Hollister-Whitney

A VANTAGE Company

# GLV-40D1 Gearless Machine Instruction Manual (#1194)



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## WARNING

This installation and service manual is intended for the use of qualified and authorized elevator personnel ONLY. For your safety and the safety of others, do not attempt ANY procedure that you are not qualified and authorized to perform. Recommended procedures must be done in accordance with the applicable rules of the latest edition of the National Electrical Code; the latest edition of ASME A17.1; and all governing local codes. Every attempt has been made to ensure that this guide is accurate and up to date. Hollister-Whitney Elevator Co. LLC assumes no liability for consequences resulting from any error or omission. Please notify Hollister-Whitney Elevator Co. LLC regarding any difficulties with this guide.

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Section

1

# 1 Introduction

## 1.1 Description

Thank you for choosing the Hollister Whitney Elevator Company (HWEC) GLV-40D1 Gearless Machine!

The GLV-40D1 machine has been designed for use in 1:1 roped, machine room applications with VVVF controls. The machine is designed with 30 poles to provide smooth, quiet, and long-lasting operation.

HWEC machines are designed to perform in a tolerant machine space. The machine space working temperature should be held between 35° F & 104° F, (1.7° C & 40° C) and humidity should be held to an average of 90% non-condensing.

## 1.2 Warranty Information

All parts and equipment manufactured by HWEC are guaranteed against defects in material and workmanship for a period of one (1) year from the date of shipment.

Warranty covers only the repair or replacement of parts, F.O.B. our factory, upon determination by inspection at our factory that warranty is applicable.

Equipment and components not of our manufacture are warranted only to the extent of the original manufacturer's warranty.

Our warranty specifically does not include any other incidental liability or expense such as transportation, labor, and unauthorized repairs.

Section

2

# 2 Safety Precautions

Read this section before any work is performed on elevator equipment.

**✱ IMPORTANT –**

**The procedures contained in this manual are intended for the use of qualified elevator personnel. In the interest of your personal safety and the safety of others, do NOT attempt ANY procedure that you are NOT qualified to perform.**

All procedures must be done in accordance with the applicable rules in the latest edition of the National Electrical Code; the latest edition of ASME A17.1; and any governing local codes.

## 2.1 Terms in This Manual

**CAUTION:**

**Caution statements identify conditions that could result in damage to the equipment or other property if improper procedures are followed!**

**WARNING:**

**Warning statements identify conditions that could result in personal injury if improper procedures are followed!**

## 2.2 General Safety

Specific warnings and cautions are found where they apply, and DO NOT appear in this summary.

## 2.3 Electrical Safety

All wiring must be in accordance with the National Electrical Code and must be consistent with all state and local codes.

## 2.4 Electrical Hazards

Electric shocks can cause personal injury or loss of life. Circuit breakers, switches and fuses may NOT disconnect all power to the equipment. Always refer to the wiring diagrams. Whether the A/C supply is grounded or not, high voltage will be present at many points.

## 2.5 Mainline Disconnect

Unless otherwise suggested, always turn OFF. Lock and tag out the mainline disconnect to remove power from the equipment.

## 2.6 Test Equipment Safety

Always refer to manufactures' instruction book for proper test equipment operation and adjustments.

Megger testing, or buzzer type continuity testers, can damage electronic components. Connection of devices such as voltmeters on certain low-level analog circuits may degrade electronic system performance. Always use a voltmeter with a minimum impedance of 1M Ohm/Volt. A digital voltmeter is recommended.

## 2.7 When Power Is On

Dangerous voltages exist at several points in some products. To avoid personal injury, do NOT touch exposed electrical connections or components while power is On.

## 2.8 Product Specific Warnings

### WARNING

**GLV-40D1 machine MUST be balanced during hoisting. See paragraph 3.4 for proper lifting configurations.**

### WARNING

**Hang the elevator car before removing ANY bolts. Failure to do so may result in severe injury and equipment damage.**

Section

3

# 3 Arrival of the Equipment

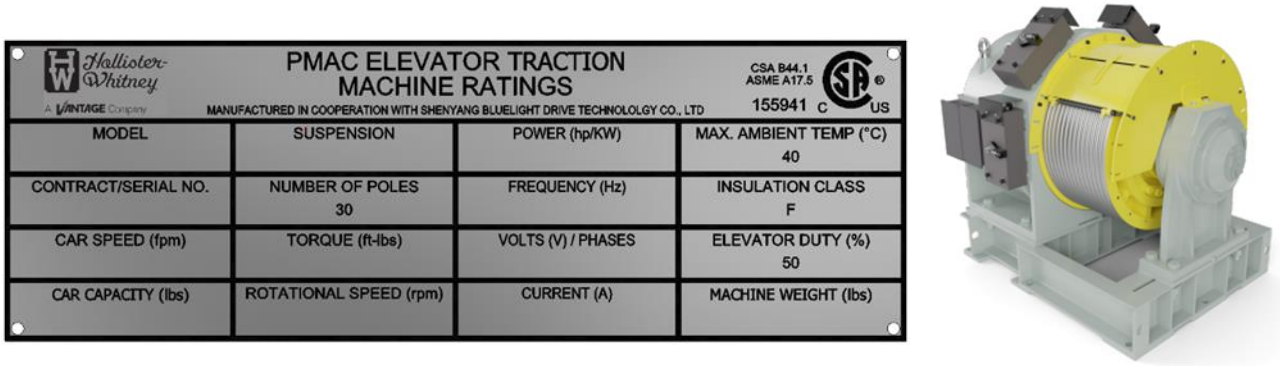
## 3.1 Receiving

Immediately upon arrival of the machine, make a visual check for any external damage. If any damage incurred in transit is found, make notice of the claim in the presence of the carrier, and notify HWEC. If necessary, do not put these machines into operation without first consulting HWEC.

If the machine has gotten wet during transportation, make notice of the claim in the presence of the carrier and notify HWEC. See also Section 3.6.

## 3.2 Data Tag

Check the machine data tag to ensure the machine conforms to your order.



Hallister-Whitney
A VINTAGE Company

PMAC ELEVATOR TRACTION MACHINE RATINGS

MANUFACTURED IN COOPERATION WITH SHENYANG BLUELIGHT DRIVE TECHNOLOLGY CO., LTD

CSA B44.1
ASME A17.5
155941 C US

| MODEL | SUSPENSION | POWER (hp/KW) | MAX. AMBIENT TEMP (°C) 40 |
|---|---|---|---|
| CONTRACT/SERIAL NO. | NUMBER OF POLES 30 | FREQUENCY (Hz) | INSULATION CLASS F |
| CAR SPEED (fpm) | TORQUE (ft-lbs) | VOLTS (V) / PHASES | ELEVATOR DUTY (%) 50 |
| CAR CAPACITY (lbs) | ROTATIONAL SPEED (rpm) | CURRENT (A) | MACHINE WEIGHT (lbs) |

**Figure 1**

## 3.3 Handling

The machine will be delivered on a wooden pallet. It can be left on the pallet and moved with a standard fork truck or pallet jack.

## 3.4 Hoisting

The machine weighs about 5300 pounds (2410 kg). When removing the machine from the pallet, it must be lifted using the lifting holes provided at the bottom of the machine.

When lifting the machine, use a spreader beam or other suitable rigging device to pull straight up on the lifting holes.

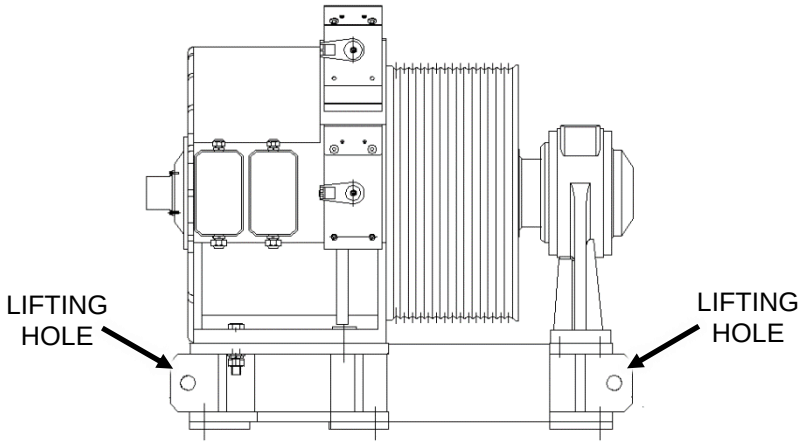



**Figure 2**

## WARNING

**Use only the lifting holes when lifting the machine! Do not use any other machine component to lift the machine! Lifting the machine by any other component will result in damage to the machine or possible failure of the component resulting in the machine falling from the hoisting system!**

**Follow all the necessary precautions to avoid damage to the machine or risk to personnel when moving or hoisting the machine.**

## 3.5 Storage

During storage in a warehouse or on the elevator job site, precautions must be taken to protect the machine from dust, dirt, moisture, metal shavings and temperature extremes.

For short term storage, place the machine in a warm, dry, and clean environment.

Protect the machine from harsh weather conditions and temperature variations that can lead to condensation.

Protect from dust and metal shavings. Metal dust and shavings can be attracted into the machine by the magnets.

For longer term storage, follow the recommendations above plus; place the machine in a sealed, waterproof enclosure. Add a dehydrating packet that is sized for the enclosure's volume and humidity level.

## 3.6 Moisture, Condensation

Before installing the machine, and before any voltage is applied, check the machine for condensation, or any evidence of moisture or water. If any evidence of wetness is found, contact HWEC for drying instructions.

After the machine has been dried per factory instructions, it will be necessary to verify the insulation between each coil phase and earth ground. Using an insulation tester (or megohmmeter) check the insulation resistance at 500VDC.The resistance should be NO LESS than100 Mohm.

Section

4

# 4 Application

## 4.1 Overview

The GLV-40D1 series machine is a synchronous permanent magnet gearless machine designed for elevators. The machine has 30 poles to provide smooth, quiet, and long-lasting operation. Its configuration allows elevator capacity up to 4000 lbs. with 1:1 roping, double wrap arrangement at 50% counterbalance with up to a 39,600 lb shaft load (19800 lb system load). See Section 4.4 below for complete specifications. The overall system load is calculated by adding the following items:

**Empty Car Weight + Counterbalance Weight + Capacity + Hoist Rope Weight + Compensation Weight + Traveling Cable Weight**

The GLV-40D1 machine brake system uses four block brakes.

The latest HWEC manuals, bulletins and procedures are available for download from the HWEC website.

The following is a list of major components of the GLV-40D1 machines. Along with a description of their functions, there is an overview of some of the critical adjustments and maintenance information. See Installation and Maintenance for detail.

1. **PM Motor Housing** - The housing contains the PM windings used to provide the necessary torque and speed to move the elevator in operation.
2. **Traction Sheave** – A grooved sheave is connected directly to the machine rotor. The grooves provide traction between the sheave and the hoist ropes.
3. **Brake** – The electromechanical device is used to prevent the elevator from moving when the car is at rest.
4. **Sheave Guard/Rope Retainer** – Provides rope retention and keeps hoist ropes away from contact after rope installation.
5. **Machine Rotor & Brake Wheel** – The brake wheel is connected to the main shaft. When the brake is energized, the brake is released from the brake wheel.
6. **Nameplate** - Displays the machine rated data and manual factory contact/serial number information.
7. **Encoder** – (Behind Cover) This device is directly coupled to the rotor of the machine. It is provided to give the absolute speed feedback of the hoist motor to the inverter drive system and to the elevator controller.

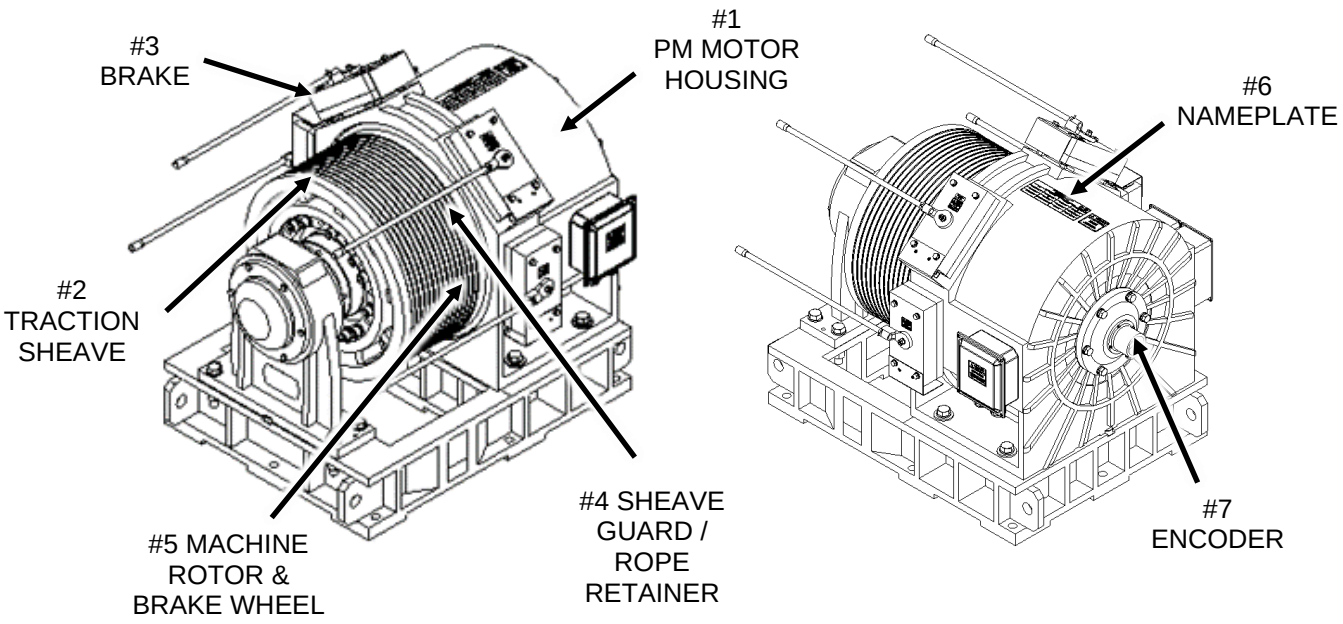



**Figure 3**

## 4.2 Codes and Standards

These machines are designed to comply with ASME A17.1/CSA B44 code. The motors are designed with insulation class F minimum and have been approved by and carry a CSA approved label.

## 4.3 Environmental Specifications

- Operating ambient temperature: 35° F to 104° F (1.7 C to 40 C)
- Humidity average of 90% non-condensing

## 4.4 Machine Specifications

- Traction Sheave (removeable) Diameter: 20 in or 25 in
- Main and emergency block brakes. Each capable of holding 125% of the load
- Brake switches, wired normally close standard
- Heidenhain ECN1313 2048 encoder and 1.5-meter-long cable (standard)
- Sheave guard/rope retainer
- Machine dimensions and parts list can be found at the end of this book.

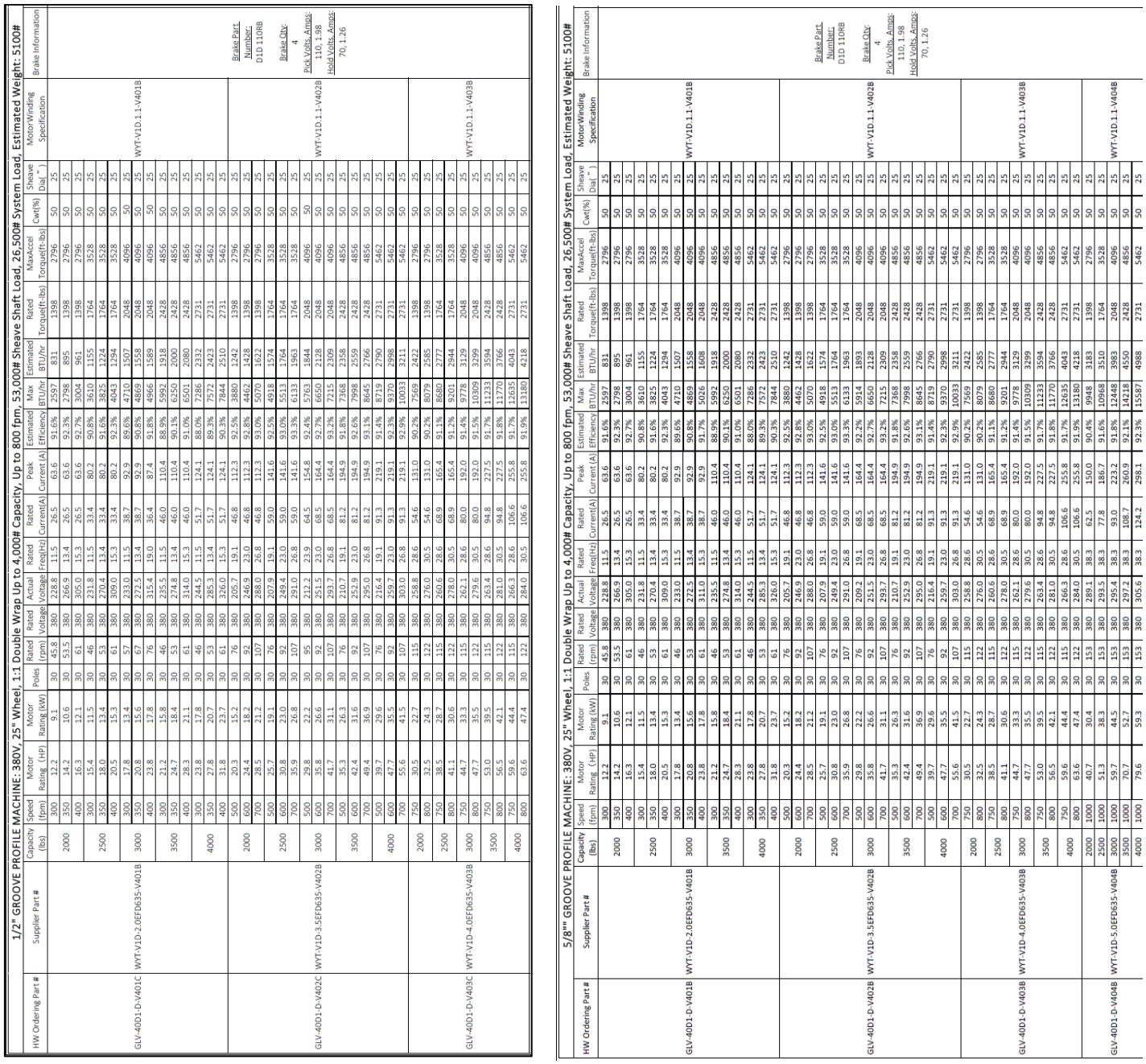


**Table 1 – Maximum Detailed Specifications**

## 4.5 Brake Specifications

- Four brakes are supplied standard from the factory. Two brakes are meant to serve as a primary machine brake and the other two brakes as a secondary emergency brake. Please contact Hollister-Whitney for details regarding using a Rope Gripper® as the emergency brake with a GLV-40D1 machine.
- Brake switch rating DC 110 V Rated current 1.98 A.
- The opening voltage of the brake is not more than 110 V, the releasing voltage is not more than 70 V, and the control range is 15 V-30 V.
- The machine brakes are mounted in 4 locations as shown in Figure 4.

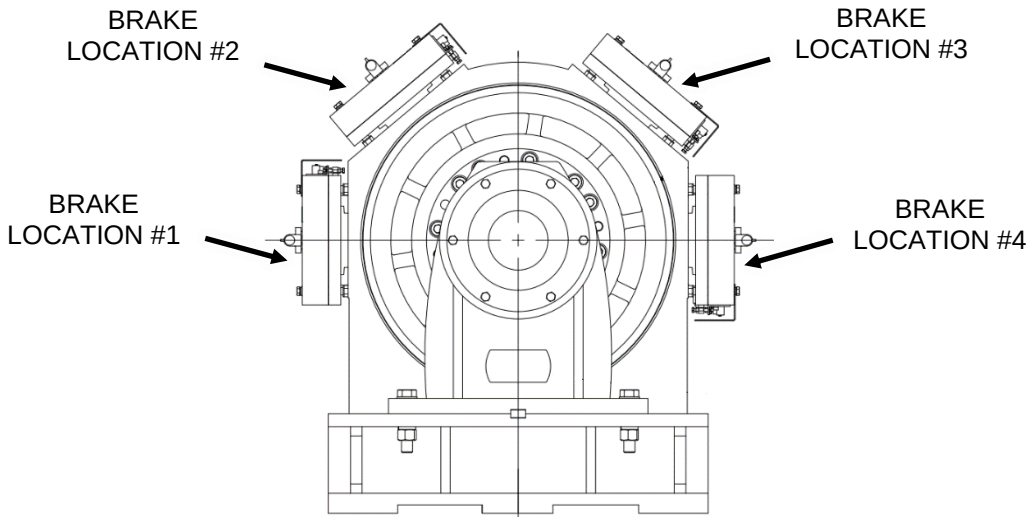



**Figure 4**

Section

5

# 5 Installation

## 5.1 Machine Mounting

Before hoisting the machine into place, verify all the hoisting equipment is rated for the 5300 pounds (2410 kg) weight of the machine.  See Section 3.4.

Provide a level, structurally supported (rated for the load on the machine) machine space with proper clearance around the machine for maintenance and adjustments.

This machine is primarily intended to be mounted in traditional overhead applications with down-pull forces on the traction sheave.

### 5.1.1 Traditional Overhead Mounting

Anchor the machine to the structural support surface using the (8) mounting hole locations in the base. The hardware required to anchor the machine to the support surface should be at least 1” diameter, grade #5 minimum, with standard washers. Hardware adhering to ASME A325 is also suitable.

**Note - Due to the varying mounting surface thicknesses, no mounting hardware is shipped with the machine.**

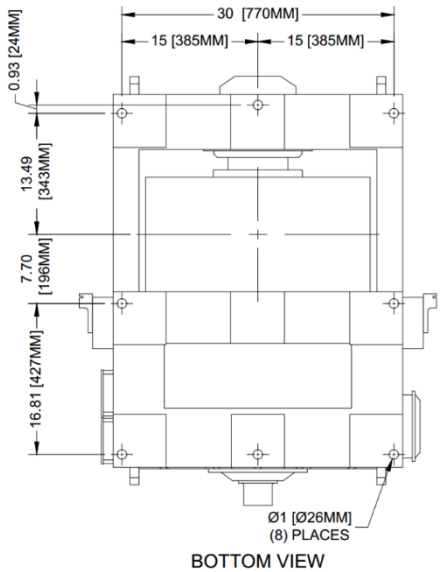



**Figure 5**

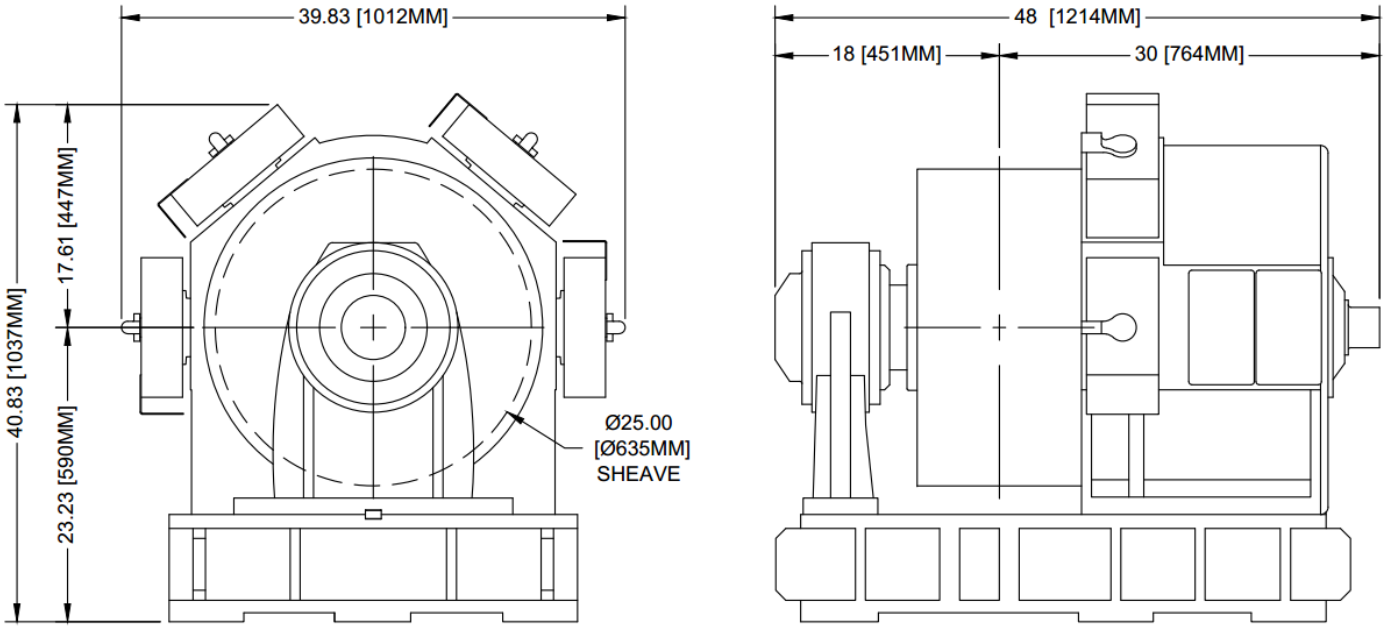



**Figure 6**

## 5.2 Electrical Connection

Use the project wiring diagrams (with the motor configuration information) to connect the motor to the controller.

# WARNING

**Before performing any electrical connections, make sure that power supply is turned off. Only then proceed with connecting electrical leads to power supply. Never work in machine electrical enclosure while power supply is on!**

**Direct connection to the three-phase power is forbidden, it may destroy the motor.**

### 5.2.1 Machine Wiring

- The Thermal Protection Switch (TPS) is wired with leads labeled and supplied into the machine electrical enclosure. Refer to Figure 7.
- Consult your controller manufacturer for appropriate TPS connections.
- Verify the electrical supply from the elevator drive and brake power supplies match the machine data tag. Refer to Figure 1.

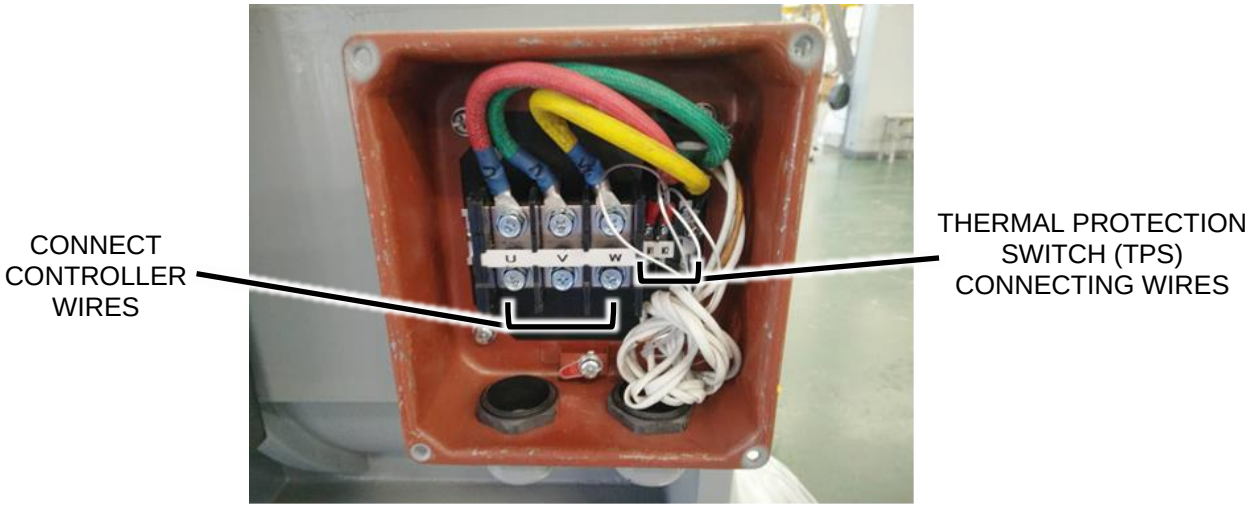



**Figure 7**

- Connect the U-V-W lines from the drive as shown.
- Earth Ground connects to the ground lug terminal inside the electrical enclosure.

**Note - Check and tighten all leads (motor side and line side) on installation.**

## WARNING

**The machine and emergency brake coils must be independent!**

**It is the responsibility of the user to connect the motor in accordance with the current laws and regulations in the country of use. This is particularly important regarding wire sizes used to connect the power, earth ground, and the type and size of fuses.**

### 5.2.2 Brake Wiring

- Connect the machine brake and emergency brake as shown.
- The brake switches are wired normally closed from HWEC.
- To change the switches to function as normally closed, remove the blue wire from the terminal block in the electrical enclosure, and replace it with the spare gray wire coming from the brake switch.

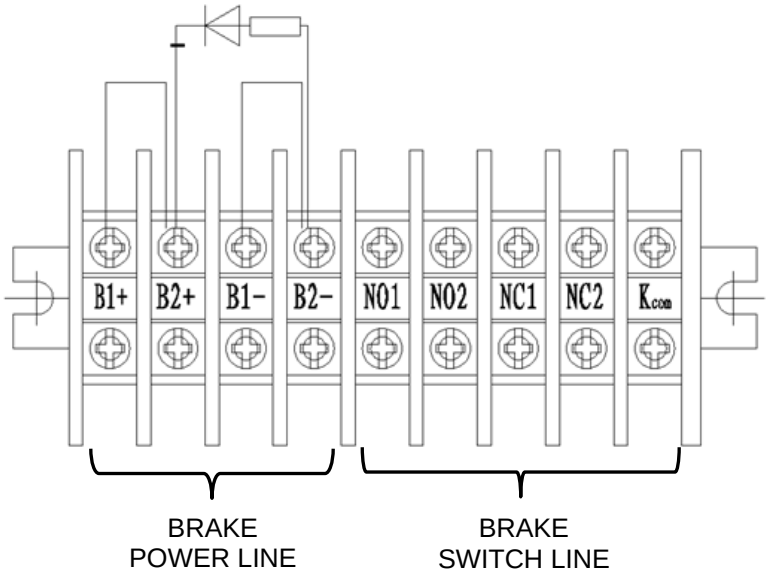



**Figure 8**

## 5.3 Brake Adjustment/Centering

# WARNING

**Before performing any maintenance on the machine brakes, take all necessary safety precautions to immobilize the car and counterweight to prevent any unintended movement during the maintenance period that may result in injury or death!**

# WARNING

**Brakes must be adjusted after the load is applied to the machine!**

**As brake pads are worn or new pads are installed readjustment is required.**

## 5.3.1 Adjustment of the Stroke

The air gap of the brake is the space between the braking pad and braking wheel. This gap must be adjusted to ensure proper operation of the brake. The correct air gap is between 0.012” (0.30 mm) to 0.022” (0.55 mm).

### 5.3.1.1 Initial Adjustment

Initial adjustment is to take place after the block brake has been properly installed.

1. Using a 16 mm wrench, loosen the four fixed bolts. See Figure 9.
2. Using a torque wrench and 16 mm socket, torque the fixed bolts in an “X” pattern to 44.25 ft-lb (60 N-m)
3. Confirm the air gap is between 0.012” (0.30 mm) to 0.022” (0.55 mm) using a 0.012” (0.30 mm) and 0.014” (0.36 mm) go no-go feeler gauge. See Figure 9.

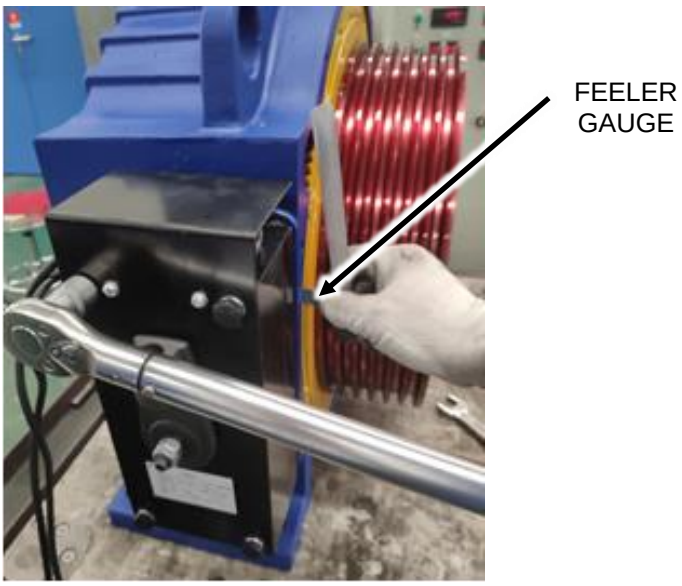



**Figure 9**

### 5.3.1.2 When the air gap of brake is more than 0.022" (0.55 mm), please do as follows:

1. Loosen one of the 4 fixed bolts with a 16 mm wrench. See Figure 10.

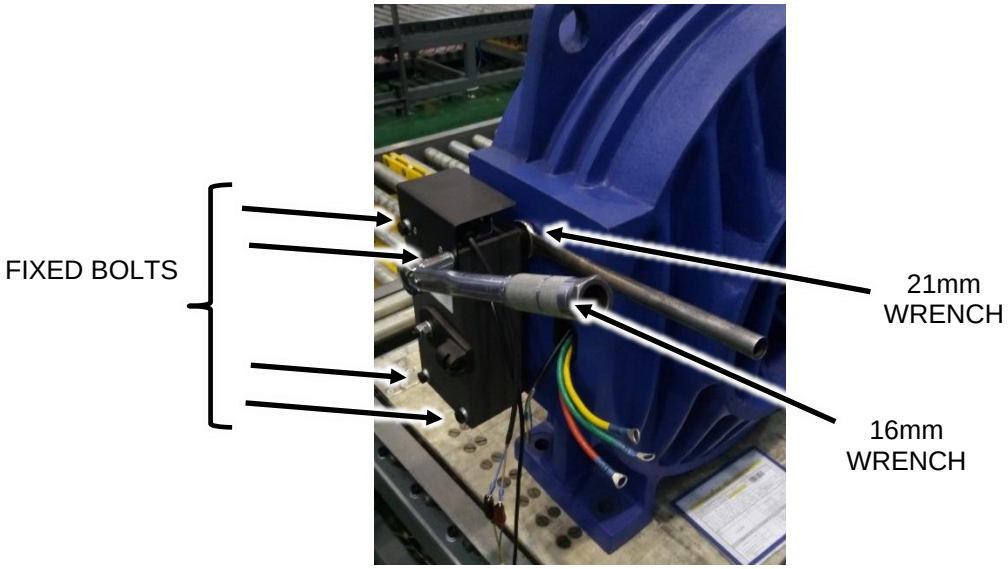



**Figure 10**

2. Use a 21 mm wrench, rotate the adjustment bolt corresponding to the loosened fixed bolt in small increments, less than ½ a flat of the hex head, counterclockwise. See Figure 11.

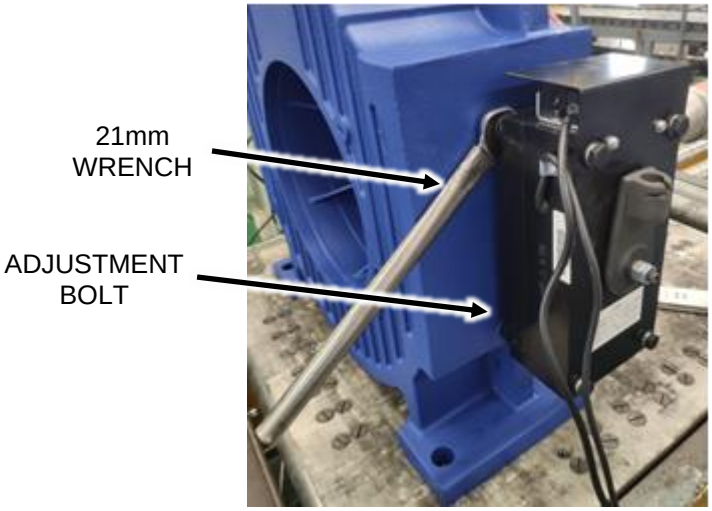



**Figure 11**

3. Retorque the fixed bolts to 44.25 ft-lbs (60 N-m) and confirm air gap is within 0.012" (0.30 mm) to 0.022" (0.55 mm) using a feeler gauge. Repeat this process for the other three bolts, one at a time. Recheck adjustments after all four bolts have been initially adjusted and readjust as necessary.

#### 5.3.1.3 When the air gap of brake is less than 0.012" (0.30 mm) please do as follows:

1. Loosen one fixed bolt with a 16 mm wrench.

2. Turn the 21 mm adjustment bolt corresponding to the loosened fixed bolt clockwise in small increments, less than ½ turn of the hex head flat. Retorque 16 mm fixed bolts to 44.25 ft-lb (60 N-m)

3. Confirm air gap is within 0.012" (0.30 mm) to 0.022" (0.55 mm) using a feeler gauge.

### 5.3.2 Verify Brake Function

When testing the brakes electrically energize them. Once brakes are adjusted run the car to verify the brakes are relatively quiet on stop and start. Verify no noticeable rubbing noise occurs during machine operation. Once adjustment is confirmed ensure dust guards are present to prevent dust buildup which can cause brake failure.

## 5.4 Brake Burnishing

**WARNING**

**Brakes must be burnished to achieve full stopping torque!**

Each brake on the machine must be burnished separately. Repeat the following procedure for each brake.

1. Clamp the brake on the rotor. Ensure brake circuit is de-energized.

2. Run the elevator in the direction of the load at 11 RPM for 1 minute.
    a. If the overall travel of the elevator will not allow the burnishing time to be met in one pass, open (energize) the brake at the bottom of the hoist way, lift the load back to the top, and repeat the run until the burnishing time is achieved.
    b. Stop the elevator occasionally to ensure the brake and motor do not overheat.

3. After burnishing time is achieved re-verify the air gap between the brake pads and rotor. Ensure air gap is within 0.012” (0.30 mm) to 0.022” (0.55 mm) using a feeler gauge.

## 5.5 Encoder Connection

The machines are supplied with Heidenhain ECN1313 2048 encoder. A 1.5-meter encoder cable is connected to the encoder and extends from the back of the machine.

Connect the supplied encoder cable to the encoder cable extending from the back of the machine.

When using a KEB drive, the encoder cable can be used "as-is."

When using any other manufacturer's drive, consult control manufacturer for cable compatibility and availability. DO NOT modify the KEB cable without first consulting the control manufacturer. Any modification of the KEB cable voids its warranty.

## 5.6 Startup

Verify all the motor related settings in the elevator controller match the information on the machine data tag. Refer to Figure 1.

Verify that all the brake parameters match the information on the machine data tag. Refer to Figure 1.

Follow the controller manufacturer's procedure for alignment of the magnets (motor learn).

Briefly run the machine to verify the machine functionality and brake operation.

Verify the drive sheave is plumb and aligned with the rope drop locations.

Install the hoist ropes, adjust the rope shackles, and check the ropes for equal tension. The rope tension must be uniform, or it may cause vibration and premature wear on the traction sheave and hoist ropes.

Re-verify the traction sheave is plumb once the machine is fully loaded.

## 5.7 Manual Brake Release

The brakes can be manually released in the event of loss of power.

**NOTE: The manual releasing device should be operated by 3 professionals, and make sure the power is shut down first.**

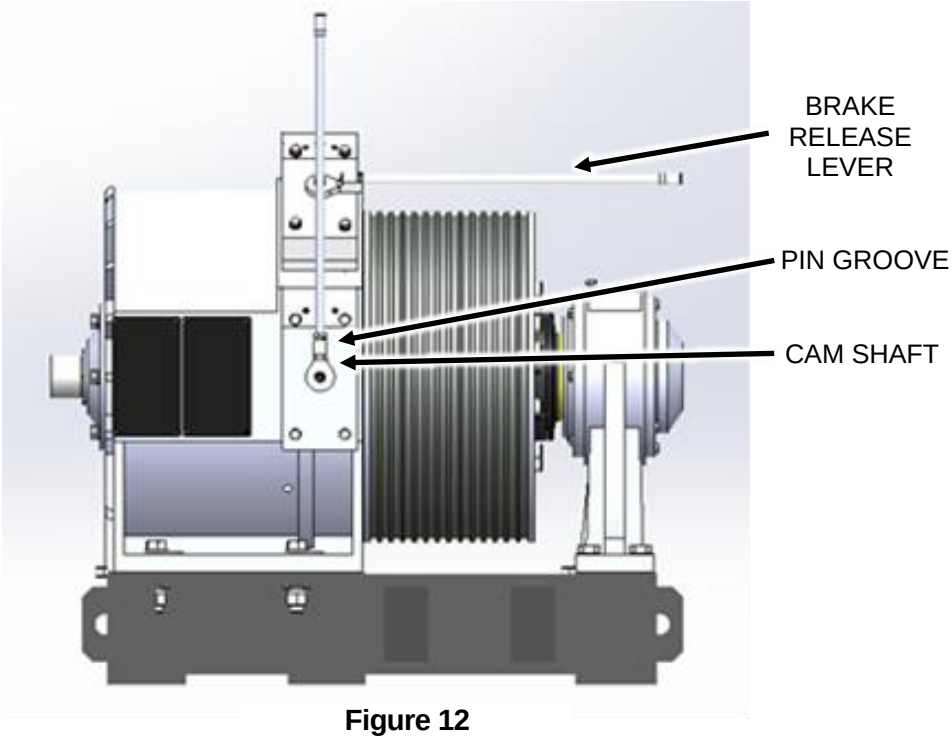



**Figure 12**

1. Insert the brake release levers into the cam release on top of each brake. Align the pin on the brake release lever with the mating groove on the cam release to prevent the brake release lever from slipping.

2. Apply force to the end of the brake release levers until the brake releases from the brake wheel.

3. The brake opening brake release levers must be removed from the cam release prior to normal elevator operation.

Section

6

# 6 Maintenance

## WARNING

**Before performing any maintenance checks on equipment, take all the necessary safety precautions to immobilize the car and counterweight to prevent any unintended movement during the maintenance period that may result in injury or death!**

## 6.1 General

To keep equipment functioning efficiently, good maintenance practices must be established, observed, and maintained. Systematic inspections of the equipment should be scheduled, and records kept of these inspections. Monitoring these records will indicate any sign of a potential issue.

Each installation has its own special conditions, so it is not possible for HWEC to outline an overall plan for periodic maintenance. HWEC would recommend, at a minimum, yearly inspections, but installation conditions may warrant a more frequent schedule. The maintenance contractor will need to make the final determination.

## 6.2 Cleaning

Dirt, dust, excess lubrication, and moisture are the greatest enemies of electrical equipment and of maintenance teams in general. Dirt and dust layers on a machine can prevent heat dissipation, which can lead to overheating and eventual insulation breakdown. Many types of dust in an elevator machine room are electrically conductive and can also lead to insulation failure. Dust and dirt can draw moisture to unpainted surfaces such as brake rods causing oxidation that can cause brake faults. Excess lubrication can draw dust and dirt as well.

Dust and dirt can be removed from surfaces with a dry, lint-free cloth, or with suction. With suction, however, care must be taken to not build up or discharge static electricity while cleaning. Dry, compressed air (at less than 50 psi) may also be used to remove dirt and dust however, this must be closely monitored as the compressed air will re-suspend the dust and dirt in the machine room atmosphere.

## 6.3 Bearings

Bearings have been sized for the maximum speeds, loads and capacities found in this manual at 50% duty. Bearings must be greased at least yearly, but greasing frequency will depend on duty and hoistway conditions.

1. To grease bearings, first remove the pressure relief plugs from the outboard stand and the back of the machine. See Figure 13.

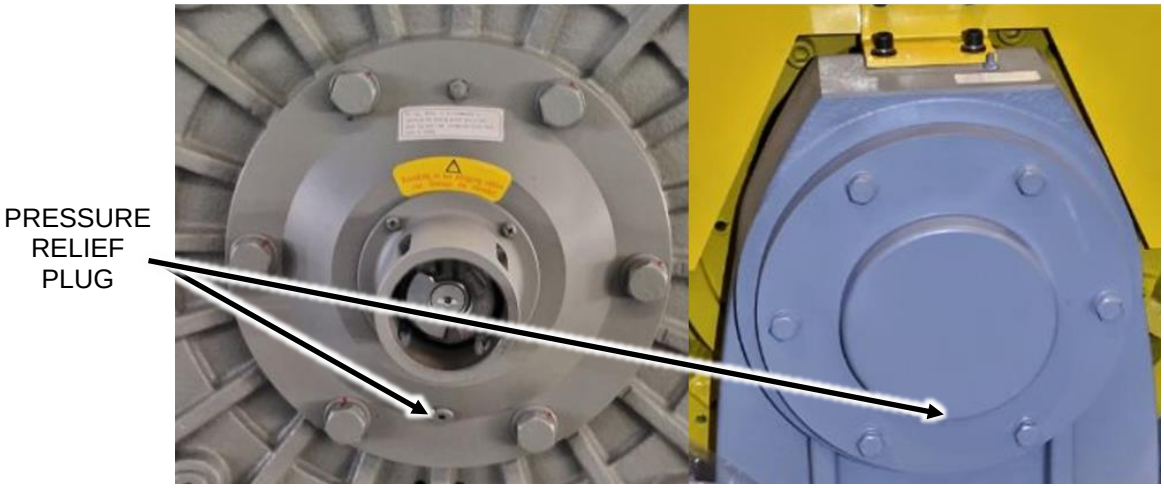



**Figure 13**

2. The grease point is opposite the relief plug. Figure 14.

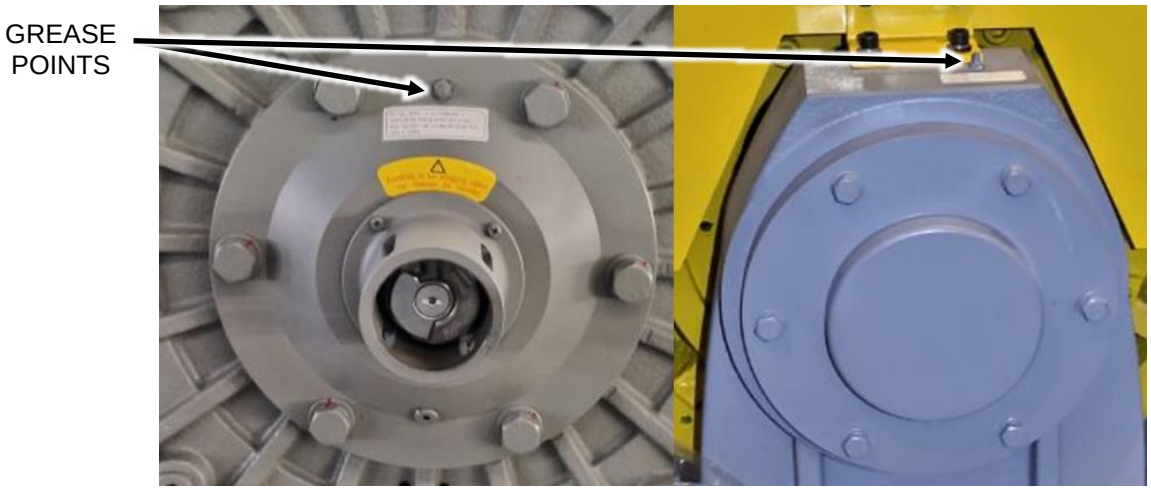



**Figure 14**

3. Apply 2-3 oz. of grease (use Shell “Gadus S3 V220C 2” or equal) at least yearly or according to the maintenance schedule for the installation conditions.

Bearings calculated life rating (based on speed, loads and 50% duty) is approximately 20 years. Please note that installation conditions vary, so shorter or longer bearing life may be experienced.

## 6.4 Brake Wear

**WARNING**

**If the brake pad wears too much, the brake will be disabled.**

### 6.4.1 Suggested check cycle

- Every 3 months after install in the first 6 months.
- Every 1 year afterwards.

### 6.4.2 Benchmark Criteria

- Check the brake for flexibility, the brake pad and traction sheave for wear, and the bearings. Replace worn and damaged parts when necessary.
- As the brake pad wears it adds to the air gap and could contribute to braking noise. You may adjust the air gap as detailed in Section 5.3.
- If brake pad wear is excessive replace the brake pad or replace the entire brake assembly. See Figure 15.

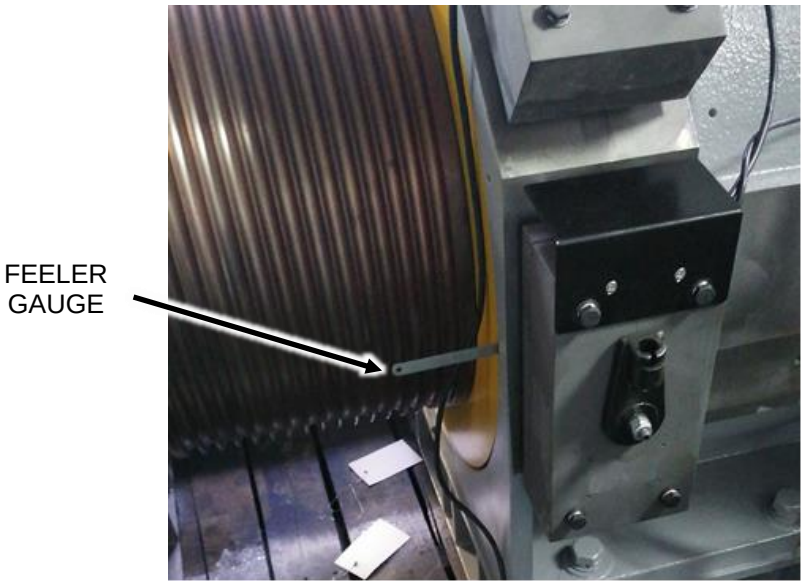



**Figure 15**

## 6.5 Other Items

Traction wheel, brake shoe and brake wheel are usually the only components that will wear. Among them, the brake wheel is most unlikely to wear. Brake pads are more likely to wear but can be monitored with feeler gauges. Refer to the brake section of this manual for brake inspection procedures.

The winding working temperature of traction machine shall not exceed 130 ℃. It can be controlled by the thermal switch in the main machine. When the temperature reaches 130 ℃, the traction machine shall be stopped.

When the traction machine rotates under the passive condition, it will be in the state of power generation. At this time, high voltage will be generated at the host terminal. Attention shall be paid to avoid electric shock and equipment damage.

Grease and other impurities shall be avoided between the brake pad and the brake wheel to avoid the decrease of braking force of the brake system. If the residual thickness of the brake pad is less than 5 mm due to wear, the brake pad shall be replaced.

Traction wheels are the most likely item on the machines to wear. Periodic measurements of rope depth and the evenness of wear for all ropes (groove depth should wear evenly) should be monitored. Cable should not be more than 0.125 inch (1/8”) below the outer rim of the traction wheel. If cable(s), are below 0.125 inch, or if wear is uneven, replace the traction wheel and cables.

Check machine guarding and rope retainers for clearance and attachment hardware for tightness. Adjust as necessary.

Section

7

# 7 Replacement

## WARNING

**Have only qualified personnel perform the replacement work. The person who performs the replacement work must make sure that the machine power is off and that the elevator will not move unexpectedly.**

## 7.1 Encoder Replacement

Required Tools & Materials:

- Encoder (ECN 1313)
- Hex wrench
  - 2 mm
  - 4 mm
  - 6 mm
  - 8 mm
- Hex sockets
  - 2 mm
  - 4 mm
- Torque Wrench (Need to measure 9 in-lbs. and 44 in-lbs.)
- M10 bolt (at least 1” or 25 mm in length)

### 7.1.1 Encoder Removal

The encoder can be removed from the front of the machine. See Figure 16.

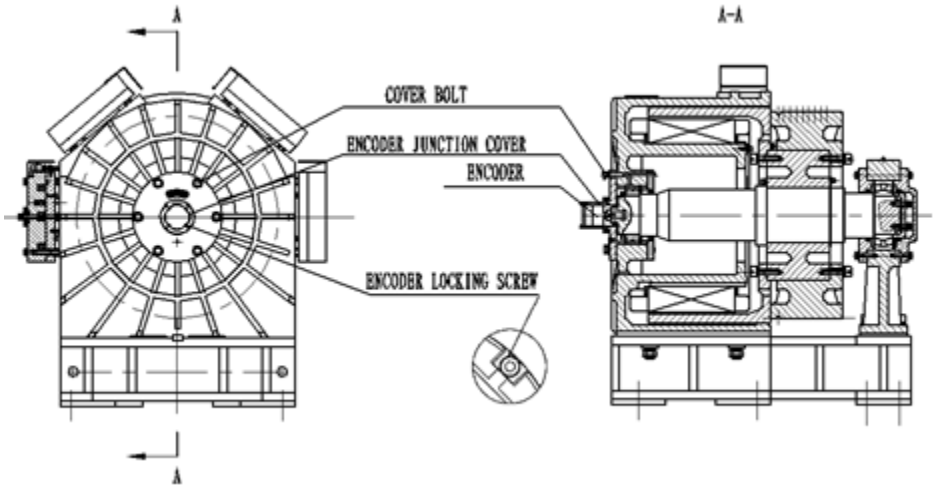



**Figure 16**

1. Loosen the encoder locking screw M2.5, as shown in Figure 17 with hex wrench (2 mm) through the encoder cover hole. The screw does not need to be removed.

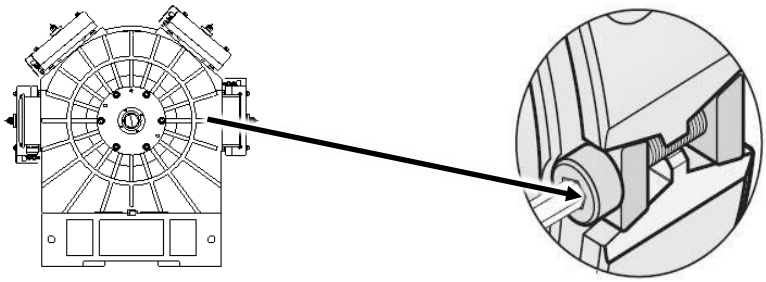


**Figure 17**

2. Remove the encoder bolt cover using the hex wrench (4 mm) and the encoder cable protective cover. See Figure 18.

**Figure 18**

3. Carefully remove wiring harness connector, See Loosen the bolt M5 inside by hex wrench (4 mm) 2~3 turns only. Do not remove this bolt.

**(M5 bolt must remain in the encoder so the M10 bolt can push against it).** See Figure 20.

4. Insert a M10 bolt into the encoder housing. See Figure 21.

5. . Leave the encoder cable on the machine. It does not need to be removed.

**Note: Do not apply excessive pressure on the cable. It may destroy the encoder cable**.

**Figure 19**

6. Loosen the bolt M5 inside by hex wrench (4 mm) 2~3 turns only. Do not remove this bolt.

**(M5 bolt must remain in the encoder so the M10 bolt can push against it).** See Figure 20.

**Figure 20**

7. Insert a M10 bolt into the encoder housing. See Figure 21.

**Figure 21**

8. Turn the M10 bolt against the M5x50 bolt to push the encoder from the shaft. The encoder will “pop” free and will be loose to the touch yet still retained by the M5 bolt. See Figure 22.

**Figure 22**

9. Remove both bolts and the encoder, See Figure 23.

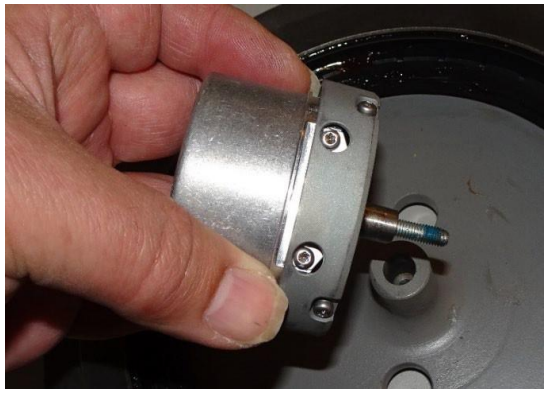


**Figure 23**

### 7.1.2 Encoder Installation

What's in the box. See Figure 24.

**Figure 24**

1. Loosen and remove the bolt M2.5 and nut assembly in the new encoder. See Figure 25.

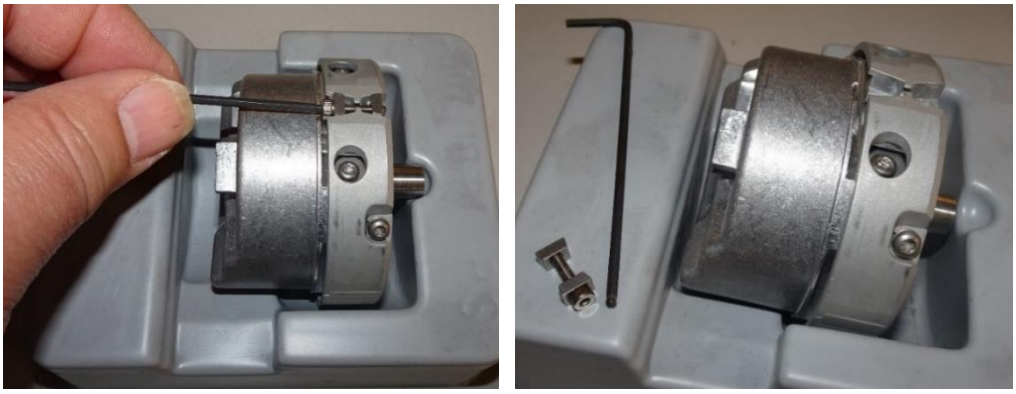


**Figure 25**

2. There is a taper in the front of the encoder shaft, put the encoder shaft into the hole of the shaft. Figure 26.

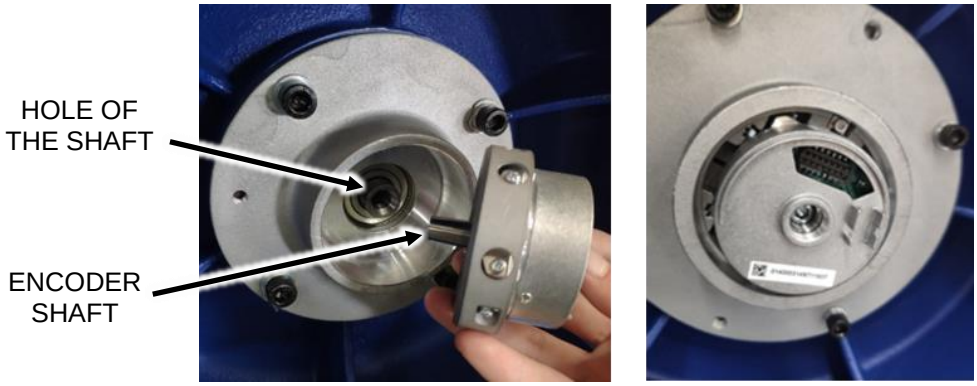



**Figure 26**

3. Install the encoder. Use the bolt M5 to secure the encoder to the encoder cover by hex wrench (4mm). Use 4mm socket Allen and torque wrench to tighten the bolt to 44 in-lbs. See Figure 27.

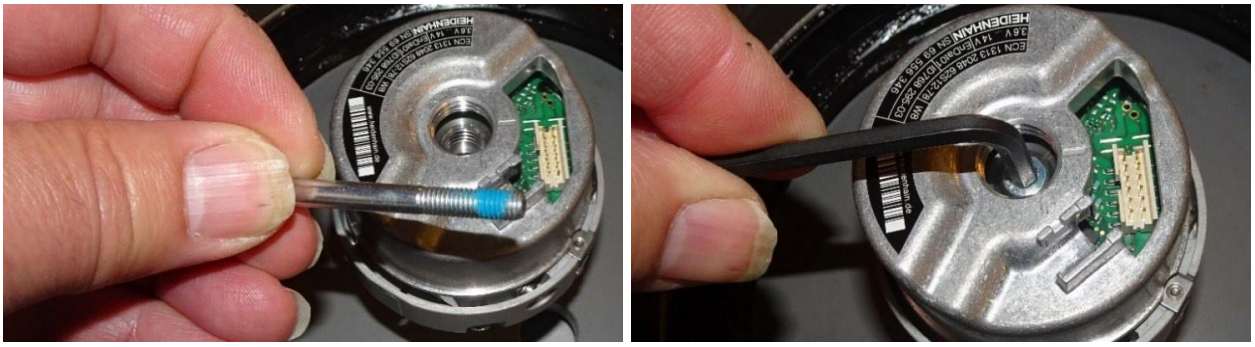


**Figure 27**

4. Rotate the encoder, it should be very flexible at this time, tighten the encoder locking screw according to 11 in-lbs. by a hex wrench so the encoder outer cannot rotate by hand. See Figure 28.

**Figure 28**

5. Install the encoder cable on the encoder. Take care to orient the plug and socket correctly. See Figure 29.

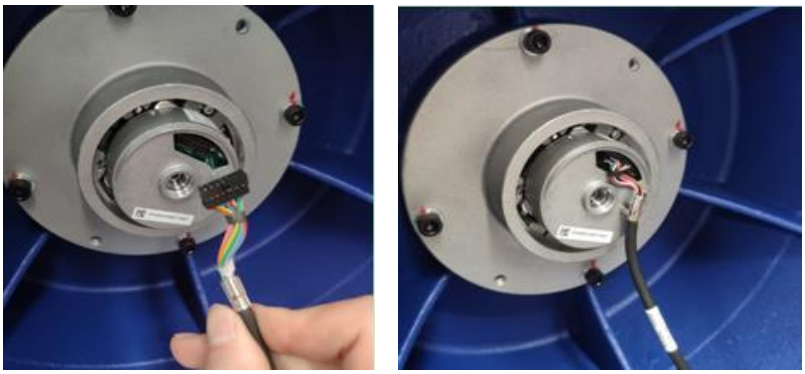


**Figure 29**

6. Place the cable cover on the encoder and secure with the encoder cover bolt (and cover) to the encoder. See Figure 30.

**Figure 30**

7. Reconnect the power supply of machine and test it.

8. Align the encoder per controller instructions.

## 7.2 Brake Replacement

**Required Tools & Materials:**

- Adjustable wrench
- Hex wrench (4 mm, 5 mm)
- Small flat head screwdriver

**WARNING:**

**Before performing any maintenance on the machine brake(s), secure the counterweight and take all the necessary safety precautions to immobilize the car and counterweight to prevent any unintended movement during the maintenance period that may result in injury or death!**

**Read the entire brake replacement procedure before beginning any of the steps outlined below. Contact HWEC with any questions prior to beginning the brake repair or replacement.**

**Before opening any electrical enclosures on the machine, remove all electricity from the machine and brakes to prevent electrical shock that may result in injury or death during the maintenance period!**

### 7.2.1 Brake Removal

1. Remove covers as necessary to access terminal blocks and brake pin set screw (4mm hex key).
2. Disconnect machine power, see Figure 31.

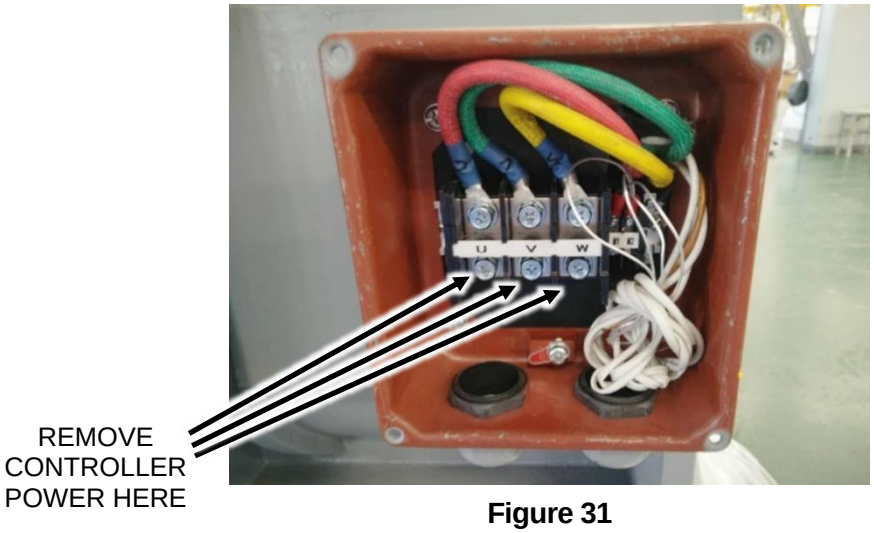



**Figure 31**

3. On the machine side disconnect the Brake and Brake Switch wires for the brake that is to be worked on, see Figure 32.

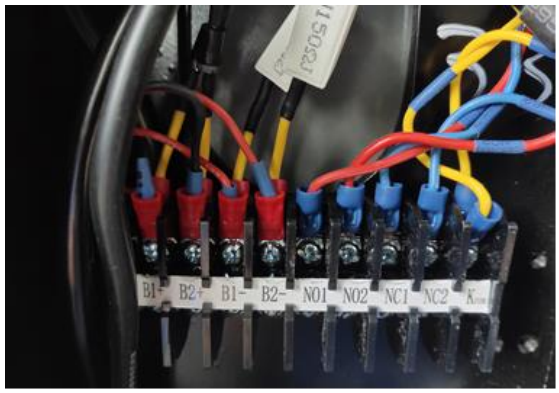



**Figure 32**

4. Use a wrench to loosen the mounting bolt of the installation bolt 1, so that the end face of the guide screw sleeve of the guide screw 2 is separated from the mounting surface of the base.
5. Remove the brake and related connecting accessories.
6. New or repaired brakes are replaced in the reverse order of the above instructions.

7. Adjust the guide screw sleeve of guide screw 2 and the mounting bolt of insulation bolt 1, so that the air gap between the armature of armature 5 and the armature of armature iron 4 is between 0.012” (0.30 mm) to 0.022” (0.55 mm), the gap between the brake belt and the brake wheel is 0.004” (0.10 mm) to 0.006” (0.15 mm), and the distance between the guide screw sleeve of guide screw 2 and the iron surface of armature iron 4 is about 0.197” (5 mm). no less than 0.118” (3 mm) under any conditions, as shown in Figure 33.

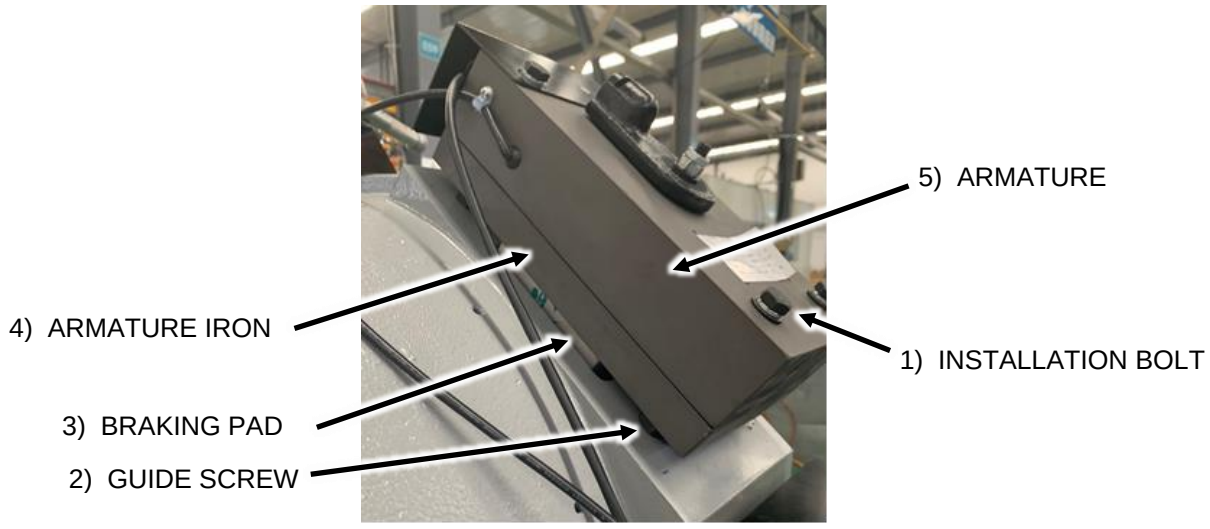



**Figure 33**

## 7.2.2 Brake Adjustment

After installation of the brake, please refer to Section 5.3 to confirm brake is centered and air gap has been restored to factory specifications