Installation & Service Manual
GL080 AC Permanent Magnet Gearless Traction Machine

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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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1 Introduction

1.1 Description

Thank you for choosing the GL080 Permanent Magnet AC Gearless Machine!
The GL080 machine has been designed for use in 2:1 roped, machine room and
machine-room-less (MRL) applications with VVVF controls. The machine is designed
with 20 poles to provide smooth, quiet, and long-lasting operation.

Hollister-Whitney 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 Hollister-Whitney Elevator Co. LLC. 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.
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 SpecificWarnings

⚠️ WARNING

GL080 series machines MUST be balanced during hoisting. See paragraph 3.3 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.
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 Hollister-Whitney. If necessary, do not put these machines into operation without first consulting Hollister-Whitney.

If the machine has gotten wet during transportation, make notice of the claim in the presence of the carrier and notify Hollister-Whitney. See also Section 3.5.

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

![Figure 1 Data Tag](image)

3.2 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.

3.3 Hoisting
The machine weighs approximately 1100 lbs. (500 kg). When the machine is removed from the pallet, it must be lifted by using the hoisting eyebolts provided at the top of the machine.
When lifting the machine, pull straight up on the hoisting eyebolts using a spreader beam or other suitable rigging apparatus to prevent damage to or failure of the eyebolts, which could result in dropping the machine. See Figure 2 for proper lifting illustrations.

![Figure 2 Proper Lifting Illustration](image)

**WARNING**

**Use only the hoisting eyebolts 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.

### 3.4 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.
3.5 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 Hollister-Whitney 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.
4 Application

4.1 Overview

The GL080 series machine is synchronous permanent magnet gearless machine designed for elevators. The machine has 20 poles to provide smooth, quiet and long-lasting operation. Its configuration allows speeds up to 350 fpm (maximum) and an elevator capacity up to 2500 lbs. with 2:1 roping, single wrap arrangement at 50% counterbalance. See Section 4.4 for complete specifications.

The GL080 machine brake system uses two independent disc brakes: a normal brake and an emergency brake.

The following is a list of major components of the GL080 series 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. **Traction Sheave** - A grooved sheave is connected directly to the machine rotor. The grooves provide traction between the sheave and the hoist ropes.

2. **PM Motor Housing** - The housing contains the PM windings used to provide the necessary torque and speed to move the elevator in operation.

3. **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.

4. **Nameplate** – Displays the machine rated data and manual factory serial number information.

5. **Sheave Guard/Rope Retainer** – Provides rope retention and keeps hoist ropes away from contact after rope installation.

6. **Machine Rotor & Brake Disc** - The smooth surfaced disc is connected to the main shaft. When the brake is energized, the brake is released from the brake disc.

7. **Brake** - The electromechanical device is used to prevent the elevator from moving when the car is at rest.

### 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: 15.75 in (400 mm)
- Rope Size: 3/8" dia. (9.5 mm) or 10mm
- Main and emergency disc brakes, each capable of holding 125% of the load
- Brake switches, wired normally open standard
- Heidenhain EnDat01 ECN1313 2048 encoder and 20-meter long cable (standard)
- Eyebolts for hoisting the machine
- Sheave guard/rope retainer

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage (AC)</th>
<th>Current (Amps)</th>
<th>Cap. 2:1 @ 50% CB</th>
<th>System Load*</th>
<th>Car Speed</th>
<th>RPM</th>
<th>Power</th>
<th>Torque</th>
<th>BTU/Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>GL080-35H</td>
<td>460</td>
<td>30</td>
<td>2500 lbs/1134 kg</td>
<td>13228 lbs/6000 kg</td>
<td>350 ft/min/1.78 m/sec</td>
<td>170</td>
<td>19 HP</td>
<td>581 ft/lb</td>
<td>788 Nm</td>
</tr>
</tbody>
</table>

* Note: 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**
4.5 Brake Specifications

- 2 brakes are supplied standard from the factory
- One brake is designated as “Emergency Brake” with a tag/sticker. The other is therefore the primary service brake.
- Brake switch rating 250 VAC 3A
  - Recommended switching current 24 VDC, 10 to 50 mA (minimum switching current 12 VDC, 10mA)
- Switches can be wired –
  - Normally Open – Black & Blue wires (as shipped)
  - Normally Closed – Black & Gray wires

<table>
<thead>
<tr>
<th>Description</th>
<th>UOM</th>
<th>Mayr 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pick (over-excitation) Voltage: 3 seconds max.</td>
<td>VDC</td>
<td>104 @ 1.49A</td>
</tr>
<tr>
<td>Pick Power</td>
<td>W</td>
<td>155</td>
</tr>
<tr>
<td>Hold Voltage</td>
<td>VDC</td>
<td>52 @ 0.75A</td>
</tr>
<tr>
<td>Hold Power</td>
<td>W</td>
<td>39</td>
</tr>
<tr>
<td>Resistance</td>
<td>ohms</td>
<td>69.8</td>
</tr>
</tbody>
</table>

- The machine brakes are mounted in 2 locations.

Machine dimensions and parts list can be found at the end of this book.
- The latest Hollister-Whitney manuals, bulletins and procedures are available for download from the Hollister-Whitney website.
5 Installation

5.1 Machine Mounting

- Before hoisting the machine into place, verify all the hoisting equipment is rated for the 1100 lbs. weight of the machine. See Section 3.3
- 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 and MRL (machine-room-less) applications with down-pull forces on the traction sheave.
- It may be used in a basement application if the machine is inverted and may be mounted horizontally for additional flexibility.

5.1.1 Traditional Overhead Mounting

- Anchor the machine to the structural support surface using the (4) mounting hole locations in the base. The hardware required to anchor the machine to the support surface should be at least 7/8" 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 Mounting Hole Locations](image)

5.1.2 Basement Set Mounting

- When used in a basement application, the machine must be inverted and mounted either within a specially designed tie-down frame supplied by Hollister-Whitney, or to the underside of substantial structural framing supplied by others.
• It is required that the mounting create the necessary “down-pull” on the traction sheave relative to the base mounting.
• Refer to all applicable building codes and ASME A17.1 when selecting hardware to anchor the machine to the structural supports in an up-pull application.
• Use the more stringent criteria between the building codes, ASME-A17.1 and the minimum hardware grades identified above.

5.1.3 Horizontal Mounting
• When used in a horizontal application, the machine must rest on a suitable support and be mounted either with a specially designed tie-down frame supplied by Hollister-Whitney, or to the vertical structural framing supplied by others.
• It is extremely important to follow the brake centering instructions (see Section 5.3) when the machine is mounted horizontally.
• It is required that the mounting create the necessary “down-pull” on the traction sheave relative to the base mounting.
• Refer to all applicable building codes and ASME A17.1 when selecting hardware to anchor the machine to the structural supports in such an application.
• Use the more stringent criteria between the building codes, ASME-A17.1 and the minimum hardware grades identified above.

5.2 Electrical Connection

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

5.2.1 Machine Wiring

⚠️ 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.

• The Thermal Protection Switch (TPS) is wired with leads labeled and supplied into the machine electrical enclosure. Refer to Figure 6.
• 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.
Connect the U-V-W lines from the drive as shown in Figure 6.
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 LEGISLATION AND REGULATIONS IN THE COUNTRY OF USE. THIS IS PARTICULARLY IMPORTANT IN REGARD TO WIRE SIZES USED TO CONNECT THE POWER AND EARTH GROUND AND THE TYPE AND SIZE OF FUSES.**

5.2.2 Brake Connection

- Connect the machine brake and emergency brake where shown in Figure 7 below.
- The brake switches are wired normally open from Hollister-Whitney.
- 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.
5.3 Brake Adjustment/Centering

- Brake air gap is checked with brake de-energized.

- Move rubber dust shield to expose Air Gap.
- Check Air Gap between Coil Carrier Assembly and Armature Disc. Brake Air Gap is factory set and should be approximately 0.020 inch (new condition). See Figure 8.
When brake gap is confirmed check/adjust Stop Bolt so that the brake when picked is centered on the disc (Figure 9). Center will be indicated by an equal gap from brake pad to rotor on both sides. (For 0.02" Air Gap, the Pad/Rotor gap will be approximately 0.01" on both sides.)

Tighten the stop bolt jam nut (Figure 10).

5.4 Encoder Connection

- The machines are supplied with Heidenhain EnDat01 ECN1313 2048. 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.

There are 2 cable classifications, and each has its own color coding per cable. See the attachments at end of this manual for diagrams.

### 5.5 Startup

- Brake Disc (rotor) surfaces should be examined and cleaned of all foreign material prior to startup. See Sections 5.3 and 5.6.
- 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.
- Remove any dirt, grease or rust that may have accumulated on the brake rotor during storage or installation. Use fine sandpaper or emery cloth with light pressure to remove rust from the rotor, taking care to keep the rust and metal dust out of the machine.
- Follow the controller manufacturer's procedure for alignment of the magnets.
- 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.

### 5.6 Brake Burnishing

- Brake Disc (rotor) surfaces should be examined and cleaned of all foreign material. Use only Isopropyl Alcohol (IPA) for brake cleaning. **DO NOT use Commercial Brake Cleaning products** to clean the brakes or brake rotors as these products may affect the brake pad (friction lining) materials. Never spray liquids of any kind directly on Hollister-Whitney equipment. Apply IPA to a clean, lint-free cloth prior to wiping the brake clean. Brake Guide Rods/Pins can be cleaned in the same way.

**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.
- Clamp the brake on the rotor. (De-energize the brake circuit.)
- Run the elevator in the direction of the load at 11 RPM for 1 minute
- If the overall travel of the elevator will not allow the burnishing time listed to be met on 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 full burnishing time has been achieved.
• Stop occasionally to ensure the rotor and brake do not overheat.
• After burnishing, re-verify the air gap between the brake pads and the rotor. For brake check procedure and service follow Section 5.3.
• Air gap should remain at approx. 0.020 inch.

*** NOTE: Air gap can surpass 0.020 inch but must not exceed 0.040 inch. ***

5.7 Manual Brake Release (Optional Equipment)

The manual brake release cable is optional equipment (Figure 11) that should be specified at the time of ordering. The standard cable length is 8'. Other lengths are available by special order up to 30'. H-W does not recommend cable lengths greater than this.

Care must be taken when routing of brake release cables to reduce the number of tight bends. Avoid “looping” extra cable length. Tight bends or looping the cable casing can restrict the movement of cable within the casing and can have an undesirable effect on the ability of the cable to activate the Brake Release mechanism. Best practice is to keep the cable run as straight as possible. Cable bend radius is recommended to be greater than 12” Radius and must not be below 6” minimum radius. Testing of the cable routing is prudent to assure proper operation. If proper operation is not possible with current routing and no other routing options are available, shortening the cable to remove the routing restriction(s) is recommended.
• The brake release handle mounting plate may be mounted in any location that will be easily accessible to maintenance personnel.
• The manual brake release handle must be removed from the mounting plate prior to normal elevator operation.

NOTICE TO THE CUSTOMER:
Concerning sealing Hollister-Whitney PMAC Gearless Machine Brakes:

• As the customer may know, ASTM A17.1-2013/CSA B44-13 states in part (see section 8.6.4.20.4);

…”For elevators installed under ASME A17.1-2000/CSA B44-00 and later editions, have the brake setting verified in accordance with the data on the brake marking plate. Upon completion of the test, the means of adjusting the holding capacity shall be sealed to prevent changing the adjustment without breaking the seal….”

• Hollister-Whitney uses the following MAYR Corporation#6 ROBA-diskstop, #6/894.510.03s disc brakes on the GL080
• These brakes are factory set and holding capacity of these brakes is not adjustable.
• Note again the code statement above; “…the means of adjusting the holding capacity shall be sealed…”
• Since no “means of adjusting the holding capacity” are available, and brake holding capacity is not adjustable, no means are necessary or provided to modify the brake to accept a seal.
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 Hollister-Whitney to outline an overall plan for periodic maintenance. Hollister-Whitney 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.
- Brake Disc (rotor) surfaces should be examined and cleaned of all foreign material. Use only Isopropyl Alcohol (IPA) for brake cleaning. DO NOT use Commercial Brake Cleaning products to clean the brakes or brake rotors as these products may affect the brake pad (friction lining) materials. Never spray liquids of any kind directly on
Hollister-Whitney equipment. Apply IPA to a clean, lint-free cloth prior to wiping the brake clean. Brake Guide Rods/Pins can be cleaned in the same way.

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 ultimately depend on duty and hoistway conditions.

Figure 12
- To grease bearings, first remove the pressure relief plug on the rotor (front) of the machine. See Figure 12.

Figure 13
- The grease point is opposite the relief plug. See Figure 13.
- 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 L₁₀ calculated life rating (based on speed, loads and 50% duty) is approximately 15 years. Please note that installation conditions vary, so shorter or longer bearing life may be experienced.

6.4 Brake Wear

⚠️ **WARNING**

*If the brake lining 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

• Brake Air Gap must be less than 0.04” (1mm)
• Brake air gap is checked with brake de-energized.

Move rubber dust shield to expose Air Gap.

Check Air Gap between Coil Carrier Assembly and Armature Disc. Brake Air Gap (new condition) is should be approximately 0.020” (0.51mm).

The brake lining wear, indicated by the air gap measurement, must be less than 0.04” (1mm). Use feeler gauges to check gap around the brake between Coil Carrier.

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*Figure 14*
Assembly and Armature Disc. If brake wear is excessive replace the brake lining or replace the whole brake assembly. See Figure 14.

6.5 Other Items

- Traction Wheels, Brake Shoes, and Brake Discs are typically the only items that will exhibit any wear. Of these, the Brake Disc is the least likely to exhibit wear. Brake Shoes are also unlikely to wear but can be monitored using feeler gages. Consult the Brake Section of this manual for brake inspection procedures. In general;
  - Check Brake(s) for maximum air gap. If air gap is greater than .040 inch, replace brake pads.
  - With Brake(s) energized, push then pull on Brake Caliper, Brake should slide free on rods (pins). If Brake(s) do not move, clean or replace Brake pins and or Brake Caliper.
  - Check Brake Rotor surface for rust. If rust is present it can be removed with fine sandpaper (suction must be used to remove sanded material). Moisture causing the rust must be eliminated.

- Traction Wheels are the most likely item on the Hollister-Whitney PMAC 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 Traction Wheel and Cables.

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

⚠️ WARNING

Only qualified personnel are allowed to 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 Front Encoder Replacement

Required Tools & Materials:

- Encoder (ECN1313)
- Hex wrench
  - 2mm
  - 4mm
  - 6mm
  - 8mm
- Hex sockets
  - 2mm
  - 4mm
- Torque Wrench (Need to measure 9 in-lbs. and 44 in-lbs.)
- M10 bolt (at least 1” or 25mm in length)
7.1.1 Encoder Removal

1. Rotate the machine so that the encoder locking screw is visible from the access hole on the encoder cover, as shown in Figure 15, Detail B.

2. Loosen the encoder locking screw M2.5, as shown in Figure 16, with hex wrench (2mm) through the encoder cover hole. The screw does not need to be removed.

3. Ensure there is enough encoder cable so that it can be pulled through machine when the encoder is removed.
4. Remove the four bolts (M8x25) using the hex wrench (6mm). See Figure 17.

5. Insert 2 bolts (M8x25) in jacking holes and jack the cover off.

6. Remove Cover and attached Encoder. See Figure 18.

7. Remove the encoder bolt cover using the hex wrench (4mm) and the encoder cable protective cover. See Figure 19.
8. Carefully Remove Wiring Harness, See Figure 20. **Note: Do not apply excessive pressure on the cable. It may destroy the encoder cable.**
9. Leave the encoder cable in the machine. It does not need to be removed.

10. Loosen the bolt M5 inside by hex wrench (4mm) 2~3 turns only. Do not remove this bolt yet (M5 bolt must remain in the encoder so the M10 bolt can push against it). See Figure 21.

11. Insert an M10 bolt into the encoder housing. See Figure 22.
12. 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 23.

13. Remove both bolts and the encoder, Figure 24.
Note: Steps 11 and 12 may have to be repeated until the encoder can be freely removed.
7.1.2 Encoder Installation

1. Loosen and remove the bolt M2.5 and nut assembly in the new encoder. See Figure 26.

2. Flip the screw and nut assembly, and then reinstall it as shown in Figure 27. Be sure the screw can be accessed from outside the machine.
3. Install the encoder to the encoder cover. 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 28.

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

5. Place the cable cover on the encoder and secure with the cover nut (and cover) to the encoder. See Figure 30.
6. Replace Cover and attached Encoder. See Figure 31.
   Note: Verify no encoder wiring is pinched by cover.

7. Install the four bolts (M8x25) using the hex wrench (6mm). See Figure 32.
   Note: Align the M2.5 bolt on the encoder with the hole on the encoder cover so that the M2.5 bolt is visible and accessible from outside of the machine.

8. Tighten the bolt (M2.5) of the encoder collar with the torque wrench and socket Allen wrench (2mm) to 9 in-lbs. through the encoder cover hole. See Figure 33.
9. Reconnect the power supply of machine and test it.
10. Align the encoder per controller instructions.
7.2 Brake Replacement

Required Tools & Materials:
- Adjustable wrench
- Hex wrench (4mm, 5mm)
- Small flat head screwdriver

⚠️ WARNING

Before performing any maintenance on the machine brake(s), land 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 Hollister-Whitney 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

Figure 34

REMOVE CONTROLLER POWER HERE
1. Remove Covers as necessary to access Terminal Blocks and Brake Pin Set Screw (4mm hex key).
2. Disconnect Machine Power, see Figure 34.

3. On the MACHINE side disconnect the Brake and Brake Switch wires for the brake that is to be worked on (Figure 35).

4. Remove the brake centering device (5mm hex key) if so equipped (Figure 36).
5. Loosen the set screw (4mm hex key, Figure 37).

6. Remove the brake pin (Figure 38).
7. Using an adjustable wrench on the brake release lever tip the brake up out of position until the brake clears the rotor. Pressure on the brake release lever opens the brake to allow this to happen (Figure 39).

![Figure 39](image)

8. Slide the brake off the remaining brake pin and transfer it to a convenient work surface (Figure 40).

9. New or repaired brakes are replaced in the reverse order of the above instructions.

10. After new or repaired brakes are installed, follow the procedures for brake burnishing found in Section 5.6. Each brake on the machine must be burnished separately.

**WARNING**

**BRAKES MUST BE BURNISHED TO ACHIEVE FULL STOPPING TORQUE!**

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.

7.2.3 Brake Pad Replacement

- Please refer to Bulletin 1158 at [https://www.hollisterwhitney.com/support/](https://www.hollisterwhitney.com/support/) for instructions. Replacement kit part number is #146-004.

7.2.4 Brake Switch Replacement

- Please refer to Bulletin 1158 at [https://www.hollisterwhitney.com/support/](https://www.hollisterwhitney.com/support/) for instructions. Replacement kit part number is #146-005.
8 Drawings and Support Documents
## 8.1 Parts List

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<th>DESCRIPTION</th>
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<td>1</td>
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<td>SUB-ASSEMBLY - GL080-35 GEARLESS MACHINE</td>
</tr>
<tr>
<td>1.1</td>
<td>1</td>
<td>GL080-001-01</td>
<td>STATOR ASSEMBLY</td>
</tr>
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<td>1</td>
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<td>STATOR FRAME</td>
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<td>GL080-001-04-002</td>
<td>M5 - 0.8 X 12MM SHCS - METRIC</td>
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<td>GL080-001-02</td>
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<td>GL080-001-02-003</td>
<td>ENCODER JUNCTION COVER</td>
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<td>GL080-001-02-004</td>
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<td>GL080-001-02-008B</td>
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<td>GL080-001-04-021</td>
<td>STEEL EYEBOLT - FOR LIFTING</td>
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<td>TB10+60DCK-1409-05P</td>
<td>MOTOR &amp; THERMAL SWITCH TERMINAL BLOCK (NOT SHOWN)</td>
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<td>GL080-001-01-009</td>
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<td>BRACKET - ROPE GUARD</td>
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<td>M5 - 0.8 X 10MM FLANGE HS</td>
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<td>M10 FLAT WASHER</td>
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<td>GL080-001-04-012</td>
<td>M20-2.5 X 30MM</td>
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<td>16</td>
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<td>GL080-001-04-013</td>
<td>M20 JAM (THIN) NUT</td>
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<td>17</td>
<td>2</td>
<td>GL080-001-04-018</td>
<td>GROUNDING LUG (NOT SHOWN)</td>
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<td>18</td>
<td>2</td>
<td>GL080-001-11-04-019</td>
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<td>GL080-001-04-020</td>
<td>HEIDENHAIN ENCODER CABLE W/PLUGS, 1.5 METER LG ID# 730736-22 (NOT SHOWN)</td>
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<td>GL100-146-115</td>
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<td>P-229</td>
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<td>142-050</td>
<td>BLACK VINYL CAP</td>
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<td>1</td>
<td>GL100-159-4</td>
<td>DIN RAIL (NOT SHOWN)</td>
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<td>22</td>
<td>2</td>
<td>GL100-159-5</td>
<td>END STOP (NOT SHOWN)</td>
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<td>23</td>
<td>8</td>
<td>GL100-159-7</td>
<td>TERMINAL BLOCK (NOT SHOWN)</td>
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<tr>
<td>24</td>
<td>1</td>
<td>ENC-1313</td>
<td>HEIDENHAIN ENCODER ID # 768295-03 &quot;ECN1313 2048 62S12-78&quot;</td>
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<td>P-176</td>
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8.3 Isometric View
8.4 Front and Side View
8.5 Top and Bottom View
8.6 Encoder Information
Encoder information begins next page.
Product Information

ECN 1313
ECN 1325
ERN 1387

Rotary Encoders with Plane-Surface Coupling for Elevator Servo Drive Control
ECN/ERN 1300 series

Rotary encoders with integral bearings for elevator technology
- Simple installation
- Rigid shaft coupling
- Plane-surface coupling for large mounting tolerances
- Uniform dimensions for various electrical interfaces

---

mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

1 = Bearing of mating shaft
2 = Bearing of encoder
3 = Required mating dimensions
4 = Measuring point for operating temperature
5 = Screw plug, width A/F 3 and 4. Tightening torque: 5+0.5 Nm
6 = PCB connector
7 = Self-tightening screw M5 x 50 DIN 6912 width A/F 4, tightening torque 5+0.5 Nm
8 = M10 back-off thread
9 = M6 back-off thread
10 = Max. permissible tolerance during motor shaft rotation ±1.5 mm
11 = Max. permissible static radial offset of motor shaft in indicated direction ±0.13 mm
12 = Direction of shaft rotation for output signals as per the interface description
<table>
<thead>
<tr>
<th><strong>Absolute</strong></th>
<th><strong>ECN 1325</strong></th>
<th><strong>ECN 1313</strong></th>
<th><strong>Incremental</strong></th>
<th><strong>ERN 1387</strong></th>
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<tr>
<td><strong>Part number</strong></td>
<td>683643-xx</td>
<td>768295-xx</td>
<td>749146-xx</td>
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<tr>
<td><strong>Interface</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>EnDat 2.2</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Ordering designation</strong></td>
<td>EnDat22</td>
<td>EnDat01</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Position values/revolution</strong></td>
<td>33554432 (25 bits)</td>
<td>8192 (13 bits)</td>
<td>Z1 track&lt;sup&gt;3&lt;/sup&gt;</td>
<td>–</td>
</tr>
<tr>
<td><strong>Electrically permissible speed/error</strong>&lt;sup&gt;2&lt;/sup&gt;</td>
<td>≤ 15000 rpm (for continuous position value)</td>
<td>≤ 15000 rpm/±1 LSB</td>
<td>≤ 12000 rpm/±50 LSB</td>
<td>–</td>
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<tr>
<td><strong>Calculation time t&lt;sub&gt;cal&lt;/sub&gt;</strong></td>
<td>≤ 7 µs</td>
<td>≤ 9 µs</td>
<td>≤ 2 MHz</td>
<td>–</td>
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<tr>
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<td>≤ 16 MHz</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Incremental signals</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Line count/system accuracy</strong></td>
<td>2048/±20°</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Reference mark</strong></td>
<td>–</td>
<td>One</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Cutoff frequency –3 dB</strong></td>
<td>–</td>
<td>≥ 400 kHz</td>
<td>≥ 210 kHz</td>
<td>–</td>
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<td><strong>Electrical connection</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Rotary encoder: 12-pin</td>
<td>12-pin</td>
<td>14-pin</td>
<td>–</td>
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<tr>
<td><strong>Via PCB connector</strong></td>
<td>temperature sensor&lt;sup&gt;4&lt;/sup&gt;: 4-pin</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Voltage supply</strong></td>
<td>DC 3.6 V to 14 V</td>
<td>DC 5 V ±0.25 V</td>
<td>–</td>
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<td><strong>Power consumption</strong>&lt;sup&gt;1&lt;/sup&gt; (maximum)</td>
<td>3.6 V: ≤ 600 mW</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Current consumption</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>14 V: ≤ 700 mW</td>
<td>–</td>
<td>–</td>
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<td><strong>Stator coupling</strong></td>
<td>Plane-surface coupling</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Shaft</strong></td>
<td>Taper shaft Ø 9.25 mm; taper 1:10</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Mech. permiss. speed n</strong></td>
<td>≤ 2000 rpm</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Starting torque</strong></td>
<td>≤ 0.01 Nm (at 20 °C)</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Moment of inertia of rotor</strong></td>
<td>2.6 · 10&lt;sup&gt;-6&lt;/sup&gt; kgm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Permissible axial motion of measured shaft</strong>&lt;sup&gt;5&lt;/sup&gt;</td>
<td>±1.5 mm</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Radial runout of the measured shaft</strong></td>
<td>0.13 mm</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Vibration</strong>&lt;sup&gt;55 Hz to 2000 Hz**</td>
<td>≤ 300 m/s&lt;sup&gt;2&lt;/sup&gt;&lt;sup&gt;6&lt;/sup&gt; (EN 60068-2-6)</td>
<td>≤ 2000 m/s&lt;sup&gt;2&lt;/sup&gt; (EN 60068-2-27)</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Shock</strong>&lt;sup&gt;6 ms**</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>–40 °C to +115 °C</td>
<td>–40 °C to +120 °C</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Protection</strong>&lt;sup&gt;4&lt;/sup&gt;</td>
<td>IP40 when mounted</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td><strong>Mass</strong></td>
<td>≈ 0.25 kg</td>
<td>–</td>
<td>–</td>
<td>–</td>
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</tbody>
</table>

<sup>1</sup> See *Interfaces of HEIDENHAIN Encoders* brochure

<sup>2</sup> Velocity-dependent deviations between the absolute value and incremental signals

<sup>3</sup> One sine and one cosine signal per revolution

<sup>4</sup> Evaluation optimized for KTY 84-130

<sup>5</sup> Compensation of mounting tolerances and thermal expansion, not dynamic motion

<sup>6</sup> As per standard for room temperature; for operating temperature Up to +100 °C: ≤ 300 nV/s<sup>2</sup>

Up to +115 °C or +120 °C: ≤ 150 nV/s<sup>2</sup>
**Electrical connection**

### Pin layouts

#### ECN 1313 pin layout

**17-pin coupling or flange socket M23**

- **Power supply**
  - 7
  - 1
  - 10
  - 4
  - 11
  - 15
  - 16
  - 12
  - 13
  - 14
  - 17
  - 8
  - 9
- **Incremental signals**
  - 2a
  - 5b
  - 4a
  - 3b
  - 6b
  - 1a
  - 2b
  - 5a
- **Serial data transfer**
  - 1b
  - 6a
  - 4b
  - 3a
  - /
- **Internal shield**
  - A+
  - A–
  - B+
  - B–
- **Data**
  - 12

**12-pin PCB connector**

- **Up**
  - Sensor
  - 0 V
  - Sensor
  - 0 V
- **internal shield**
  - Brown/Green
  - Blue
  - White/Green
  - White
- **Sensor**
  - 0 V
  - 0 V
  - 0 V
- **Violet**
  - Yellow

#### ECN 1325 pin layout

**8-pin coupling or flange socket, M12**

- **Voltage supply**
  - 8
  - 2
  - 5
  - 1
  - 3
  - 4
  - 7
  - 6
  - /
  - /
- **Serial data transfer**
  - M12
  - 16
  - 9
  - M23
  - 1b
  - 6a
  - 4b
  - 3a
  - 6b
  - 1a
  - 2b
  - 5a
  - 8a
  - 8b
- **Other signals**
  - Brown/Green
  - Blue
  - White/Green
  - White
  - Gray
  - Pink
  - Violet
  - Yellow
  - Brown
  - Green

**16-pin PCB connector**

- **Up**
  - Sensor
  - 0 V
  - Sensor
  - 0 V
- **Internal shield**
  - Brown/Green
  - Blue
  - White/Green
  - White
- **Data**
  - 12

**Cable shield connected to housing**

- **Up** = Power supply voltage; **T** = Temperature

**Sensor:** The sensor line is connected in the encoder with the corresponding power line. Vacant pins or wires must not be used.

---

1) Only with ordering designations EnDat 01 and EnDat 02

2) Only for cables inside the motor housing
### ERN 1387 pin layout

#### 17-pin coupling or flange socket M23

<table>
<thead>
<tr>
<th>Voltage supply</th>
<th>Incremental signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 1 10 4 11 15 16 12 13 3 2</td>
<td>1b 7a 5b 3a / 6b 2a 3b 5a 4b 4a</td>
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<table>
<thead>
<tr>
<th>U_p</th>
<th>Sensor</th>
<th>0 V</th>
<th>Sensor</th>
<th>0 V</th>
<th>Internal shield</th>
<th>A+</th>
<th>A-</th>
<th>B+</th>
<th>B-</th>
<th>R+</th>
<th>R-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown/ Green</td>
<td>Blue</td>
<td>White/ Green</td>
<td>White</td>
<td>/</td>
<td>Green/ Black</td>
<td>Yellow/ Black</td>
<td>Blue/Black</td>
<td>Red/Black</td>
<td>Red</td>
<td>Black</td>
<td></td>
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</tbody>
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<td>7b 1a 2b 6a / /</td>
</tr>
</tbody>
</table>

Cable shield connected to housing;

**U_p** = Power supply; **T** = Temperature

**Sensor:** The sensor line is connected internally with the corresponding power line. Vacant pins or wires must not be used.

1) Only for cables inside the motor housing
PINOUT DETAIL
SCALE 4:1

NOTES: HEIDENHAIN CABLE ASSEMBLY. REF. ID No. 730736-22

291614-02 PLUG
SEE PINOUT DETAIL ABOVE REF. HEIDENHAIN DRAWING #D332202-05-A-01 FOR PLUG AND CABLE

59.1 ± 1.0 in
[1500.0 ± 25.4 mm]

291698-25 PLUG TO FIT CONTROLLER EXTENSION CORD

WEIGHT: 0.5 lbmass

HOLLISTER-WHITNEY ELEVATOR CO. LLC

ENCODER CABLE WITH PLUGS - 1.5 METER LENGTH

THIRD ANGLE PROJECTION

IN THIS DRAWING IS SUPPLIED AS A REPRESENTATION OF THE EQUIPMENT HOLLISTER-WHITNEY ELEVATOR CO. LLC (MANUFACTURER) HAS AGREED TO SUPPLY. SLIGHT ADJUSTMENTS MAY OCCUR DURING MANUFACTURING AND INSTALLATION. ANY MODIFICATIONS NOT APPROVED IN WRITING BY MANUFACTURER MAY AFFECT OPERATION, voids any warranty and releases manufacturer of all liability. THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION THAT CANNOT BE REPRODUCED OR DIVULGED, IN WHOLE OR IN PART, WITHOUT WRITTEN AUTHORIZATION FROM THE MANUFACTURER.
CABLE LENGTH OVER 40 METERS

Stiftsteckverbinder: SUB-D 15 pol. Metallgehäuse mit Schirmanbindung Gehäusebreite max 31 mm

Kabel: (4 x (2x0,25) + 2 x 1,0) Geeignet für Energieführungsketten Helixkabel Topgeber 510 77750 Aderforde keine noch DIN 47100

Buchsensteckverbinder: Metallgehäuse mit Schirmanbindung, Kontaktbuchsen

Hersteller 1: Intercontac
Typ: ASTA 035 FR 11 12 0005 000

Hersteller 2: Interconnection
Typ: SPN A 178 NN NN 169

Hersteller 3: Coninvers
Typ: RC-17 SINBA R300

DETAIL X
Kabelkennzeichnung mit KEB Art. Nr. auf dem Kabelmantel an beiden Steckerseiten. Bei Längen unter 1m nur einseitig.

Kabelmantel muß bis in das Steckergehäuse geführt werden. Lötkontakte im Stecker mit Schrumpfschlauch isolieren.

violett (B-) VIOLET
blau (B+) BLUE
braun (A-) BROWN (0.25mm wire)
grün (A+) GREEN
rot (Takt-) RED
schwarz (Takt+) BLACK

blau (5V) BROWN (1.0mm wire)
weiß und alle Innenschirme (GND) WHITE
rosa (Data-) PINK
grau (Data+) GREY

00.F5.0C1−LxPx KABELLÄNGE x, x METER
00.F5.0C1−Lxxx KABELLÄNGE xxx METER

ANSICHT KABELSEITE

Geberkabel F5
Zeichnungs-Nr./Drawing No. 00.F5.0C1−L005

Format Scale 1:1
Datum 06.06.07 Name Horn
gez. = ✓ = ✓ S100 Rz 100
prg. ✓ = ✓ S25 Rz 25
Format Size Modellab Stand Scale 6.3 ✓ ✓

Nr.: Datum Name Rohstoff Size of Sr. Abmessungen Abmessungen
Keine Maße aus der Zeichnung abnehmen/Do not scale Alle Maße in Millimeter/All dimensions in millimetres
<table>
<thead>
<tr>
<th>German</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROT</td>
<td>RED</td>
</tr>
<tr>
<td>BLAU</td>
<td>BLUE</td>
</tr>
<tr>
<td>GELB</td>
<td>YELLOW</td>
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<tr>
<td>GRÜN</td>
<td>GREEN</td>
</tr>
<tr>
<td>VIOLETT</td>
<td>VIOLET</td>
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<tr>
<td>SCHWARZ</td>
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<td>WEIß</td>
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