Memory Fault.</b> Problem with the ROM (FLASH memory)   | 1. Cycle power to the drive.<br>2. Replace the drive.   |
| <b>CPF13</b>                         | <b>Watchdog Circuit Exception.</b> Control circuit damage.   | 1. Cycle power to the drive.<br>2. Replace the drive.   |
| <b>CPF14</b>                         | <b>Control Circuit Fault.</b> CPU Error (CPU operates incorrectly due to noise, etc)   | 1. Cycle power to the drive.<br>2. Replace the drive.   |
| <b>CPF16</b>                         | <b>Clock Fault.</b> Standard clock error.  | 1. Cycle power to the drive.<br>2. Replace the drive.   |
| <b>CPF17</b>                         | <b>Timing Fault.</b> A timing error occurred during an internal process.   | 1. Cycle power to the drive.<br>2. Replace the drive.   |
| <b>CPF18 and CPF19</b>               | <b>Control Circuit Fault.</b> CPU error (CPU operates incorrectly due to noise, etc.)  | 1. Cycle power to the drive.<br>2. Ensure that the control board terminals and wiring are shielded from electrical noise.<br>3. Replace the drive.                                      |
| <b>CPF20 and CPF21</b>               | <b>RAM fault, FLASH memory error, watchdog circuit exception.</b>  | 1. Cycle power to the drive.<br>2. Replace the drive.   |
| <b>CPF22</b>                         | <b>A/D Conversion Fault.</b> A/D conversion error.   | 1. Cycle power to the drive.<br>2. Ensure that the control board terminals and wiring are shielded from electrical noise.<br>3. Replace the drive.                                      |
| <b>CPF23</b>                         | <b>PWM Feedback Fault.</b> PWM feedback error.   | 1. Cycle power to the drive.<br>2. Replace the drive.   |



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| <b>CPF24</b>                               | <b>Drive Capacity Signal Fault.</b> Entered a capacity that does not exist (checked when the drive is powered up.)   | 1. Cycle power to the drive.<br>2. Replace the drive.   |
| <b>CRST</b>                                | <b>Cannot reset.</b> External fault occurred and reset button was pressed before motor was completely stopped. Fault reset was being executed when a RUN command is executed during a fault.   | 1. Wait for motor to come to complete stop.<br>2. Reset fault before issuing a RUN command.   |
| <b>DNE</b><br>Drive not ready              | <b>User is trying to give a run command while a FWD or REV is present at Power Up.</b>   | 1. Check input terminals.<br>2. Check H01.01 to H01.07 programming.   |
| <b>EF</b> (flashing)<br>External Fault     | Both FORWARD/UP and REVERSE/DOWN commands are input at same time for 500 msec or longer.   | 1. Check control input wiring.<br>2. Check the sequence of operation.   |
| <b>EF0</b><br>Optional External Fault      | External fault input from communication option card.   | 1. Check communication option card connection and signals.<br>2. Check external device for any fault(s).  |
| <b>EF1</b><br>External Fault 1             | External fault occurs on Terminal S1.  | 1. Check constant H01.01 for proper programming.<br>2. Check the conditions for input terminal S1 (U01.10).   |
| <b>EF2</b><br>External Fault 2             | External fault occurs on Terminal S2.  | 1. Check constant H01.02 for proper programming.<br>2. Check the conditions for input terminal S2 (U01.10).   |
| <b>EF3</b><br>External Fault 3             | External fault occurs on Terminal S3.  | 1. Check constant H01.03 for proper programming.<br>2. Check the conditions for input terminal S3 (U01.10).   |
| <b>EF4</b><br>External Fault 4             | External fault occurs on Terminal S4.  | 1. Check constant H01.04 for proper programming.<br>2. Check the conditions for input terminal S4 (U01.10).   |
| <b>EF5</b><br>External Fault 5             | External fault occurs on Terminal S5.  | 1. Check constant H01.05 for proper programming.<br>2. Check the conditions for input terminal S5 (U01.10).   |
| <b>EF6</b><br>External Fault 6             | External fault occurs on Terminal S6.  | 1. Check constant H01.06 for proper programming.<br>2. Check the conditions for input terminal S6 (U01.10).   |
| <b>EF7</b><br>External Fault 7             | External fault occurs on Terminal S7.  | 1. Check constant H01.07 for proper programming.<br>2. Check the conditions for input terminal S7 (U01.10).   |
| <b>GF</b><br>Ground Fault                  | <b>Ground Fault.</b> Current shorted to ground exceeded 50% of rated current in output side of the drive. Setting L08.09 to 1 enable ground fault detection in models 2025 and 4014 or larger. | 1. Disconnect motor from drive and check it for shorts using a megger.<br>2. Ensure that R/C Surge Suppressors are used across all brake contactor coils to prevent disturbance by electrical transients. |
| <b>HBB</b>                                 | <b>Hardware Base Block.</b> The Safe Disable Input channel is open.  | 1. Check if external safety circuit tripped and disabled the drive.<br>2. If the Safe Disable function is not utilized, check if the terminals HC and H1 are linked                                       |
| <b>LC</b><br>Load Check Err                | <b>Load Check Fault.</b> Load is greater than specified amount.  | 1. Reduce Load.<br>2. Check Load Check sequence set-up. (C05.XX)  |
| <b>LF</b><br>Output Phase Loss             | <b>An open phase occurred at the inverter output.</b>  | 1. Check for broken wires in output cable.<br>2. Check for open winding in the motor.<br>3. Check for loose terminals.  |
| <b>LL1</b> (flashing)<br>Lower Limit 1 Err | <b>Lower Limit 1-SLOW Down Indicator.</b> Lower Limit 1-Slow Down is input (switch status is changed).   | 1. May not require corrective action.<br>2. Check the position of the Limit Switch.<br>3. Check the condition of the Limit Switch.<br>4. Check the conditions of/for input terminal H01.XX(U01.10)        |
| <b>LL2</b> (flashing)<br>Lower Limit 2 Err | <b>Lower Limit 2-STOP Indicator.</b> Lower Limit 2-Stop is input (switch status is changed).   | 1. May not require corrective action.<br>2. Check the position of the Limit Switch.<br>3. Check the condition of the Limit Switch.<br>4. Check the conditions of/for input terminal H01.XX(U01.10)        |
| <b>MNT</b><br>Maintenance Required         | <b>Maintenance Required Alert.</b> Running time has exceeded C12.05  | 1. Reset timer by MFI=5A or depress Mode/Service key three times and enter within 2 seconds.  |
| <b>OC</b><br>Over Current                  | <b>Output current exceeds 200% of inverter rated output current.</b>   | 1. Check for a phase-to-phase short in the motor or wiring using a megger.<br>2. Extend the acceleration/deceleration time.<br>3. Check torque limit setting.   |

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| <b>OH</b> (flashing)<br>Heatsnk Over temp | <b>Overheat Pre-Alarm.</b> Heatsink is overheating. The temperature of the inverters heatsink exceeded the setting in L08.02.   | 1. The inverter cooling fan has stopped.<br>2. Reduce the ambient temperature.   |
| <b>OH1</b><br>Heatsink MaxTemp            | <b>Overheat Fault.</b> There are two situations that result in an overheat fault. The first occurs when the measured heat sink exceeded 105°C. The second is a result of a fault in the internal 24VDC cooling fan. | 1. Ensure that the heat sink cooling fans are functioning.<br>2. Ensure that the heat sink is free from dirt and debris.<br>3. Ensure that the inverter's ambient temperature is within specifications.                                  |
| <b>OH2</b><br>(Flashing)<br>Overheat 2    | <b>Overheat Alarm.</b> Signal is input by external terminal. H01.XX=39  | 4. Replace the 24VDC fan.<br>5. Replace the heat sink thermistor(s).   |
| <b>OH3</b> Motor<br>Overheat 1            | <b>Motor Overheating 1.</b> Thermistor analog input detected motor overheating. See L01.03.   | 1. Check the motor rated current value, E02.01.  |
| <b>OH4</b> Motor<br>Overheat 2            | <b>Motor Overheating 2.</b> Thermistor analog input detected motor overheating. See L01.04.   | 2. Increase cycle time OH4 Motor or reduce the load.   |
| <b>OL1</b><br>Motor<br>Overloaded         | <b>Motor Overload Fault.</b> Inverter output exceeded the inverter overload level.  | 1. Ensure drive is programmed with proper motor full load Amps (E02.01).<br>2. Reduce the load.  |
| <b>OL2</b><br>INV Overload                | <b>Inverter Overload Fault.</b> Inverter output exceeded the inverter overload level.   | 1. Reduce the load.<br>2. Extend the acceleration time.  |
| <b>OPE01</b><br>kVA Selection             | <b>kVA Settings Fault.</b> Inverter kVA setting range is incorrect.   | 1. Check 002.04 constant for proper kVA.   |
| <b>OPE02</b>                              | <b>Parameter Range Setting Error.</b> Parameter settings are set outside the parameter range.   | 1. Press enter to view parameter.<br>2. Change parameter to appropriate setting.   |
| <b>OPE03</b><br>Terminal                  | <b>Multi-Function Input Settings Fault.</b> Set values other than "F" and "FF" are duplicated.  | 1. Check the settings for H01.01 to H01.07, verify that the same input is not used twice.  |
| <b>OPE04</b><br>Terminal                  | <b>Parameters do not match.</b> The drive, control board, or terminal board has been replaced, and the parameter settings between the controller board or terminal board do not match.                              | 1. Press ENTER to view the parameter.<br>2. Change parameter(s) to appropriate settings.<br>3. Set A01.05 = 5550.  |
| <b>OPE07</b><br>Analog Selection          | <b>Multi-Function Analog Input Setting Fault.</b> Set values other than 00 and 0F are duplicated.   | 1. Check setting for H03.02 and H03.10. Verify that the same value is not used twice.  |
| <b>OPE08</b><br>Terminal                  | <b>Selection Parameter error.</b> A parameter has been changed that is not available in the present control method.   | 1. Undo the last parameter change (if known).<br>2. Scroll through modified constants for obvious setting error.<br>3. Perform a user initialize (A01.05=1110)<br><b>CAUTION: All settings will be restored to the factory defaults.</b> |
| <b>OPE10</b><br>V/fPtm Setting            | <b>V/f Parameter Setting Error.</b>   | 1. Check Parameters E01.04 to E01.11.  |
| <b>OPE23</b><br>Load Check                | <b>Check C05.04≤C05.07≤C05.09.</b>  | 1. Load Check setting error.   |
| <b>OT1</b><br>Overtorque<br>Det 1         | <b>Overtorque Detection Level 1 Fault.</b> Current is higher than set value (L06.02) for more than set time (L06.03).   | 1. Check for proper programming of L06.02 and L06.03.  |
| <b>OT2</b><br>Overtorque<br>Det 2         | <b>Overtorque Detection Level 2 Fault.</b> Defined by L06.05. Alarm defined by L06.04.  | 1. Check for proper programming for L06.XX constant.   |
| <b>OV</b><br>DC Bus Overvolt              | <b>Overvoltage Fault.</b> The DC bus voltage exceeded for overvoltage level. Detection level: 230V class-approximate 410V 460V class-approximate 820V   | 1. Extend the deceleration time.<br>2. Check for proper DBU operation.<br>3. Check the resistor.<br>4. Check the line voltage.<br>5. If on a load break hoist, check the gear box.   |
| <b>OV</b> (flashing)<br>DC Bus Overvolt   | <b>Overvoltage Fault.</b> Overvoltage occurs during stop. Main circuit DC voltage rises above the detection level while the drive output is off. Detection level: 410V or more for 230V, 820V or more for 460V.     | 1. Check the line voltage.   |
| <b>PF</b><br>Input Pha Loss               | <b>Input Phase Loss Fault.</b> Inverter input power supply has open phase.  | 1. Check the line voltage.<br>2. Remove power.<br>3. Retighten the input terminal screws.<br>4. Check the fuses.   |
| <b>RR</b><br>DynBrk Transistr             | <b>Braking Transistor Fault.</b> Internal Braking transistor failed.  | 1. Verify that the external braking resistor is connected to the proper terminals.<br>2. Confirm that the proper resistor is installed.<br>3. Check for a short circuit across the braking resistor.                                     |
| <b>UL1</b><br>Upper Limt 1 Err            | <b>Upper Limit 1-SLOW DOWN Indicator.</b> Upper Limit 1-SLOW DOWN switch status is changed.   | 1. May not require corrective action.<br>2. Check the position of the Limit Switch.<br>3. Check the condition of the Limit Switch.<br>4. Check the conditions of/for input terminal H01.XX (U01.10)                                      |

|  |   |   |
|--|---|---|
| <b>UL2</b><br>Upper Limit 2 Err          | <b>Upper Limit 2-Stop Indicator.</b> Upper Limit 2-STOP switch status is changed.   | 1. May not require corrective action.<br>2. Check the position of the Limit Switch.<br>3. Check the condition of the Limit Switch.<br>4. Check the conditions of/for input terminal H01.XX (U01.10) |
| <b>UL3</b><br>Upper Limit 3 Err          | <b>Upper Limit 3-Weighted Stop.</b> Upper Limit weighted limit switch tripped   | 1. May not require corrective action.<br>2. Check the position of the Limit Switch.<br>3. Check the condition of the Limit Switch.<br>4. Check the conditions of/for input terminal H01.XX (U01.10) |
| <b>UT1</b><br>Undertorque Det1           | <b>Undertorque Detection 1.</b> The current is less than L06.02 for more that L06.03.   | 1. Check settings.<br>2. Check motor coupling.  |
| <b>UT2</b><br>Undertorque Det2           | <b>Undertorque Detection 2.</b> The current is less than L06.05 for more that L06.06.   | 1. Check settings.<br>2. Check motor coupling.  |
| <b>UV</b> (Flashing)<br>DC Bus Undervolt | <b>Undervoltage Fault.</b> Undervoltage status occurs for more than 2 sec during STOP. Input voltage drops below 190V DC or less for 230V AC class, 380V DC or less for 460V AC class.          | 1. Check the power source wiring.<br>2. Replace and bad branch fuses.<br>3. Check collector system.   |
| <b>UV1</b><br>DC Bus Undervolt           | <b>Undervoltage 1 Fault.</b> Undervoltage status occurs for more than 2 sec during RUN command. Input voltage drops below 190V DC or less for 230V AC class, 380V DC or less for 460V AC class. | 1. Check the power source wiring.<br>2. Correct the line voltage.<br>3. Check collector system.   |
| <b>UV2</b><br>CTL PS Undervolt           | <b>Undervoltage 2 Fault.</b> The inverter detected a loss of 24V logic power supply voltage.  | 1. Check the power source wiring.<br>2. Correct the line voltage.<br>3. Check collector system.   |
| <b>UV3</b><br>MC Answerback              | <b>MC Fault.</b> The pre-charge contactor opened during operation   | 1. Check the power supply wiring.<br>2. Correct the line voltage.<br>3. Check collector system.<br>4. Wait 30-45 seconds before restarting drive after auto shut down.                              |

## ELECTROMOTIVE SYSTEMS LIMITED WARRANTY

Electromotive Systems, hereafter referred to as Company, guarantees that the drive has been manufactured by it against any defects of material and/or workmanship for a period of two years from the date of shipment. Company makes NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AS TO THE MERCHANTABILITY OR FITNESS OF THE ITEMS FOR THEIR INTENDED USE OR AS TO THEIR PERFORMANCE. Any statement, description or specification in Company's literature is for the sole purpose of identification of items sold by the Company and imparts no guarantee, warranty or undertaking by company of any kind. Components and accessories not manufactured by Electromotive Systems are not included in this warranty and are warranted separately by their respective manufacturers.

Company's sole liability shall be to repair at its factory, or replace any item returned to it within two years from date of shipment, which Company finds to contain defective material or workmanship. All items to be repaired or replaced shall be shipped to Company (Note: return authorization by Company is required) within said two year period, freight prepaid, as a condition to repair or replace defective material or workmanship. Company's herein assumed responsibility does not cover defects resulting from improper installation, maintenance, or improper use. Any corrective maintenance performed by anyone other than the Company during the warranty period shall void the warranty. Company shall not be liable for damages of any kind from any cause whatsoever beyond the price of the defective Company supplied items involved. Company shall not be liable for economic loss, property damage, or other consequential damages or physical injury sustained by the purchaser or by any third party as a result of the use of any Company supplied items or material.

Company neither assumes nor authorizes any other person to assume for Company any other liability in connection with the sale or use of items sold by Company.

Materials or items may not be returned for credit, without the prior written consent of the Company. Any authorized return of materials or items shall be subject to a restocking charge equal to 25% of the net invoiced amount (\$100 minimum charge for all control products) after Company determines that the material or item is in resalable condition. If upon receipt of the material or items returned, the Company determines that said material or items cannot be resold without alteration or service, the Company reserves the right to reject the returned materials or items and to send the same back to said purchaser at purchaser's expense.

Any claim for errors in shipment or for material or time shortages must be received by Company within 30 days of shipment and must be accompanied by copies of the bill of lading and packing slip.

Refer to hoist manual for CM's Repair/Replacement policy that applies to the hoist.

[illegible]



COLUMBUS McKINNON  
CORPORATION

FAMILY OF BRANDS



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