



A **VANTAGE** Company

# GLV-40S1 Gearless Machine Instruction Manual (#1196)



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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 Corporation's (HVEC), GLV-40S1 Gearless Machine!

The GLV-40S1 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.

HVEC 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 HVEC 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.

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**GLV-40S1 #1196 GEARLESS TRACTION MACHINE**

## 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-40S1 series machines 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 HVEC. If necessary, do not put these machines into operation without first consulting HVEC.

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

### 3.2 Data Tag

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



<div><div><b>Halliester-Whitney</b> <small>A VINTAGE Company</small></div><div><b>PMAC ELEVATOR TRACTION MACHINE RATINGS</b></div><div><small>MANUFACTURED IN COOPERATION WITH SHENYANG BLUELIGHT DRIVE TECHNOLOGY CO., LTD</small></div></div> <div><small>CSA B44.1 ASME A17.5</small><div><b>155941 C</b> <small>US</small></div></div>			
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 4500 pounds (2040 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.

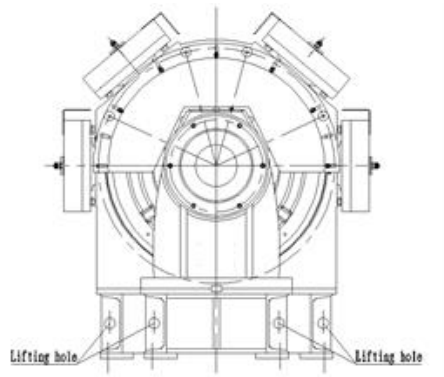


Figure 2

## **WARNING**

**Use only the hoisting method shown 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 than 100 Mohm.

## Section

# 4

## 4 Application

### 4.1 Overview

The GLV-40S1 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, single wrap arrangement at 50% counterbalance with up to a 22000 lb. shaft 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**

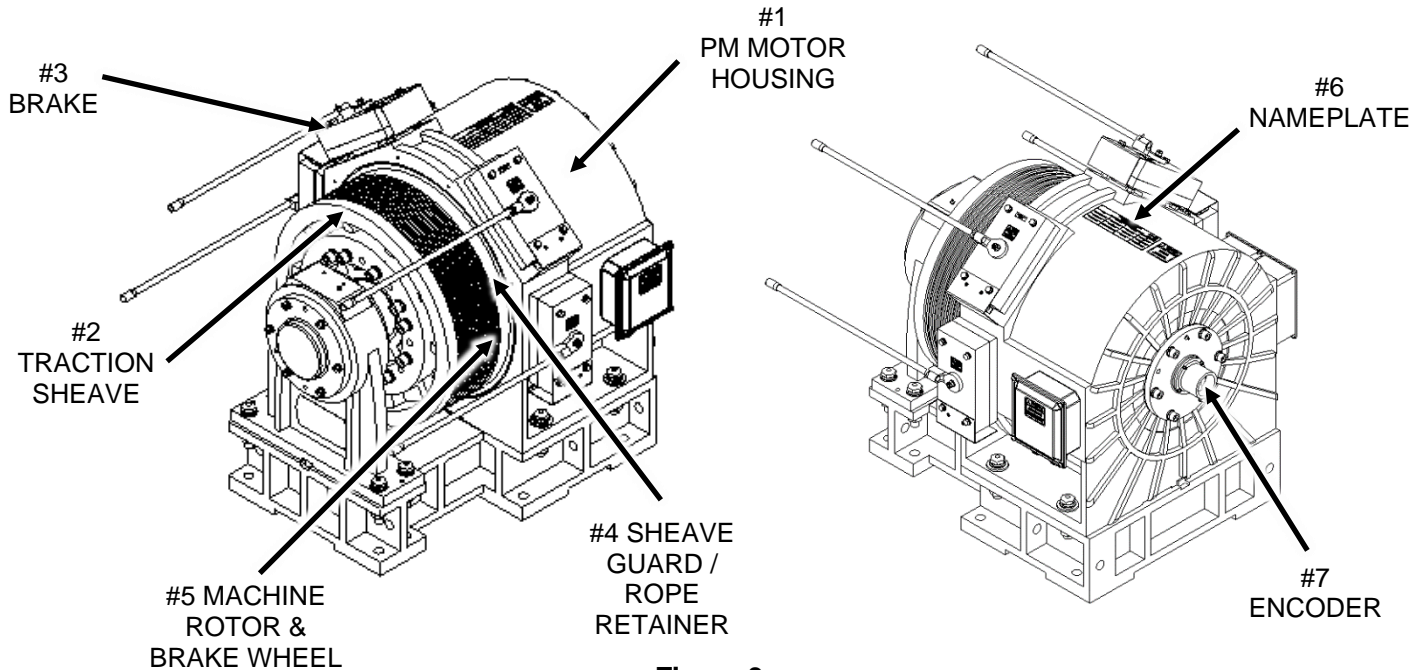
The GLV-40S1 machine brake system uses four block brakes.

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-40S1 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

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**GLV-40S1 #1196 GEARLESS TRACTION MACHINE**



**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**

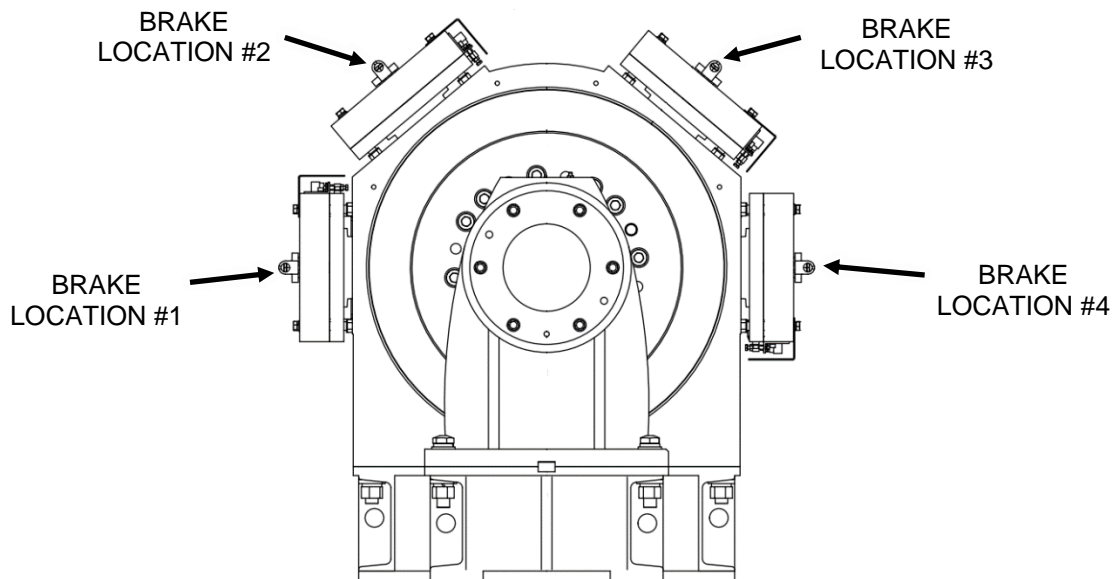
- Traction Sheave (removeable) Diameter: 20 in or 25 in
- Main and emergency disc brakes, each capable of holding 125% of the load
- Brake switches, wired normally close standard
- Heidenhain ECN1313 2048 encoder and 1.5-meter-long cable (standard)
- Sheave guard/rope retainer
- Machine dimensions and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

## GLV-40S1 #1196 GEARLESS TRACTION MACHINE

380V, 25" Wheel, 1:1 Single Wrap Up to 4,000# capacity, Up to 500 fpm, 22000# Sheave Shaft Load													
Capacity (lbs)	Speed (fpm)	Motor Rating (HP)	Motor Rating (kW)	Poles	Rated Voltage (V)	Actual Voltage (V)	Rated Freq (Hz)	Rated Current (A)	Peak Current (A)	Estimated Efficiency (%)	Max Btu/Whr	Estimated Btu/Whr	Rated Torque (ft-lb)
Capacity (lbs)	Speed (fpm)	Motor Rating (HP)	Motor Rating (kW)	Poles	Rated Voltage (V)	Actual Voltage (V)	Rated Freq (Hz)	Rated Current (A)	Peak Current (A)	Estimated Efficiency (%)	Max Btu/Whr	Estimated Btu/Whr	Rated Torque (ft-lb)
2500	100	5.1	3.8	30	320	320	5.8	15.7	41.0	86.8%	2244	218	1459
	150	5.1	3.8	30	320	320	5.8	15.7	41.0	86.8%	2244	218	1459
	200	10.2	7.7	30	30.6	380	312.0	7.7	38.7	87.8%	3244	1095	1764
3000	100	6.0	4.4	30	35.5	380	358.2	9.9	46.3	87.2%	3244	1095	1764
	150	8.9	6.6	30	22.9	380	286.2	8.8	46.3	84.0%	3823	1359	2048
	200	11.9	8.8	30	30.6	380	316.0	7.7	46.3	86.3%	4148	1327	2048
3500	100	7.1	5.3	30	35.5	380	358.2	9.9	55.2	87.2%	4148	1327	2048
	150	10.6	7.9	30	22.9	380	293.3	5.8	55.2	82.1%	4818	1366	2428
	200	14.1	10.5	30	30.6	380	319.0	5.8	55.2	82.1%	4818	1366	2428
4000	100	8.5	6.3	30	35.5	380	358.2	9.9	64.3	85.4%	5263	1584	2428
	150	12.9	9.6	30	22.9	380	293.3	5.8	64.3	80.8%	5825	1684	2731
	200	17.8	13.1	30	30.6	380	319.0	5.8	64.3	80.8%	5825	1684	2731
4500	100	11.8	8.9	30	35.5	380	358.2	9.9	75.8	84.3%	6331	2026	2731
	150	17.8	13.1	30	22.9	380	293.3	5.8	75.8	84.3%	6331	2026	2731
	200	24.7	18.4	30	30.6	380	319.0	7.7	75.8	84.3%	6331	2026	2731
5000	100	12.8	9.6	30	38.2	380	311.0	9.6	86.6	88.7%	6639	2138	1764
	150	18.4	13.6	30	25.9	380	253.7	11.5	86.6	85.5%	7279	2329	2048
	200	25.8	19.2	30	38.2	380	311.0	9.6	86.6	85.5%	7279	2329	2048
5500	100	14.9	11.1	30	45.8	380	253.7	11.5	99.4	89.1%	7740	2477	1764
	150	21.7	16.1	30	38.2	380	293.3	9.6	99.4	88.1%	8512	2648	2048
	200	29.7	22.1	30	45.8	380	253.7	11.5	99.4	88.1%	8512	2648	2048
6000	100	16.5	12.3	30	45.8	380	253.7	11.5	115.2	90.3%	8744	2728	1764
	150	24.7	18.4	30	38.2	380	293.3	9.6	115.2	90.3%	9704	2899	2048
	200	33.7	25.1	30	45.8	380	253.7	11.5	115.2	90.3%	9704	2899	2048
6500	100	18.4	13.6	30	45.8	380	253.7	11.5	135.2	91.3%	9704	2899	2048
	150	27.8	20.7	30	38.2	380	293.3	9.6	135.2	91.3%	10764	3069	2329
	200	38.2	28.5	30	45.8	380	253.7	11.5	135.2	91.3%	10764	3069	2329
7000	100	20.7	15.3	30	51.1	380	232.8	15.2	156.1	92.2%	10764	3069	2329
	150	30.6	22.7	30	38.2	380	293.3	9.6	156.1	91.1%	11824	3239	2609
	200	42.9	31.8	30	51.1	380	232.8	15.2	156.1	91.1%	11824	3239	2609
7500	100	23.1	17.2	30	51.1	380	232.8	15.2	171.4	92.2%	11824	3239	2609
	150	35.3	26.3	30	38.2	380	293.3	9.6	171.4	91.1%	12884	3409	2889
	200	48.9	36.4	30	51.1	380	232.8	15.2	171.4	91.1%	12884	3409	2889
8000	100	25.8	19.2	30	51.1	380	232.8	15.2	186.6	92.2%	12884	3409	2889
	150	38.2	28.5	30	38.2	380	293.3	9.6	186.6	91.1%	13944	3579	3169
	200	52.9	39.7	30	51.1	380	232.8	15.2	186.6	91.1%	13944	3579	3169
8500	100	28.5	21.3	30	51.1	380	232.8	15.2	201.8	92.2%	13944	3579	3169
	150	42.9	31.8	30	38.2	380	293.3	9.6	201.8	91.1%	15004	3749	3449
	200	59.7	44.4	30	51.1	380	232.8	15.2	201.8	91.1%	15004	3749	3449
9000	100	31.8	23.7	30	51.1	380	232.8	15.2	217.0	92.2%	15004	3749	3449
	150	48.9	36.4	30	38.2	380	293.3	9.6	217.0	91.1%	16064	3919	3729
	200	67.8	50.7	30	51.1	380	232.8	15.2	217.0	91.1%	16064	3919	3729
9500	100	35.3	26.3	30	51.1	380	232.8	15.2	232.2	92.2%	16064	3919	3729
	150	52.9	39.7	30	38.2	380	293.3	9.6	232.2	91.1%	17124	4089	4009
	200	72.9	54.0	30	51.1	380	232.8	15.2	232.2	91.1%	17124	4089	4009
10000	100	38.2	28.5	30	51.1	380	232.8	15.2	247.4	92.2%	17124	4089	4009
	150	57.8	42.9	30	38.2	380	293.3	9.6	247.4	91.1%	18184	4259	4289
	200	79.7	58.7	30	51.1	380	232.8	15.2	247.4	91.1%	18184	4259	4289
10500	100	41.9	31.1	30	51.1	380	232.8	15.2	262.6	92.2%	18184	4259	4289
	150	61.9	45.8	30	38.2	380	293.3	9.6	262.6	91.1%	19244	4429	4569
	200	84.9	62.7	30	51.1	380	232.8	15.2	262.6	91.1%	19244	4429	4569
11000	100	45.8	34.0	30	51.1	380	232.8	15.2	277.8	92.2%	19244	4429	4569
	150	67.8	50.7	30	38.2	380	293.3	9.6	277.8	91.1%	20304	4599	4849
	200	92.9	69.1	30	51.1	380	232.8	15.2	277.8	91.1%	20304	4599	4849
11500	100	49.7	36.9	30	51.1	380	232.8	15.2	293.0	92.2%	20304	4599	4849
	150	72.9	54.0	30	38.2	380	293.3	9.6	293.0	91.1%	21364	4769	5129
	200	99.7	73.8	30	51.1	380	232.8	15.2	293.0	91.1%	21364	4769	5129
12000	100	53.7	39.8	30	51.1	380	232.8	15.2	308.2	92.2%	21364	4769	5129
	150	79.7	58.7	30	38.2	380	293.3	9.6	308.2	91.1%	22424	4939	5409
	200	107.9	80.0	30	51.1	380	232.8	15.2	308.2	91.1%	22424	4939	5409
12500	100	57.8	42.9	30	51.1	380	232.8	15.2	323.4	92.2%	22424	4939	5409
	150	84.9	62.7	30	38.2	380	293.3	9.6	323.4	91.1%	23484	5109	5689
	200	112.9	83.6	30	51.1	380	232.8	15.2	323.4	91.1%	23484	5109	5689
13000	100	61.9	45.8	30	51.1	380	232.8	15.2	338.6	92.2%	23484	5109	5689
	150	92.9	69.1	30	38.2	380	293.3	9.6	338.6	91.1%	24544	5279	5969
	200	124.9	92.4	30	51.1	380	232.8	15.2	338.6	91.1%	24544	5279	5969
13500	100	65.8	48.7	30	51.1	380	232.8	15.2	353.8	92.2%	24544	5279	5969
	150	99.7	73.8	30	38.2	380	293.3	9.6	353.8	91.1%	25604	5449	6249
	200	132.9	99.1	30	51.1	380	232.8	15.2	353.8	91.1%	25604	5449	6249
14000	100	69.7	51.7	30	51.1	380	232.8	15.2	369.0	92.2%	25604	5449	6249
	150	107.9	80.0	30	38.2	380	293.3	9.6	369.0	91.1%	26664	5619	6529
	200	142.9	106.6	30	51.1	380	232.8	15.2	369.0	91.1%	26664	5619	6529
14500	100	73.7	54.6	30	51.1	380	232.8	15.2	384.2	92.2%	26664	5619	6529
	150	112.9	83.6	30	38.2	380	293.3	9.6	384.2	91.1%	27724	5789	6809
	200	152.9	112.9	30	51.1	380	232.8	15.2	384.2	91.1%	27724	5789	6809
15000	100	77.7	57.6	30	51.1	380	232.8	15.2	399.4	92.2%	27724	5789	6809
	150	119.9	89.0	30	38.2	380	293.3	9.6	399.4	91.1%	28784	5959	7089
	200	162.9	121.9	30	51.1	380	232.8	15.2	399.4	91.1%	28784	5959	7089
15500	100	81.7	60.5	30	51.1	380	232.8	15.2	414.6	92.2%	28784	5959	7089
	150	124.9	92.4	30	38.2	380	293.3	9.6	414.6	91.1%	29844	6129	7369
	200	169.9	125.9	30	51.1	380	232.8	15.2	414.6	91.1%	29844	6129	7369
16000	100	85.7	63.4	30	51.1	380	232.8	15.2	429.8	92.2%	29844	6129	7369
	150	132.9	98.9	30	38.2	380	293.3	9.6	429.8	91.1%	30904	6299	7649
	200	182.9	135.9	30	51.1	380	232.8	15.2	429.8	91.1%	30904	6299	7649
16500	100	89.7	66.3	30	51.1	380	232.8	15.2	445.0	92.2%	30904	6299	7649
	150	140.9	104.9	30	38.2	380	293.3	9.6	445.0	91.1%	31964	6469	7929
	200	194.9	143.9	30	51.1	380	232.8	15.2	445.0	91.1%	31964	6469	7929
17000	100	93.7	69.2	30	51.1	380	232.8	15.2	460.2	92.2%	31964	6469	7929
	150	148.9	110.9	30	38.2	380	293.3	9.6	460.2	91.1%	33024	6639	8209
	200	204.9	151.9	30	51.1	380	232.8	15.2	460.2	91.1%	33024	6639	8209
17500	100	97.7	72.1	30	51.1	380	232.8	15.2	475.4	92.2%	33024	6639	8209
	150	154.9	114.9	30	38.2	380	293.3	9.6	475.4	91.1%	34084	6809	8489
	200	212.9	157.9	30	51.1	380	232.8	15.2	475.4	91.1%	34084	6809	8489
18000	100												

## **4.5 Brake Specification**

- 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-40S1 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 4500 pounds (2040 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.**

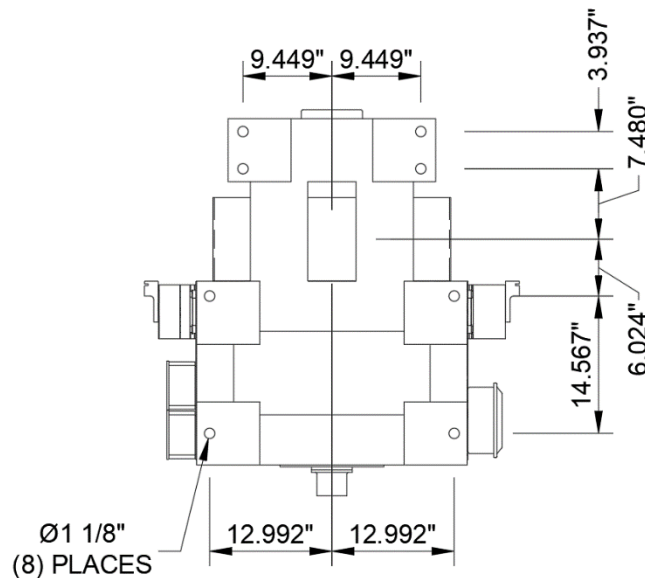


Figure 5



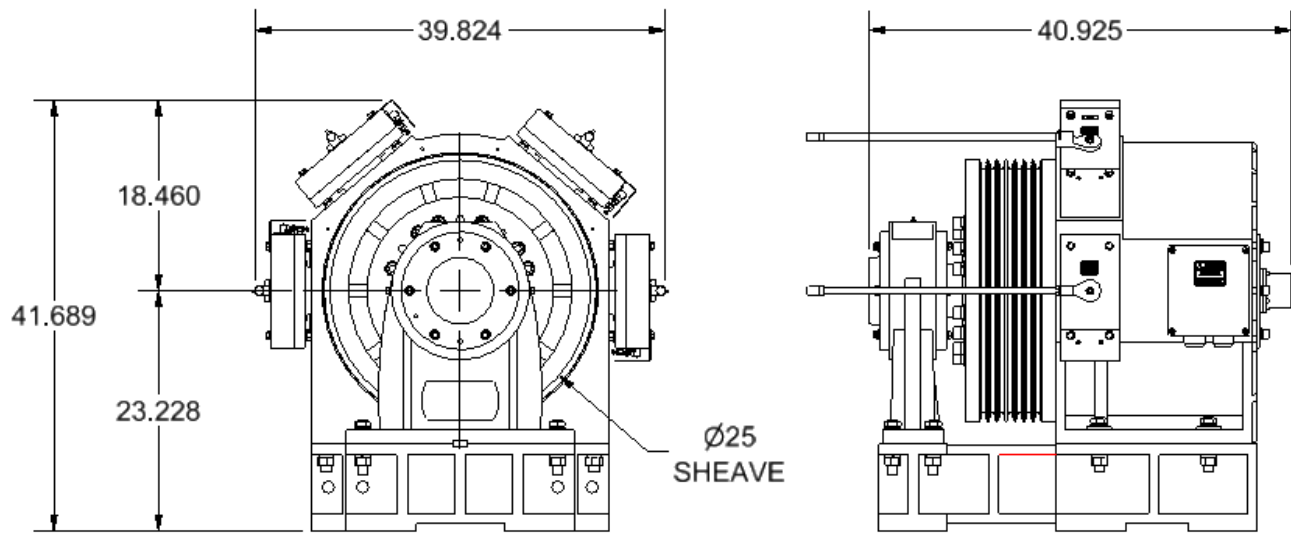


Figure 6

## 5.2 Electrical Connection

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

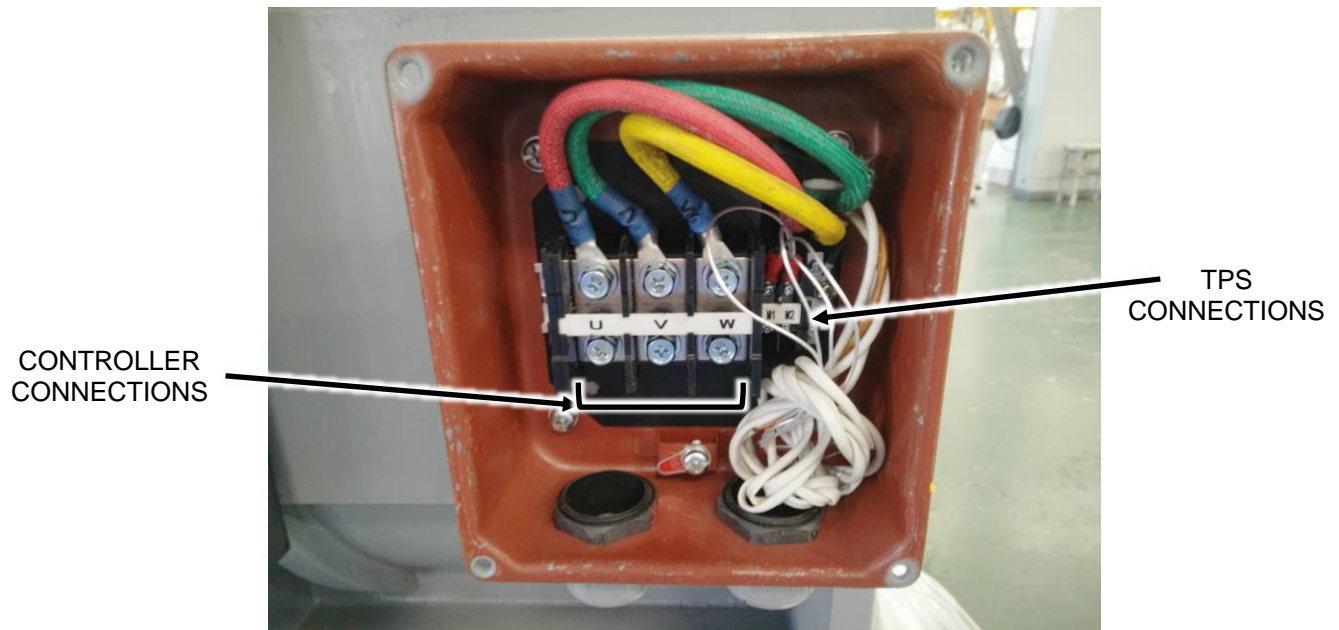
### **WARNING**

**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.

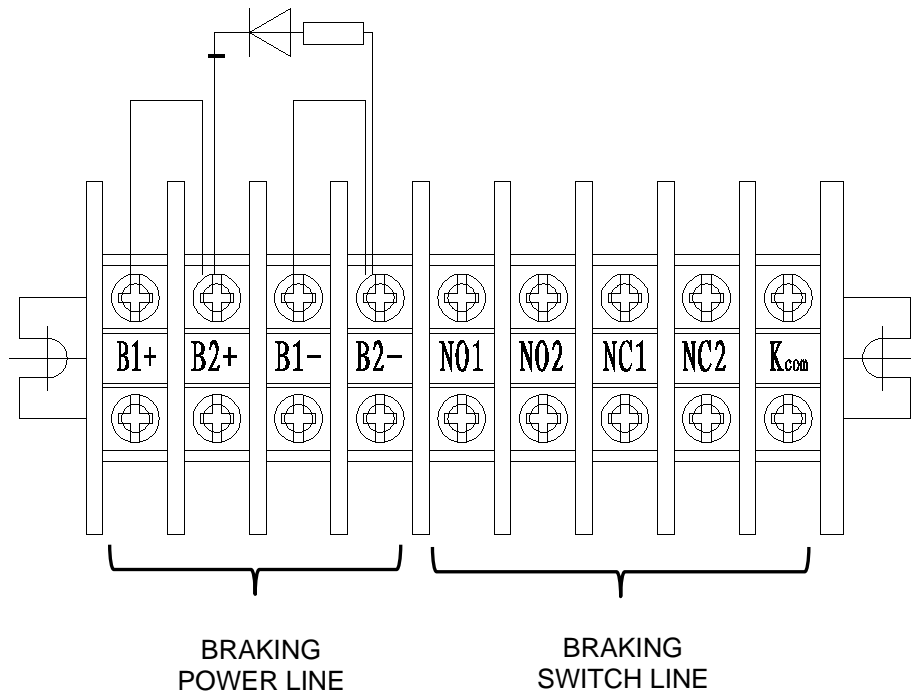


Figure 8

### 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.

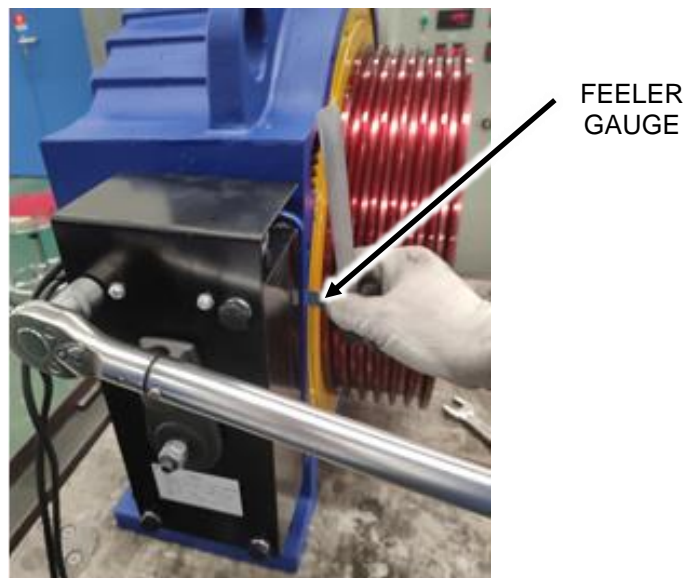
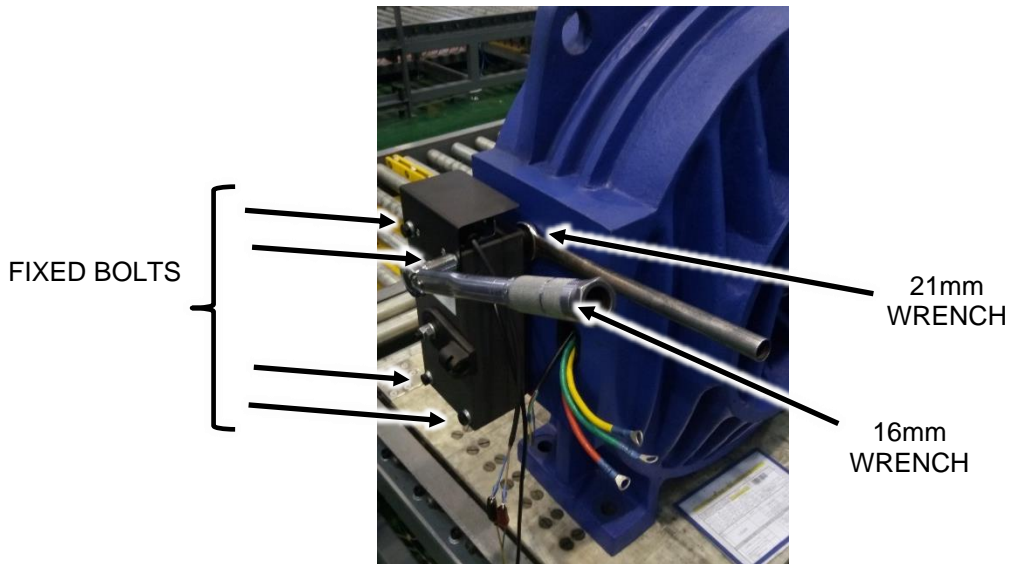


Figure 9

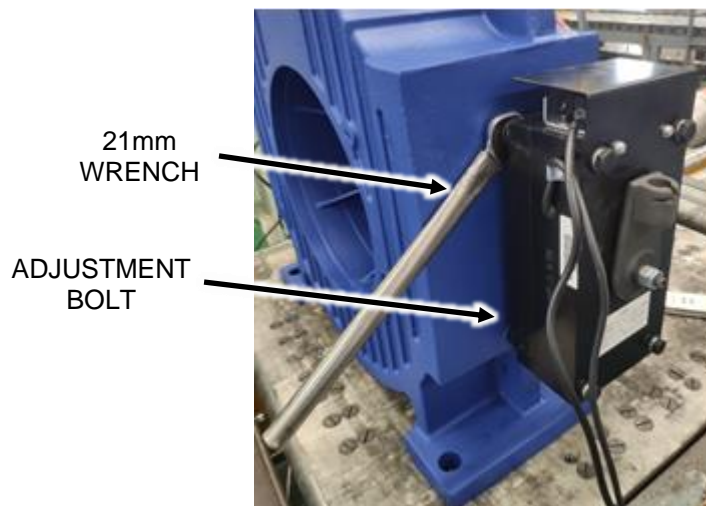
**5.3.1.2 When the air gap of brake is more than 0.022" (0.55 mm), please do as follows:**

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  $\frac{1}{2}$  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.

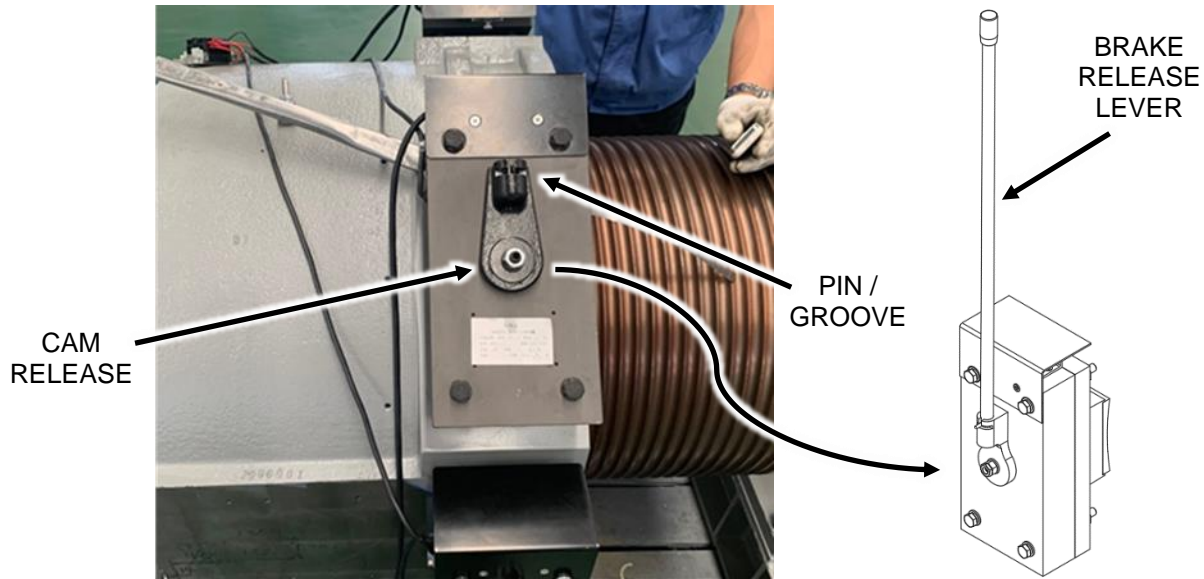
Re-verify the traction sheave is plumb once the machine is fully loaded.



## 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 2 professionals, and make sure the power is shut down first.



**Figure 12**

1. Insert the brake release lever 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 lever until the brake releases from the brake wheel.
3. The 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 50psi) 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.

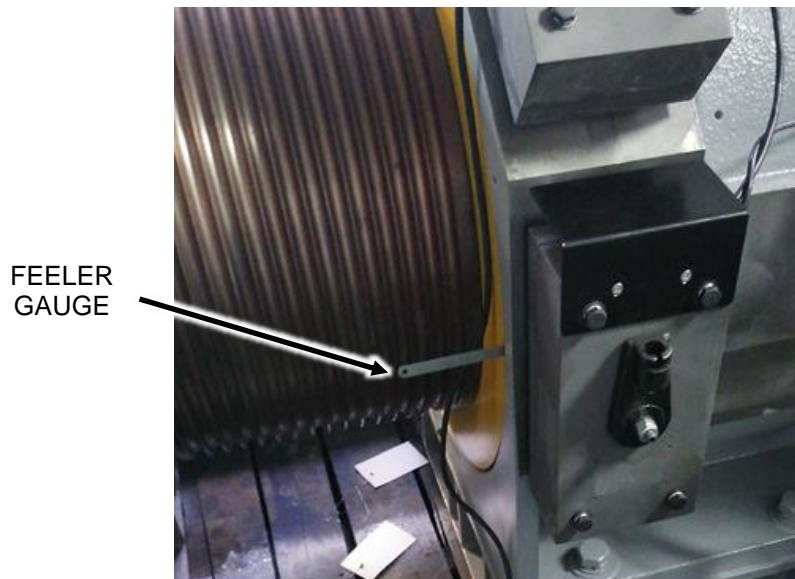


Figure 15

## **6.5 Other Items**

The 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 °C. It can be controlled by the thermal switch in the main machine. When the temperature reaches 130 °C, 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.**

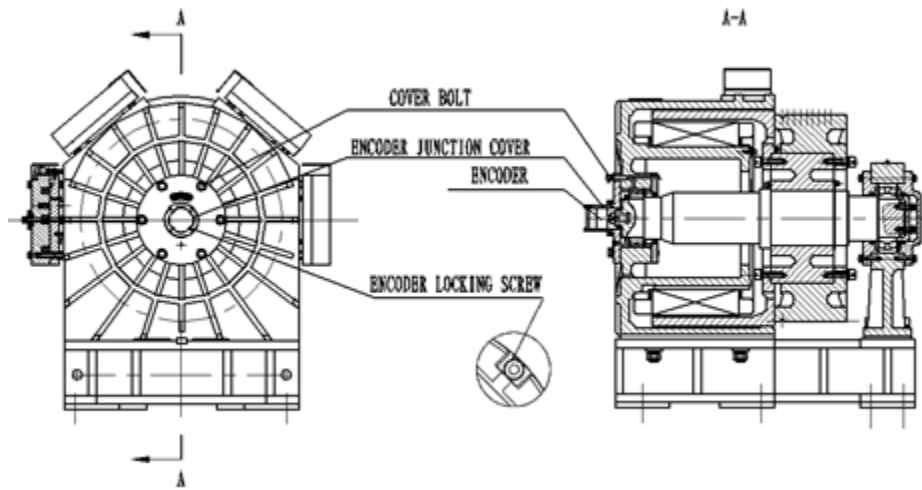
### 7.1 Encoder Replacement

Required Tools & Materials:

- Encoder (ECN1313)
- 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)

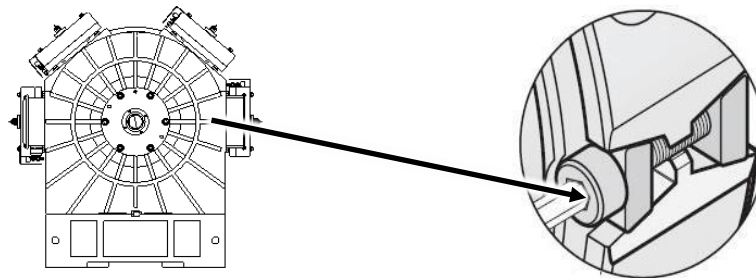
### 7.1.1 Encoder Removal

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.

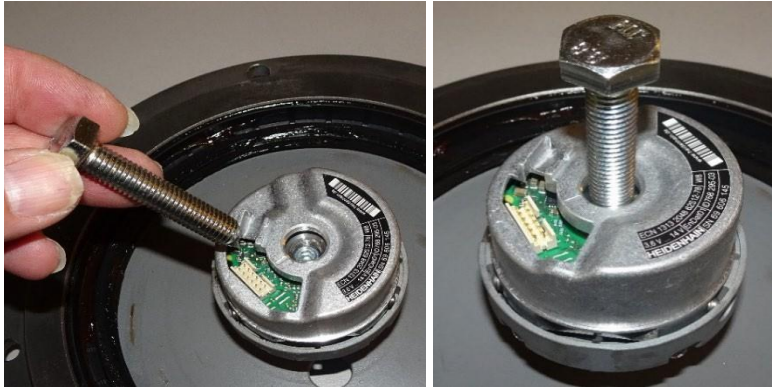
**(M5 bolt must remain in the encoder so the M10 bolt can push against it). See Figure 20.**



**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.



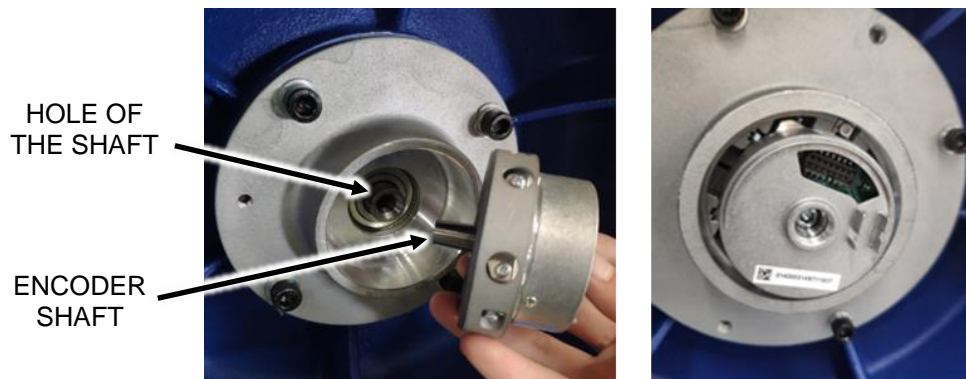
**Figure 24**

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**

# BULLETIN

**GLV-40S1 #1196 GEARLESS TRACTION MACHINE**

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.



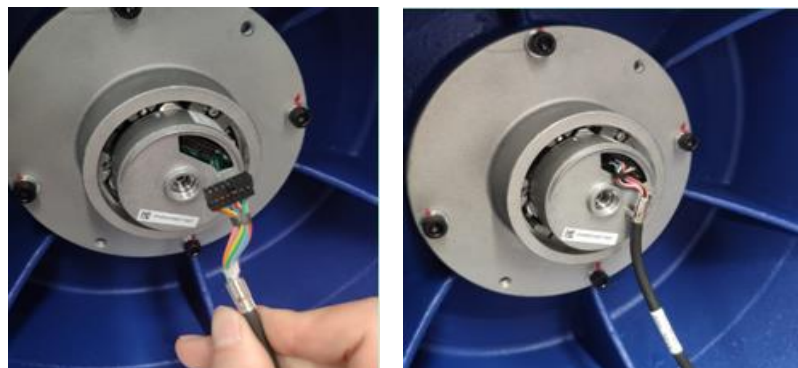
**Figure 27**

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!**

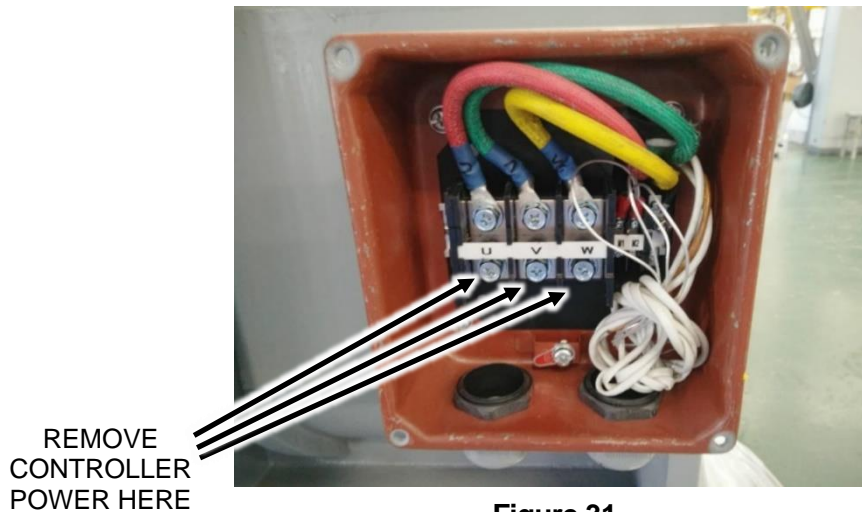
**Read the entire brake replacement procedure before beginning any of the steps outlined below. Contact HVEC with any questions prior to beginning the brake repair or replacement.**

**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!**



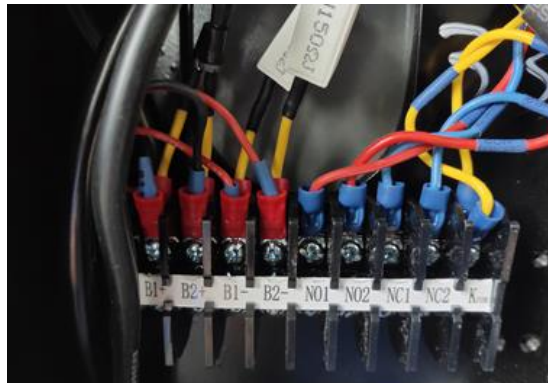
### **7.2.1 Brake Removal**

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**

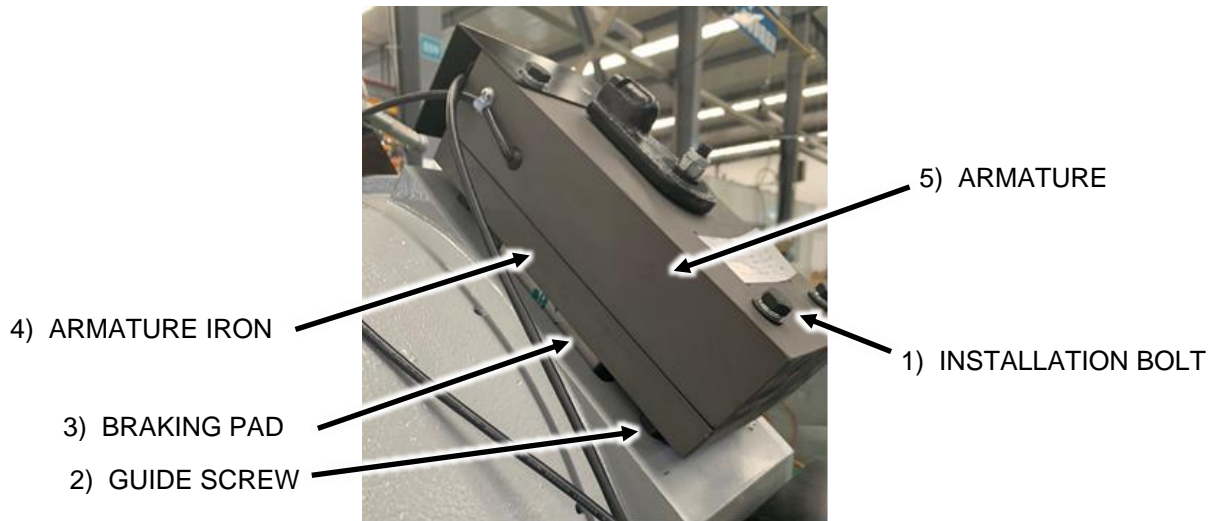
3. On the machine side disconnect the Brake and Brake Switch wires for the brake that is to be worked on, see Figure 32.



**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