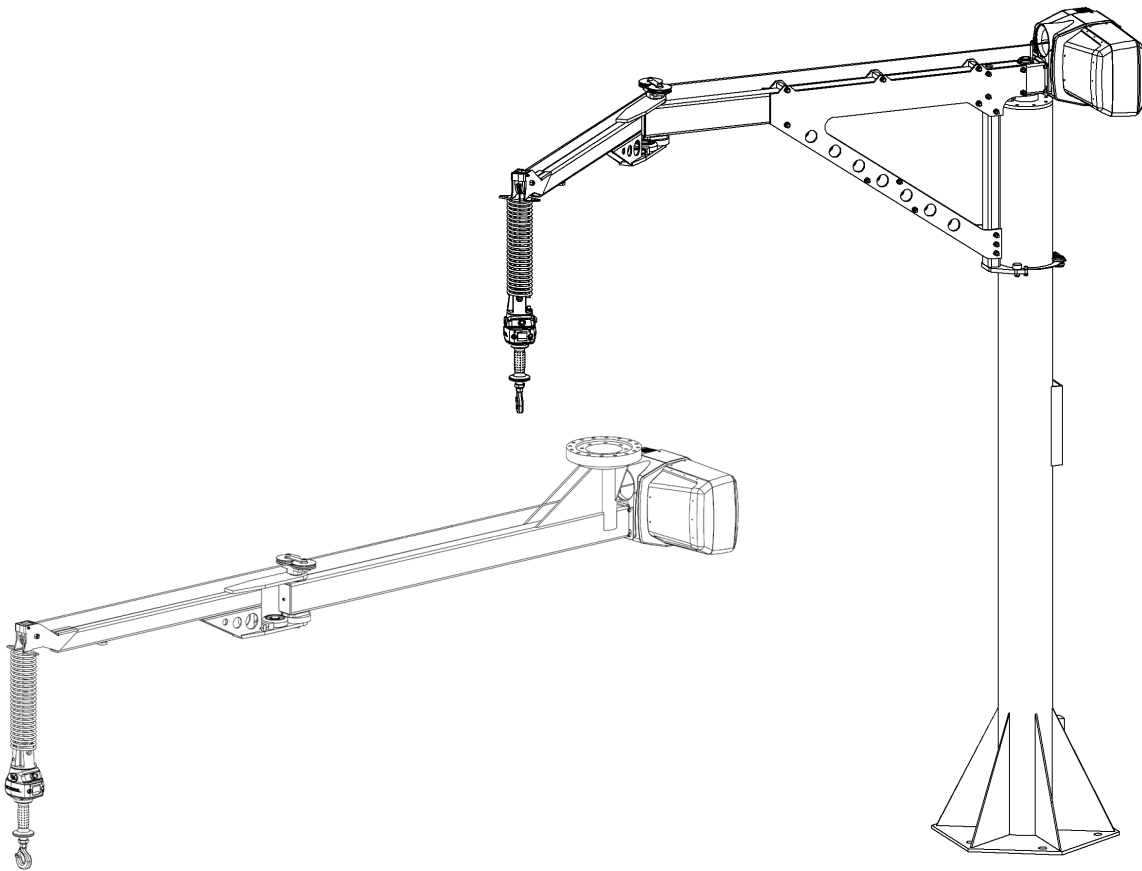


Installation & Operation Manual



**IMPORTANT!
DO NOT DESTROY**

Easy Arm® Q and iQ Series

Gorbel® Customer Order No. / Serial No. _____

Gorbel® Dealer _____

Date _____
Month Year

Distributed by Ergonomic Partners
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Questions? Concerns? Comments? Please call (314) 884-8884 (US and Canada).

SAFE HOIST OPERATING GUIDELINES

General

There is no one single factor that is more important for minimizing the possibility of personal injury to the operator and those working in the area, or damage to property, equipment, or material than being familiar with the equipment and using Safe Operating Practices.

Hoists/trolleys are designed for lifting and transporting of material only. Under no circumstances, either during initial installation or in any other use, should the hoist be used for lifting or transporting personnel.

No operator should be permitted to use the equipment that is not familiar with its operation, is not physically or mentally fit, or has not been schooled in safe operating practices. The misuse of hoists can lead to certain hazards which cannot be protected against by mechanical means; hazards which can only be avoided by the exercise of intelligence, care, and common sense.

Safe Operating Practices also involve a program of periodic inspection and preventative maintenance (covered in a separate section). Part of the operator's training should be an awareness of potential malfunctions/hazards requiring adjustments or repairs, and bringing these to the attention of supervision for corrective action.

Supervision and management also have an important role to play in any safety program by ensuring that a maintenance schedule is adhered to, and that the equipment provided for the operators is suitable for the job intended without violation of one or more of the rules covering safe operating practices and good common sense.

The Safe Operating Practices shown are taken in part from the following publications:

- American National Standard Institute (ANSI)
- Safety Standards for Cranes, Derricks, Hoists
- ANSI B30.2 - Overhead and Gantry Cranes
- ANSI B30.16 - Overhead Hoists

Do's and Don'ts (Safe Operation of Hoists)

The following are Do's and Don'ts for safe operation of overhead hoists. A few minutes spent reading these rules can make an operator aware of dangerous practices to avoid and precautions to take for his own safety and the safety of others. Frequent examinations and periodic inspections of the equipment as well as a conscientious observance of safety rules may save lives as well as time and money.

DON'TS - HOISTS

1. Never lift or transport a load until all personnel are clear and do not transport the load over personnel.
2. Do not allow any unqualified personnel to operate hoist.
3. Never pick up a load beyond the capacity rating appearing on the hoist. Overloading can be caused by jerking as well as by static overload.
4. Never carry personnel on the hook or the load.
5. Do not operate hoist if you are not physically fit.
6. Do not operate hoist to extreme limits of travel of cable without first checking for proper limit switch action.

7. Avoid sharp contact between two hoists or between hoist and end stop.
8. Do not tamper with or adjust any parts of the hoist unless specifically authorized to do so.
9. Never use the load cable as a sling.
10. Do not divert attention from load while operating hoist.
11. Never leave a suspended load unattended.
12. Do not use limit switch(es) for normal operating stop(s). These are safety devices only and should be checked on a regular basis for proper operation.
13. Never operate a hoist that has an inherent or suspected mechanical or electrical defect.
14. Do not use load cable as a ground for welding. Never touch a live welding electrode to the load cable.
15. Do not jog controls unnecessarily. Hoist motors are generally high torque, high slip types. Each start causes an inrush of current greater than the running current and leads to overheating and current failure, or burnout, if continued to excess.
16. Do not operate hoist if load is not centered under hoist.
17. Do not operate hoist if cable is twisted, kinked, or damaged.
18. Do not remove or obscure label.
19. Do not permanently activate operator present sensor.

DO'S - HOISTS

1. Read and follow manufacturer's instruction, installation, and maintenance manuals. When repairing or maintaining a hoist, use only manufacturer's recommended parts and materials.
2. Read and follow all instruction and warning information on or attached to a hoist.
3. Remove the hoist from service and thoroughly inspect and repair, as necessary, if unusual performance or visual defects (such as peculiar noise, jerky operations, travel in improper direction, or obviously damaged parts) are noticed.
4. Establish a regular schedule of inspection and maintain records for all hoists with special attention given to hooks, load cables, brakes, and limit switches.
5. Check operation of brakes for excessive drift.
6. Never lift loads over people, etc.
7. Check for damaged hooks and load cable.
8. Keep load cable clean and well maintained.
9. Check the load cable for improper seating, twisting, kinking, wear, or other defects before operating the hoist.
10. Make sure a load clears neighboring stockpiles, machinery, or other obstructions when raising, lowering, or traveling the load.
11. Center hoist over the load before operating.
12. Avoid swinging of load or load hook when traveling the hoist.
13. Be sure the load attachment is properly seated in the saddle of the hook. Balance load properly before handling. Avoid hook tip loading.
14. Pull in a straight line, so that neither hoist body nor load cable are angled around an object.
15. Take up slack slowly.
16. Know the hand signals for hoisting, cross travel, and crane travel if working with cab-operated hoists or cranes. Operators should accept signals of only those persons authorized to give them.

WARNINGS

IMPORTANT SAFETY INSTRUCTIONS

WARNINGS

1. All operators should read the Easy Arm® Installation and Operation Manual before operating the unit.
2. Check wire rope for improper seating, twisting, kinking, wear, or defects before operating.
3. Check the coil cord for improper seating, twisting, kinking, wear, or defects before operating. Any of the described conditions will seriously reduce the life of the coil cord and lead to premature failure.
4. Press the G-Force® logo button for Float Mode (option) with only the load weight hanging from the unit. Additional external forces applied to the load during initiation of Float Mode will result in the load drifting.
5. Avoid repeatedly impacting the Easy Arm® into the rotation stops.
6. The Easy Arm® does not meet “wash-down” environment requirements. The Easy Arm® does not meet “explosion proof” requirements.
7. Ensure that the slide handle is supported properly in remote mounted handle applications by mounting the slide handle at both the top and bottom mounting points (**diagram D**, page 30).
8. Do not mount any objects to the Easy Arm® slide handle grip (i.e. switches). Additional objects may interfere with the travel of the sliding handle grip and affect the overall speed and functionality of the unit.
9. Do not mount any load bearing components to the blue housing of the Easy Arm® slide handle, pendant handle, or actuator assembly.

TOOLING INTEGRATION GUIDELINES

1. All tooling must be retained to the G360™ assembly utilizing the M16 thread and locking pin provided. The locking pin is optional on Slide Handle and Wire Rope Swivel assemblies if proper inspection and maintenance procedures are followed.
2. Do not mount anything to the Easy Arm® handle housing. Use supplied brackets, valves, and switches whenever possible.
3. In-line tooling must always be centered directly under the hand controller.
4. Tooling design which does not keep the tooling level; and balanced in both the loaded and unloaded condition may induce a bending force on the handle and/or collector assembly which may reduce the life and/or performance of the handle and/or collector assembly.
5. Do not mount anything to the sliding portion of the Easy Arm® hand controller.
6. Do not alter or add conductors to the Easy Arm® coil cord.
7. Use only Gorbel's slide on air hose (slides over coil cord) to supply air power to end effector tooling. Gorbel cannot guarantee performance or functionality of other methods of supplying air power to end effector tooling.
8. All cables used in a remote mounted handle configuration must be properly clamped and/or strain-relieved to prevent premature failure of the Easy Arm® or customer tooling.

INTRODUCTION

Thank you for choosing a Gorbel® Easy Arm® Crane** to solve your material handling needs. The innovative design and heavy-duty construction of the Easy Arm® will provide a superior quality product that will offer years of long term value. A Gorbel® Easy Arm® will provide many years of dependable service by following the installation and maintenance procedures described herein.

** U.S. Patent No's: 5,865,426, 6,299,139, & 6,386,513, Other Patents Pending

CE certification is only applicable to systems directly wired to manufactures suggested voltage.

Dimensions contained in this installation manual are for reference only and may differ for your particular application.

WARNING

Only competent erection personnel familiar with standard fabrication practices should be employed to install the Easy Arm® because of the necessity of properly interpreting these instructions. Gorbel is not responsible for the quality of workmanship employed in the installation of this hoist according to these instructions. Contact Gorbel, Inc., at 600 Fishers Run, P.O. Box 593, Fishers, New York 14453, 1-585-924-6262, for additional information if necessary.

WARNING

Equipment described herein is not designed for, and should not be used for, lifting, supporting, or transporting humans. Failure to comply with any one of the limitations noted herein can result in serious bodily injury and/or property damage. Check Federal, State and Local regulations for any additional requirements.

WARNING

Gorbel, Inc. authorizes use of wire rope only as supplied by Gorbel for any Easy Arm® equipment. Use of other than Gorbel supplied wire rope shall void Gorbel's warranty of the product.

WARNING

Prior to installation, consult a qualified structural engineer to determine if your support structure is adequate to support the anchor bolt force, overturning moment, or axial load of your crane.

WARNING

Crane cannot be used as a ground. A separate ground wire is required. For example, systems with 3-phase power require 3 conductors plus one ground wire.

WARNING

Reference American Institute of Steel Construction (AISC) Manual of Steel Construction (9th edition), Part 5, Specification for Structural Joints using ASTM A325 or A490 Bolts (section 8.d.2) for proper procedure to follow when using any torque tightening methods.

WARNING

Do not field modify crane in any way. Any modification, without the written consent of Gorbel, Inc., will void warranty.

WARNING

The jog switch buttons are for system maintenance and load testing only, and should not be manipulated during normal operation of the Easy Arm®. Operation of the jog switch buttons during normal operation increases the risk of personal injury to the operator.

WARNING

The unique serial number for this unit can be found on the front cover of this manual or on a sticker attached to the back of the head assembly. Always have this serial number available during all correspondence regarding your Easy Arm® crane, or when ordering repair parts.

INSTALLATION

STEP 1 - PRE-ASSEMBLY

- 1.1 Read entire installation manual **before** installing the crane.
- 1.2 Check packing list to ensure no parts have been lost prior to initiating assembly of crane.
- 1.3 Tools and materials (by others) typically needed to assemble crane:
 - Torque wrench with metric sockets
 - Metric Allen wrenches
 - Grout (Non-Shrink Precision Grout)
 - Lifting device to lift heavy mast and arm assembly
 - Hand tools
 - Ladders / man lifts
 - Level
- 1.4 For Floor Mounted Easy Arm®, identify crane size, anchor bolt load, and footer width and depth.

| CAPACITY | HUH | SPAN | MODEL NUMBER (Q or iQ) | MIN. FOOTER DEPTH | MIN. FOOTER WIDTH | ANCHOR BOLT LOAD (KIPS) |
|----------|-----|------|---------------------------|----------------------|----------------------|----------------------------|
| 165# | 6' | 6' | EA-F-165-6-6 | 6" | 48" | 0.94 |
| | | 8' | EA-F-165-6-8 | 6" | 48" | 1.32 |
| | | 10' | EA-F-165-6-10 | 6" | 60" | 1.72 |
| | | 12' | EA-F-165-6-12 | 6" | 60" | 0.99 |
| | | 14' | EA-F-165-6-14 | 6" | 60" | 1.23 |
| | 8' | 6' | EA-F-165-8-6 | 6" | 48" | 0.94 |
| | | 8' | EA-F-165-8-8 | 6" | 48" | 1.32 |
| | | 10' | EA-F-165-8-10 | 6" | 60" | 0.79 |
| | | 12' | EA-F-165-8-12 | 6" | 60" | 0.99 |
| | | 14' | EA-F-165-8-14 | 6" | 60" | 1.23 |
| | 10' | 6' | EA-F-165-10-6 | 6" | 48" | 0.94 |
| | | 8' | EA-F-165-10-8 | 6" | 48" | 0.59 |
| | | 10' | EA-F-165-10-10 | 6" | 60" | 0.79 |
| | | 12' | EA-F-165-10-12 | 6" | 60" | 0.99 |
| | | 14' | EA-F-165-10-14 | 6" | 60" | 1.23 |
| | 11' | 6' | EA-F-165-11-6 | 6" | 48" | 0.94 |
| | | 8' | EA-F-165-11-8 | 6" | 48" | 0.59 |
| | | 10' | EA-F-165-11-10 | 6" | 60" | 0.79 |
| | | 12' | EA-F-165-11-12 | 6" | 60" | 0.99 |
| | | 14' | EA-F-165-11-14 | 6" | 60" | 1.23 |
| 330# | 6' | 6' | EA-F-330-6-6 | 6" | 60" | 0.71 |
| | | 8' | EA-F-330-6-8 | 6" | 60" | 1.02 |
| | | 10' | EA-F-330-6-10 | 6" | 72" | 1.37 |
| | | 12' | EA-F-330-6-12 | 6" | 72" | 1.71 |
| | | 14' | EA-F-330-6-14 | 6" | 72" | 2.07 |
| | 8' | 6' | EA-F-330-8-6 | 6" | 60" | 0.71 |
| | | 8' | EA-F-330-8-8 | 6" | 60" | 1.02 |
| | | 10' | EA-F-330-8-10 | 6" | 72" | 1.37 |
| | | 12' | EA-F-330-8-12 | 6" | 72" | 1.71 |
| | | 14' | EA-F-330-8-14 | 6" | 72" | 2.07 |
| | 10' | 6' | EA-F-330-10-6 | 6" | 60" | 0.71 |
| | | 8' | EA-F-330-10-8 | 6" | 60" | 1.02 |
| | | 10' | EA-F-330-10-10 | 6" | 72" | 1.37 |
| | | 12' | EA-F-330-10-12 | 6" | 72" | 1.71 |
| | | 14' | EA-F-330-10-14 | 6" | 72" | 2.07 |
| | 11' | 6' | EA-F-330-11-6 | 6" | 60" | 0.71 |
| | | 8' | EA-F-330-11-8 | 6" | 60" | 1.02 |
| | | 10' | EA-F-330-11-10 | 6" | 72" | 1.37 |
| | | 12' | EA-F-330-11-12 | 6" | 72" | 1.71 |
| | | 14' | EA-F-330-11-14 | 6" | 72" | 2.07 |

Chart 1A. Floor Mounted Easy Arm® Footer Depth, Width and Anchor Bolt Loadings.

STEP 1 - PRE-ASSEMBLY (CONTINUED)

- 1.5** The Under Hung unit is designed to be mounted to a platform using eight (8) M16 x 2.0mm pitch, hex head cap screws and lockwashers. The top mounting surface is part of a large bearing which allows the main pivoting movement of the unit. The bearing is provided with 16 tapped holes on a 10.63 inch diameter bolt circle. The mounting platform must also have a center hole for the power cable to pass through.

The required fastener length will depend upon the design of the mounting platform. The length should allow for the lockwasher thickness, the mounting plate thickness, and a minimum of one inch insertion into the tapped hole.

Please refer to **chart 1B** for the minimum bolt loads. A class 10.9 fastener (or better) is recommended.

The mounting platform should be level and should have a flat mating surface. A level platform provides a vertical axis of rotation for the bearings and prevents drifting of the arms. If the platform is moveable there should be some provision in the design to prevent the tilting of the mounting surface due to large moment loads (e.g. limit vertical movement of trolley wheels). The flatness of the mating surface is required to ensure the smooth operation of the bearing.

| CAPACITY | SPAN | MODEL NUMBER (Q or iQ) | MOUNTING BOLT LOAD |
|----------|------|---------------------------|-----------------------|
| 165# | 6' | EA-U-165-6 | 930# |
| | 8' | EA-U-165-8 | 1250# |
| | 10' | EA-U-165-10 | 1580# |

Chart 1B. Under Hung Easy Arm® Mounting Bolt Loads.

STEP 1 - PRE-ASSEMBLY (CONTINUED)

1.6 Prior to installing the Easy Arm®, it is a good idea to familiarize yourself with the main components.

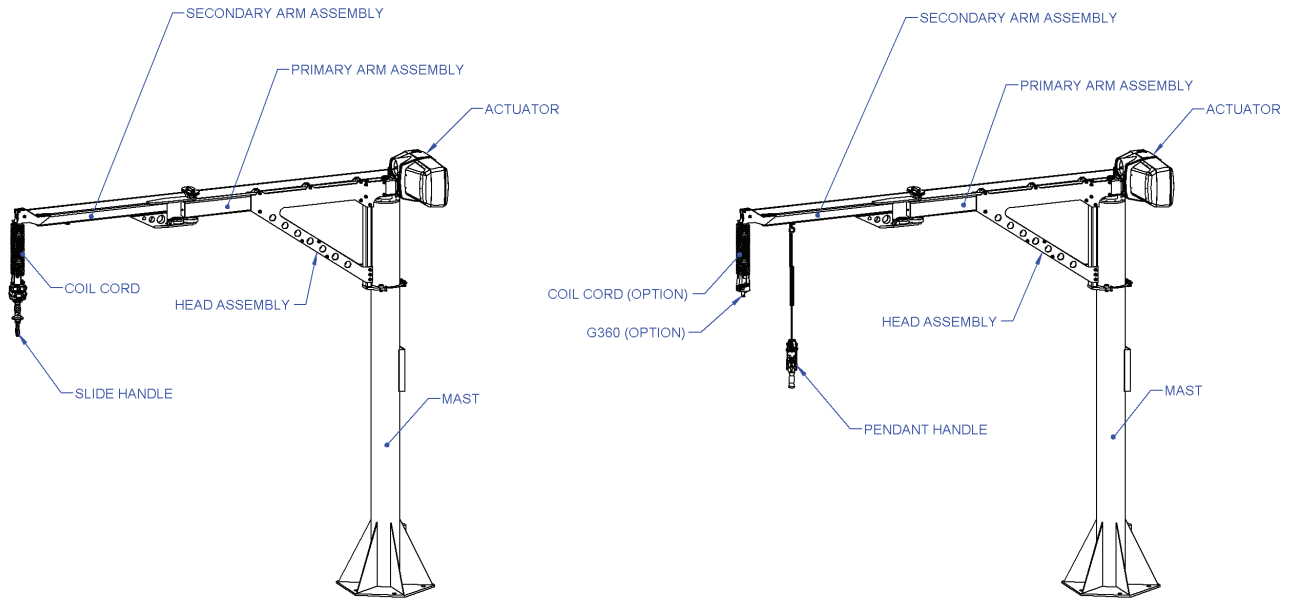


Diagram 1A. Main Floor Mounted Easy Arm® Components.

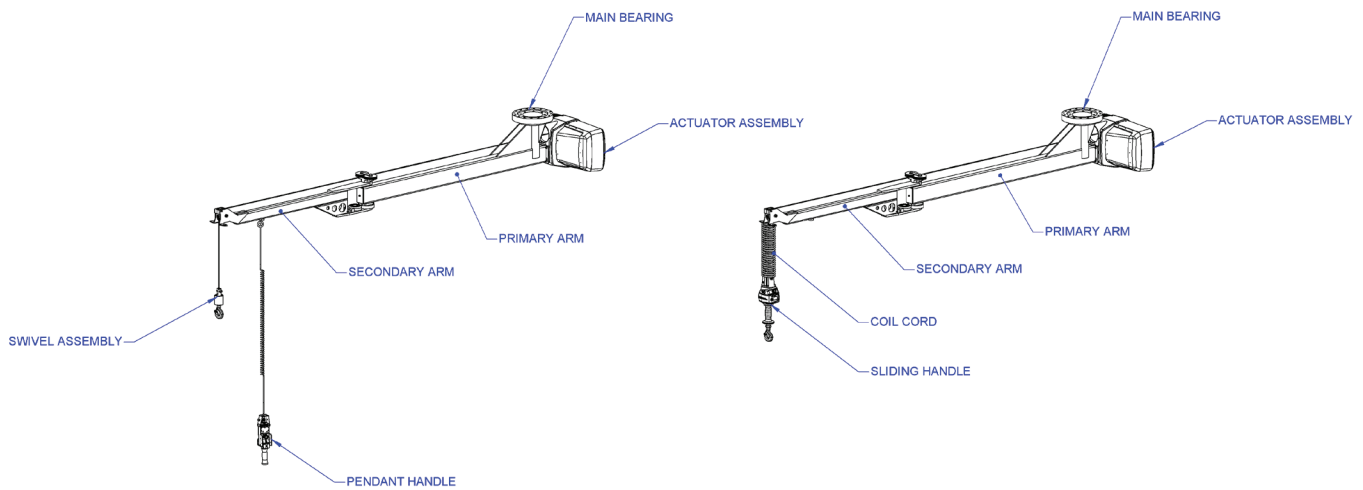


Diagram 1B. Main Under Hung Easy Arm® Components.

STEP 2 - UNPACKING THE EASY ARM®

➔ **TIP:** Packing list can be found in plastic pocket attached to shipping box.

- 2.1 Carefully remove banding straps from the shipping box and remove top (*diagram 2A*).
- 2.2 Remove sleeve from packaging (*diagram 2B*).
- 2.3 Remove packaging supports (*diagram 2C*).
CAUTION: arm assembly must be supported once packaging supports are removed.
- 2.4 Using a proper lifting device, lift the Easy Arm® out of the packaging box using the included eyebolts (*diagrams 2D* and *2E*). Do not do this until you are ready to install the system.

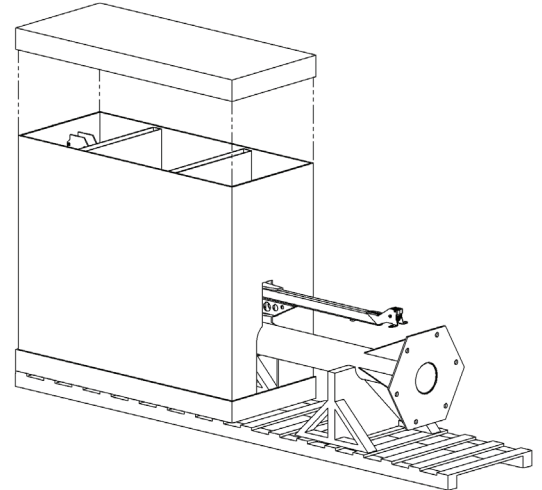


Diagram 2A. Packaging top removal.

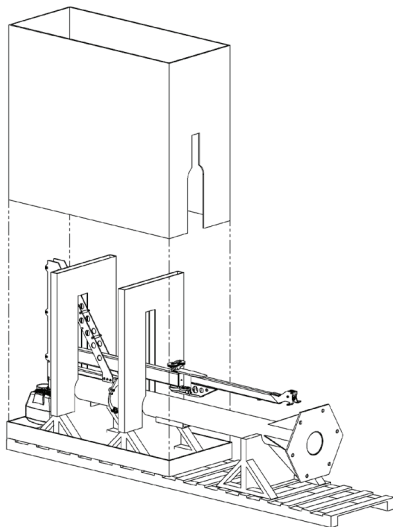


Diagram 2B. Packaging sleeve removal.

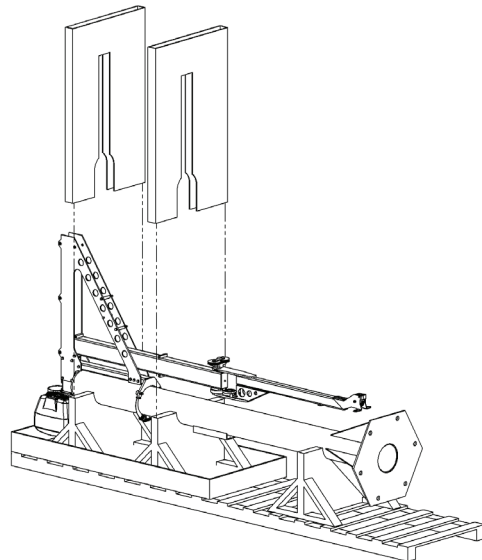


Diagram 2C. Packaging support removal.

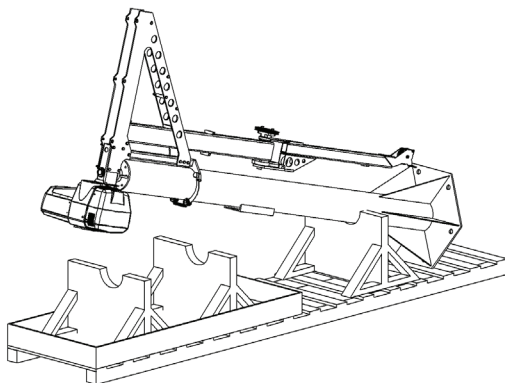


Diagram 2D. Easy Arm® assembly removal from packaging.

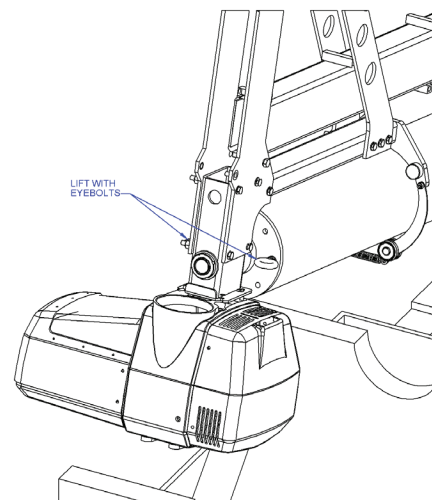


Diagram 2E. Easy Arm® assembly removal from packaging.

STEP 3 - FLOOR MOUNTED SYSTEM (MAST) INSTALLATION

WARNING

Do not proceed if your support structure does not meet the loading requirements determined in **Step 1.4**.

Note: Easy Arm® Crane foundation requirements are based on soil pressure of 2500# per square foot. Concrete pressure recommended for jib crane foundation is 3000# per square inch of compressive force, with no cracks or seams in a square footer width as dimensioned in **chart 1A**, page 4.

Note: Chemical (epoxy) anchor bolts are recommended because of the vibrating loads caused by the impact of the hoist stopping and starting under load.

Note: A minimum 6"-thick reinforced concrete floor is required.

3.1 INSTALLING ANCHOR BOLTS

WARNING

Units with span and height under hook under 18' use a square baseplate.

3.1.1 165 lb. (75 kg) units:

A) Anchor bolts (by others) for **square** base plates must:

- be 3/4" in diameter.
- be embedded a minimum of 4-1/2" into floor (**diagram 3A**).
- have minimum of two threads above nut after installation.

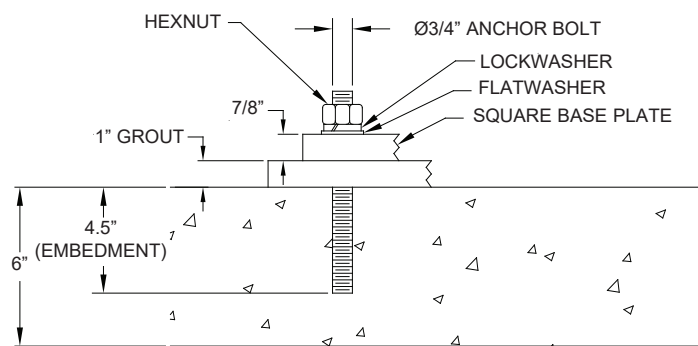


Diagram 3A. Typical square base plate anchor bolt embedment.

B) Anchor bolts (by others) for **hexagonal** base plates must:

- be 3/4" or 1" in diameter.
- be embedded a minimum of 4-1/2" into floor (**diagram 3A**).
- have **minimum** of two threads above nut after installation.

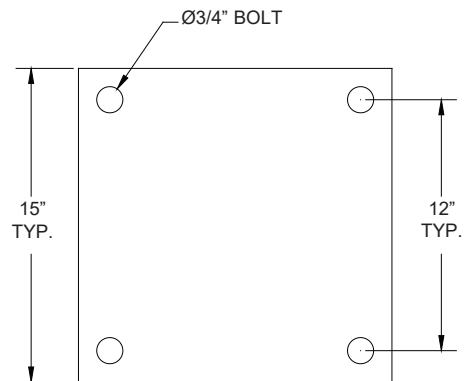


Diagram 3B. Square base plate pattern.

C) Drill holes in concrete floor using pre-drilled holes in base plate of **diagram 3B** or **3C**, depending on your baseplate configuration, as a guide (use drill bit size recommended by anchor bolt manufacturer).

D) Install anchor bolts (Grade 5 or better) and hardware (by others) according to manufacturer's installation directions and requirements.

E) Proceed to Step 3.2, page 9, for mast installation and plumbing.

STEP 3 - FLOOR MOUNTED SYSTEM (MAST) INSTALLATION (CONTINUED)

3.1 INSTALLING ANCHOR BOLTS (CONTINUED)

3.1.2 330 lb. (150 kg) units:

A) Anchor bolts (by others) for **hexagonal** base plates must:

- be 1" or 1-1/4" in diameter.
- be embedded a minimum of 4-1/2" into floor.
- have **minimum** of two threads above nut after installation.

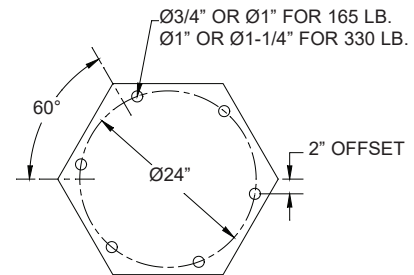


Diagram 3C. 6 bolt base bolt pattern.

B) Drill holes in concrete floor using pre-drilled holes in baseplate of **diagram 3C** as a guide (use drill bit size recommended by anchor bolt manufacturer).

C) Install anchor bolts (Grade 5 or better) and hardware (by others) according to manufacturer's installation directions and requirements.

D) Proceed to Step 3.2, page 9, for mast installation and plumbing.

STEP 3 - FLOOR MOUNTED SYSTEM (MAST) INSTALLATION (CONTINUED)

WARNING

Mast pin must be plumb to prevent arm assembly from drifting.

3.2 INSTALLING AND PLUMBING MAST

- A) Cover entire base-plate area with one inch of non-shrink precision grout. Set mast in place.
- B) Hold a level against the mast (*diagram 3D*).
- C) Pick a starting point and plumb the mast by adjusting the mast at the base-plate. Check the plumb of the mast every 60°.
- D) Once the main pivot pin is plumb **and grout has cured**, tighten bolts until base-plate is completely seated in grout.

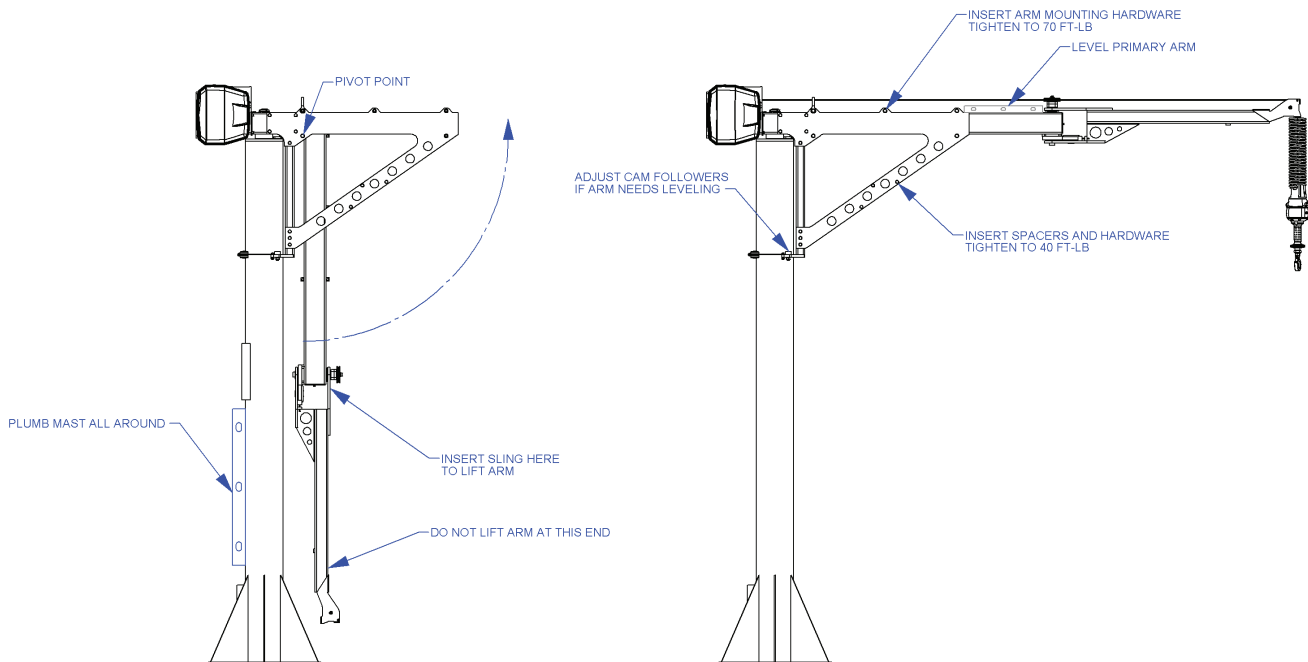


Diagram 3D. Plumbing the mast.

STEP 4 - FLOOR MOUNTED ARM ASSEMBLY

➔ **TIP:** Wire rope will be loose to accommodate the shipping of the unit with the arm assembly rotated. **DO NOT** bend or kink the wire rope during assembly. Be careful not to pinch any wires or connectors between the arm assembly and head side plates during installation.

4.1 Loosen and remove the arm mounting hardware from the head assembly. Using a proper lifting device, rotate the arm assembly up into the horizontal position (**diagram 4A**). Once arm is properly in place, reassemble the arm mounting hardware. **DO NOT** torque down the mounting hardware at this time.

4.2 Place a level across the primary arm (**diagram 4B**). Adjust the arm assembly up or down as required, utilizing the eccentric cam followers. To raise the arm, rotate cam followers to increase the gap between the cam follower plate and the mast. To lower the arm assembly, rotate cam followers to decrease the gap between the cam follower plate and the mast.

4.3 When the arm assembly has been leveled, torque down the arm assembly mounting hardware.

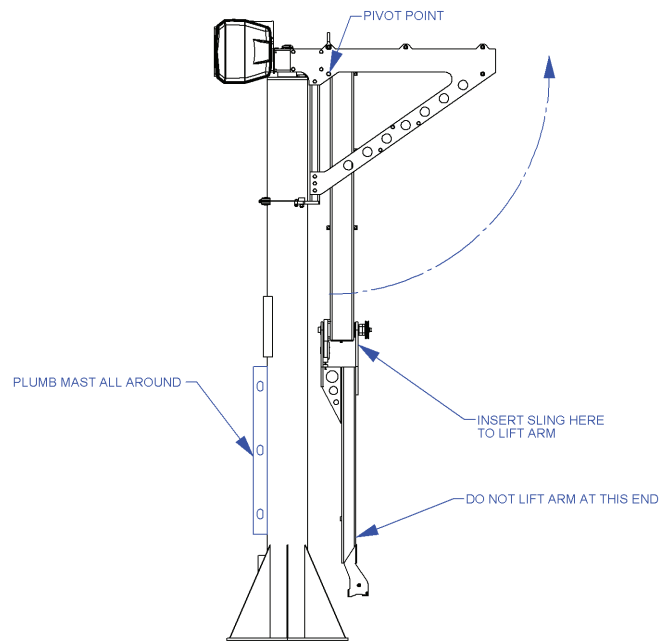


Diagram 4A. Final arm assembly installation.

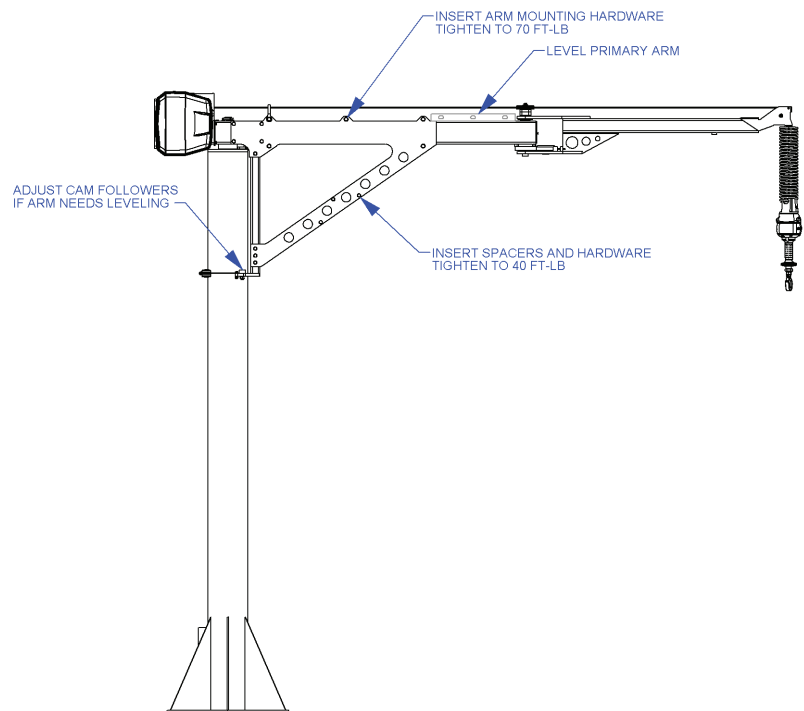


Diagram 4B. Arm assembly-leveling adjustment.

STEP 5 - UNDER HUNG SYSTEM INSTALLATION

➔ **TIP:** Wire rope will be loose to accommodate the shipping of the unit. **DO NOT** bend or kink the wire rope during assembly. Be careful not to pinch any wires or connectors.

STOP!

Do not proceed if your support structure does not meet the loading requirements determined in **Step 1.5**.

- 5.1 The primary and secondary arms are wrapped with a cardboard sleeve during shipping. Leave the sleeve in place to prevent relative motion of the arms until after the unit is mounted to the platform.
- 5.2 The crane has a high center of gravity relative to the bottom surfaces of the arms. When lifting the unit from the packaging take precautions to prevent the assembly from rolling on its side.
- 5.3 Raise the unit up to the mounting platform and thread the power supply cable (and optional air hose) through the center hole in the platform (**diagram 5A**). Insert fasteners through the platform and into the tapped holes of the main bearing. Keep the unit supported by crane or fork truck until all fasteners have been properly tightened.
- 5.4 Once the unit is secure, reroute the electrical cables and air hose (if included) along the bottom of the primary arm using the clamps provided. The slack switch cable and coil cord extension should pass through the secondary arm. The optional air hose follows the bottom of the secondary arm.

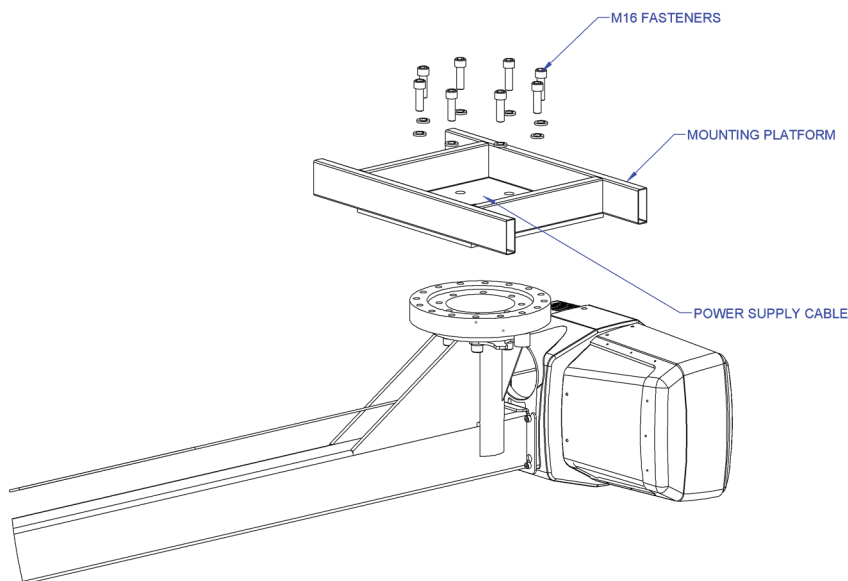


Diagram 5A. Installing Under Hung Easy Arm®.

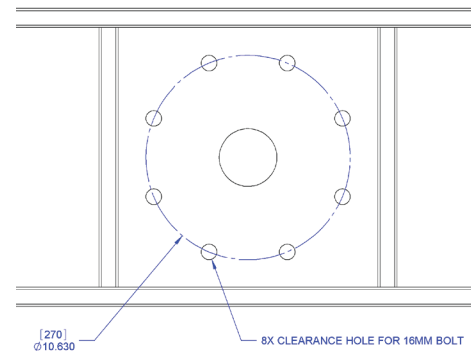


Diagram 5B. Bolt Pattern for Under Hung Easy Arm®.

STEP 6A - IN-LINE SLIDE & IN-LINE FORCE SENSING HANDLE INSTALLATION

- 6A.1** Ensure the wire rope is still fed through the center of the coil cord. Hold the slide handle just below the coil cord.
- 6A.2** Center the coil cord footer between the ears of the slide handle swivel. **Note:** Make sure the fin of the coil cord footer is on the opposite side of the slide handle connector.
- 6A.3** Remove the 16mm shoulder bolt from the coil cord footer and wire rope and allow the coil cord footer and wire rope to slide down into the slide handle swivel.
- 6A.4** Once the wire rope, coil cord footer and slide handle swivel are aligned, replace the 16mm shoulder bolt, thereby capturing the wire rope, coil cord footer and slide handle (**diagram 6A1**).
- 6A.5** Thread the coil cord connector into the slide handle connector (**diagram 6A1**).
- 6A.6** Thread the M12 jam nut onto the 16mm shoulder bolt.
- 6A.7** Check that the coils of the coil cord are centered around the wire rope when properly installed.
- 6A.8** **Optional:** Install the hook or tooling through the retaining nut and lock washer. The included flat washer is unnecessary in this application. Use the open pilot hole on the Slide Handle Retaining Nut and a #21 drill bit to drill a hole completely through the threads of the hook and the opposite side of the nut. Hammer the included M4x36mm spring into the hole until it is flush with the surface of the nut (**diagram 6A2**).
- 6A.9** Continue to Step 7 on page 19.

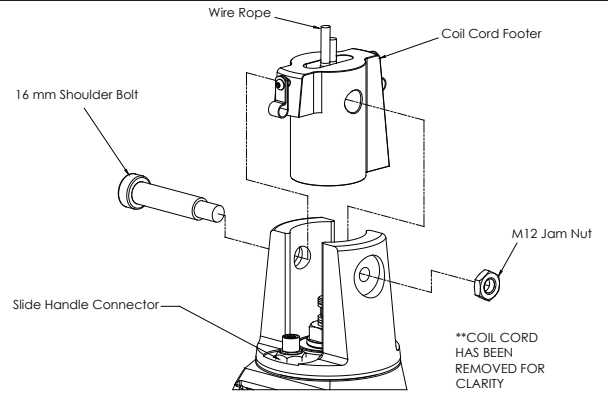


Diagram 6A1. Slide Handle, Shoulder Bolt and Coil Cord

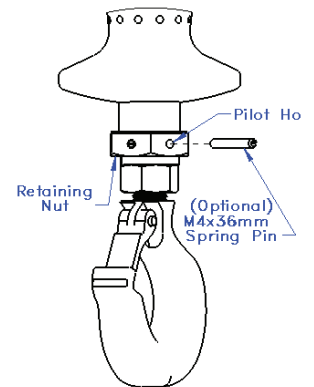


Diagram 6A2. Slide Handle with Optional Pin.

STEP 6B - REMOTE MOUNTED SLIDE HANDLE INSTALLATION

- 6B.1** Ensure the wire rope is still fed through the center of the coil cord. Hold the G360™ swivel just below the coil cord assembly.
- 6B.2** Center the coil cord footer between the ears of the G360™ swivel. **Note:** Make sure the fin of the coil cord footer is on the opposite side of the G360™ connector.
- 6B.3** Remove the 16mm shoulder bolt from the coil cord footer and wire rope and allow the coil cord footer and wire rope to slide down into the G360™ swivel.

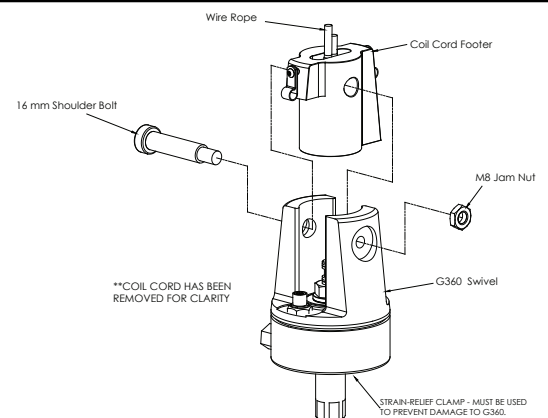


Diagram 6B1. G360™, Shoulder Bolt and Coil Cord.

STEP 6B - REMOTE MOUNTED SLIDE HANDLE INSTALLATION (CONTINUED)

6B.4 Once the wire rope, coil cord footer and G360™ swivel are aligned, replace the 16mm shoulder bolt thereby capturing the wire rope, coil cord footer and G360™ swivel (*diagram 6B1*, page 13).

6B.5 Thread the coil cord connector into the G360™ connector (*diagram 6B1*, page 13).

6B.6 Thread M12 jam nut onto the 16mm shoulder bolt.

6B.7 Check that the coils of the coil cord are centered around the wire rope when properly installed.

6B.8 A pilot hole is provided for the locking pin. Attach tooling to G360™ utilizing M16 thread. The tool bolt/rod thread should be beyond pilot hole of shaft when fully engaged. Using a #21 drill bit, drill through the tool bolt/rod thread and out the other side of G360™ shaft. Hammer pin into place thereby locking tooling to G360™ (*diagram 6B2*).

6B.9 Assemble the remote mounted slide handle inside the remote mount bracket using the hardware provided (*diagram 6B3*).
Note: This step is best completed on a workbench prior to mounting handle to tooling.

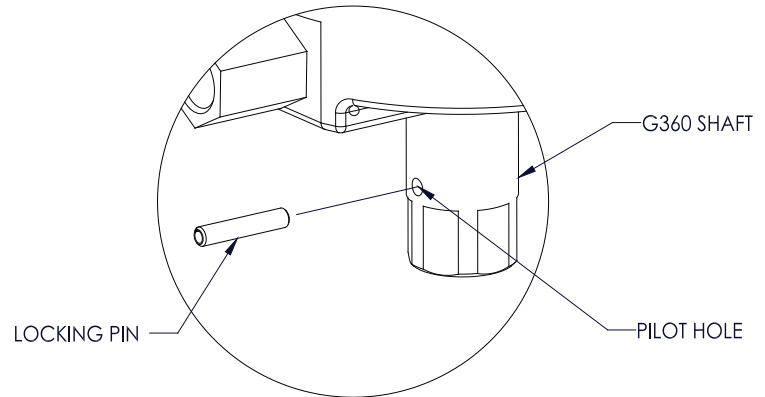


Diagram 6B2. Tooling Installation.

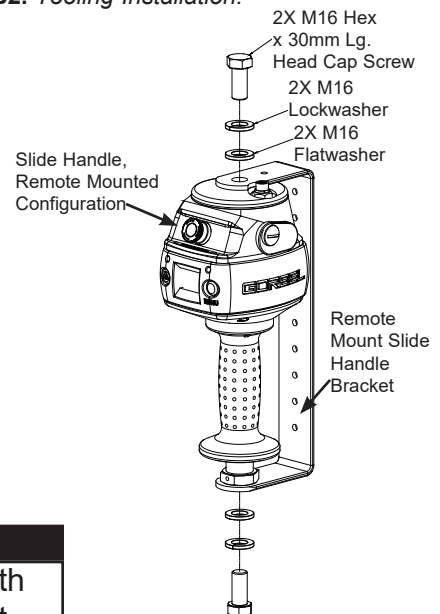


Diagram 6B3. Remote Mounted Slide Handle, Exploded View.

WARNING

Remote mounted G-Force® handles must be mounted at both the top and bottom of the handle assembly. Failure to mount the remote mounted handle at top and bottom can result in poor performance and/or premature component failure.

6B.10 Attach the remote mounted handle with bracket to the tooling. Assure that the mounting arrangement does not affect the operating function of the slide handle.

6B.11 Connect the extension cable from the G360™ to the remote mounted slide handle. Securely clamp the remote mount coil cord extension cable to the tooling as needed.

CAUTION

All cables used in a remote mounted handle configuration must be properly clamped and/or strain-relieved to prevent premature failure of the Easy Arm® or customer tooling.

CAUTION

Take care to avoid looping excess cable at locations where the loop could catch on foreign objects.

6B.12 Continue to Step 7 on page 19.

STEP 6C - SUSPENDED PENDANT HANDLE INSTALLATION

- 6C.1** Assure that the coils of the pendant handle coil cord are centered around the pendant handle wire rope.
- 6C.2** Remove the eyebolt from suspended pendant cable assembly using the threaded connector.
- 6C.3** Thread the eyebolt into the bottom of the actuator assembly as shown (**diagram 6C1**).
- 6C.4** Reattach the suspended pendant cable assembly to the eyebolt via the threaded connector.
- 6C.5** Adjust the suspended pendant cable assembly so that there is a service loop in the wiring cable and there is no tension in the wire cable.
- 6C.6** Thread the cable assembly connector into the actuator connector (**diagram 6C1**).
- 6C.7** Remove the cotter pin and clevis from the wire rope swivel assembly.
- 6C.8** **Optional:** Install the hook or tooling with the washer, lock washer and nut in the orientation shown (**diagram 6C2**) then use the pilot hole and a #21 drill bit to drill through the hook threads, a minimum of 36mm deep. Use a hammer to insert the M4x36mm spring pin into the hole until it is flush with the surface of the swivel assembly (**diagram 6C3**).
- 6C.8** Reinsert the clevis and cotter pin capturing the wire rope thimble in the swivel assembly (**diagram 6C3**).
- 6C.9** Continue to Step 7 on page 19.

Note: On suspended pendant equipped systems, the wire rope swivel assembly must be installed before AC power is applied to the system or a limit switch error will occur (501 / 11000) error codes). To clear this fault you will have to (must be done in this order):

1. Install wire rope swivel assembly or other weighted device on wire rope.
2. Disconnect AC power from the system (using the e-stop will not work).
3. Reconnect the AC power and wait approximately one minute for system to power on completely.

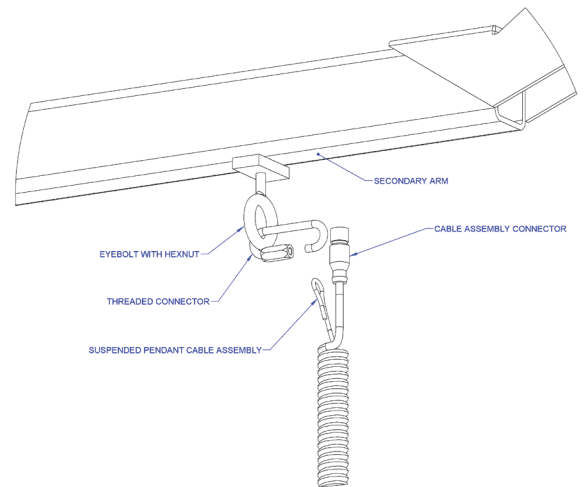


Diagram 6C1. Assembly of Suspended Pendant Cable Assembly to Bottom of Actuator Assembly.

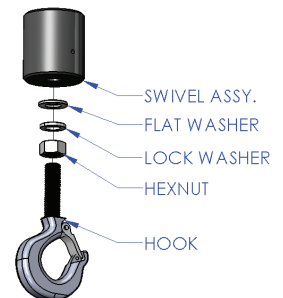


Diagram 6C2. Hook installation.

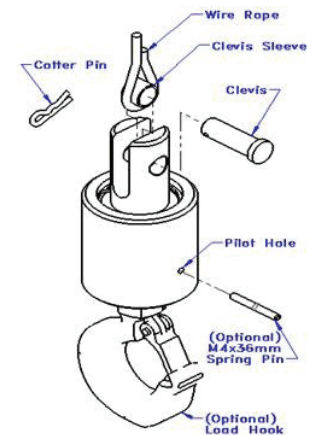


Diagram 6C3. Cotter Pin, Clevis, Wire Rope Swivel Assembly and Wire Rope Thimble.

STEP 6D - REMOTE MOUNTED PENDANT HANDLE INSTALLATION

- 6D.1** Ensure the wire rope is still fed through the center of the coil cord. Hold the G360™ swivel just below the coil cord.
- 6D.2** Center the coil cord footer between the ears of the G360™ swivel. **Note:** Make sure the fin of the coil cord footer is on the opposite side of the G360™ connector.
- 6D.3** Remove the 16mm shoulder bolt from the coil cord footer and wire rope and allow the coil cord footer and wire rope to slide down into the G360™ swivel.

STEP 6D - REMOTE MOUNTED PENDANT HANDLE INSTALLATION (CONTINUED)

6D.4 Once the wire rope, coil cord footer and G360™ swivel are aligned, replace the 16mm shoulder bolt thereby capturing the wire rope, coil cord footer and G360™ swivel (**diagram 6D1**).

6D.5 Thread the coil cord connector into the G360™ connector (**diagram 6D1**).

6D.6 Thread the M12 jam nut onto the 16mm shoulder bolt.

6D.7 Check that the coils of the coil cord are centered around the wire rope when properly installed.

6D.8 A pilot hole is provided for the locking pin. Attach tooling to G360™ utilizing M16 thread. The tool bolt/rod thread should be beyond pilot hole of shaft when fully engaged. Using a #21 drill bit, drill through the tool bolt/rod thread and out the other side of G360™ shaft. Hammer pin into place thereby locking tooling to G360™ (**diagram 6D2**).

6D.9 Attach the pendant handle bracket directly to the tooling. Assure that the mounting arrangement does not affect the operating function of the pendant handle. **Note:** If necessary, a collar clamp mounting bracket option can be used to attach the pendant handle to the tooling (**diagram 6D3**).

6D.10 Connect the extension cable from the G360™ to the remote mounted pendant handle. Securely clamp the remote mount coil cord extension cable to the tooling as needed.

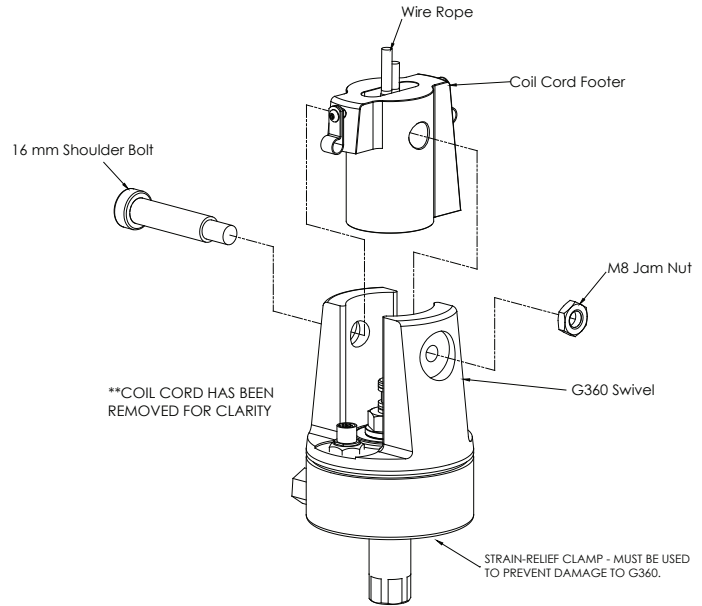


Diagram 6D1. G360™, Shoulder Bolt and Coil Cord.

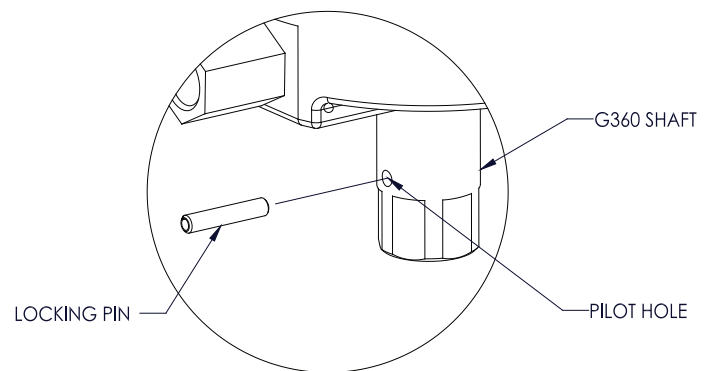


Diagram 6D2. Tooling Installation.

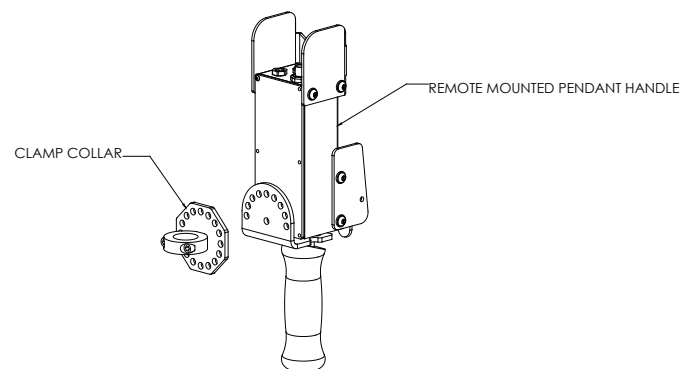


Diagram 6D3. Remote Mounted Pendant Handle with Collar Clamp Mounting Bracket (Option).

CAUTION

All cables used in a remote mounted handle configuration must be properly clamped and/or strain-relieved to prevent premature failure of the Easy Arm® or customer tooling.

CAUTION

Take care to avoid looping excess cable at locations where the loop could catch on foreign objects.

6D.11 Continue to Step 7 on page 19.

STEP 6E - REMOTE MOUNT FORCE SENSING SLIDE HANDLE INSTALLATION

- 6E.1** Follow Steps 6B.1 through 6B.7 on pages 13 and 14 to install G360™.
- 6E.2** Bracket (by others) must be sized to fit the handle it will be holding and rigid enough to resist the forces exerted on it (**diagram 6E1**).
- 6E.3** Using the included M16 hardware, fasten both ends of the handle to the bracket. Attach bracket to tooling if necessary.
- 6E.4** Connect cable from G360™ to handle top. Clamp the cable to tooling to prevent it from being snagged.
- 6E.5** Continue to Step 7 on page 19.

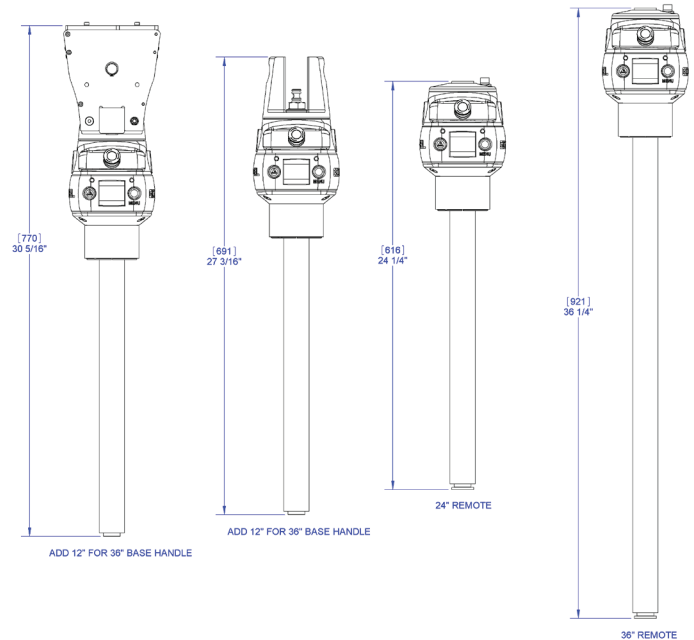


Diagram 6E1. Force Sensing Slide Handle bracket sizes.

- Note:** The system cannot support two Force Sensing Handles running simultaneously on one G-Force®. If dual handles are required, one Force Sensing Handle and one traditional handle is a supported configuration.
- Note:** Due to the nature of the Force Sensing Slide Handle, excessive twisting of the grip may be interpreted as intended motion. For best results, only push and pull the handle grip while avoiding twisting (**diagram 6E3**).
- Note:** To avoid damaging the handle, do not apply more than 200 lbs (90 kg) to the grip or handlebars.

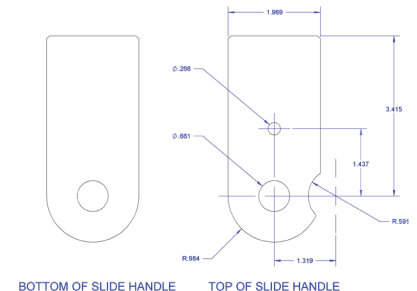


Diagram 6E2. Remote handle mounting dimensions.

- Note:** Remote handles must be mounted rigidly in order to function correctly. For Slide handles, the mounting holes on the tooling must be aligned to avoid any binding of the handle and the bolts at each end of the handle must be tightened enough to prevent motion but not induce bending. The included rubber washers must be mounted between the handle and tooling to prevent binding. Additionally the handle must be captured via the hole in the top cap to prevent rotation (see **diagram 6E2** for suggested bracket dimensions). For Hub handles, the back of the handle body must be securely fastened to the tooling.
- Note:** Do not attach anything to the grip of the Slide Force Sensing Handle as performance will be degraded.
- Note:** Changing the orientation of the handle (tilting) while the system is live may be interpreted as intent to move. It is recommended that the handle remains vertical at all times during use.
- Note:** When taring the handle, care must be taken not to apply force to the grip or handlebars as subsequently removing the force will be interpreted as intent to move.

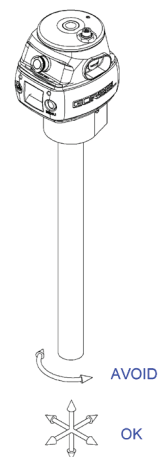


Diagram 6E3. Proper use of Force Sensing Handle grip.

- Note:** For optimal performance, re-taring the handle periodically may be necessary. The interval will depend on usage.

STEP 6F - REMOTE MOUNT FORCE SENSING HUB HANDLE INSTALLATION

WARNING

This handle is only intended for remote mount applications and must not be used for transmitting lifting loads.

6F.1 Follow Steps 6B.1 through 6B.7 on pages 13 and 14 to install G360™.

6F.2 Mount Hub body to tooling rigidly to resist forces exerted on it. Optional mounting plate 74136 is available. See **diagram 6F1** for dimensions for mounting directly to tooling.

6F.3 Attach handlebars to Hub. Handlebar kit (74630) is available or handlebars may be fabricated (by others). Optional handlebar mounting plate 74138 (with clamp collars) or 74141 (plain for modification by integrator) are available. See **diagram 6F2** for dimensions for fabricating a custom solution.

6F.4 Connect cable from G360™ to handle top. Clamp the cable to tooling to prevent it from being snagged.

6F.5 Continue to Step 7 on page 19.

Note: The system cannot support two Force Sensing Handles running simultaneously on one G-Force®. If dual handles are required, one Force Sensing Handle and one traditional handle is a supported configuration.

Note: Handlebars and attachments for Remote Force Sensing Hub Handles must not exceed 25 lb (11.3 kg). For optimal performance, handlebar assemblies should be as light as possible. Handlebar weight in excess of 10 lbs (4.5 kg) will detract from net capacity of the G-Force®.

Note: For optimal performance and to reduce the risk of damaging the handle, handlebars on Remote Force Sensing Hub Handles should not exceed 24" (0.6m) (12" or 0.3m in either direction) in width or 24" (0.6m) from the face of the handlebar mounting plate (**diagram 6F3**).

Note: To avoid damaging the handle, do not apply more than 200 lbs (90 kg) to the grip or handlebars.

Note: Remote handles must be mounted rigidly in order to function correctly. For Slide handles, the mounting holes on the tooling must be aligned to avoid any binding of the handle and the bolts at each end of the handle must be tightened enough to prevent motion but not induce bending. The included rubber washers must be mounted between the handle and tooling to prevent binding. Additionally, the handle must be captured via the hole in the top cap to prevent rotation (see **diagram 6E2**, page 17, for suggested bracket dimensions). For Hub handles, the back of the handle body must be securely fastened to the tooling.

Note: When taring the handle, care must be taken not to apply force to the grip or handlebars as subsequently removing the force will be interpreted as intent to move.

Note: For optimal performance, re-taring the handle periodically may be necessary. The interval will depend on usage.

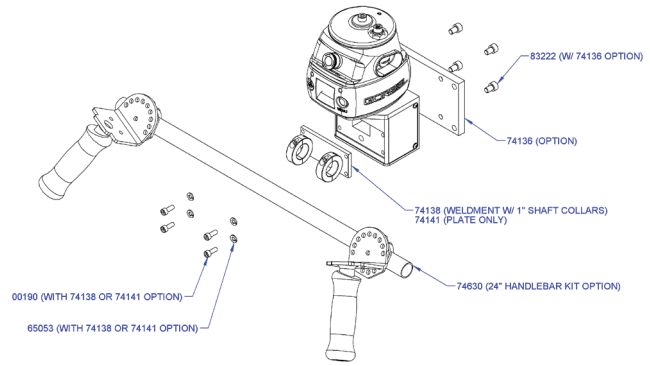


Diagram 6F1. Mounting handlebar and mounting plate.

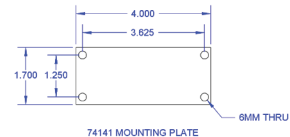
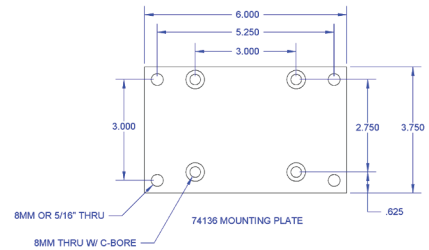


Diagram 6F2. Mounting plate dimensions.

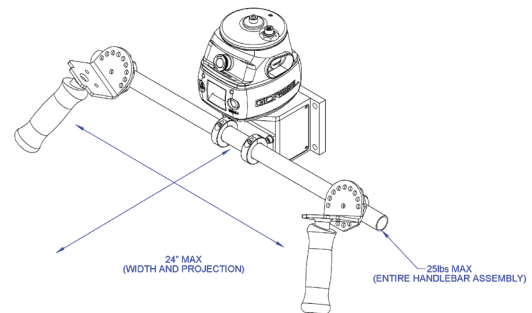


Diagram 6F3. Handlebar dimensions.

STEP 7 - ELECTRICAL POWER CONNECTION

➔ **TIP:** Do not connect to main power until all assembly is complete.

STANDARD:

- 7.1 Prior to final wiring, inspect the entire system to assure that all connections are seated properly, and are without kinks or bends. Verify the following connections:
- Coil cord to handle or G360™ collector
 - Coil cord to coil cord extension (located internal of the secondary arm tube)
 - Coil cord extension to actuator assembly
 - Slack switch connection at slack switch
 - Slack switch connection at actuator assembly
 - Power to actuator assembly
- 7.2 Connect a 220 VAC single-phase power source through a disconnect switch (by others) to the junction box on the mast.

WARNING

If your system displays drive faults 7219 and 4005 either when it powers on or when you attempt to lift or lower a load it means the AC power is too low. Even though the specification is 220 VAC +/- 10%, the power available at the system may be close to the low end of the specification because of its proximity to the power source. The closer to the nominal 220 VAC you are supplying to the system the less likely you'll experience any problems related to the AC voltage.

TRANSFORMER (OPTIONAL):

110 VAC (Step Up - Standard Option)

- 7.3 System will be supplied with a transformer mounted directly to the mast and a 10' long input power cord pre-wired to the secondary side of the transformer. Connect a 110 VAC single-phase power source through a disconnect switch (by others) to the power cord.

460 VAC (Step Down - Non-Standard Option)

- 7.4 Customer must wire primary power directly to the transformer.

STEP 8 - INITIAL POWER-UP

➔ **TIP:** Do not depress the operator present switch on the sliding handle during startup.

- 8.1 Turn on the disconnect switch (by others) to apply power to the Easy Arm®. When power is detected, "POWER ON" is displayed on the LCD.
- 8.2 Disengage the emergency stop (E-stop) button located on the front face of the handle.
- 8.3 During the system power up the LCD at the handle will display "UNIT POWER-UP". If you are using a Force Sensing Handle, after power is applied to the system and the unit has booted, fault 11008 will usually be displayed indicating that the handle needs to be tared. See page 37 for taring procedure.
- 8.4 Once the system is on-line and ready, "LIFT READY" will be displayed on the LCD.

STEP 8 - INITIAL POWER-UP (CONTINUED)

- 8.5
- **Standard Operation - Slide Handle Configuration:** Grasp the handle grip to run the unit up and down. Do this several times to get a feel for the unit. The LCD displays RUN MODE HANDLE.
 - **Standard Operation - Pendant Handle Configuration:** Depress the up and down levers to run the unit up and down. Do this several times to get a feel for the unit. The LCD displays RUN MODE PENDANT.

Note: The LCD backlight will shut off after 10 minutes of inactivity.

See the Lift Functionality section on page 28 for complete details on handle operation.

➔ **TIP:** The operator should always keep their hand under the operator present sensor on the slide handle while operating the unit in standard mode. If the hand is frequently moved away from the operator present sensor it will result in jerky movement from the unit.

- 8.6 After proper lift operation has been verified, test the rotation of the arms about their pivot points. Begin with the primary arm pivot. Using the handle, rotate the arm assembly and note the feel of the rotation of the primary arm. If the arm is too loose, tighten the friction brake located on the top of the mast. This is done by tightening the bearing locknut. If the arm is too difficult to rotate, loosen the friction brake by loosening the bearing locknut. Repeat this procedure until you are satisfied with the rotation of the primary arm.

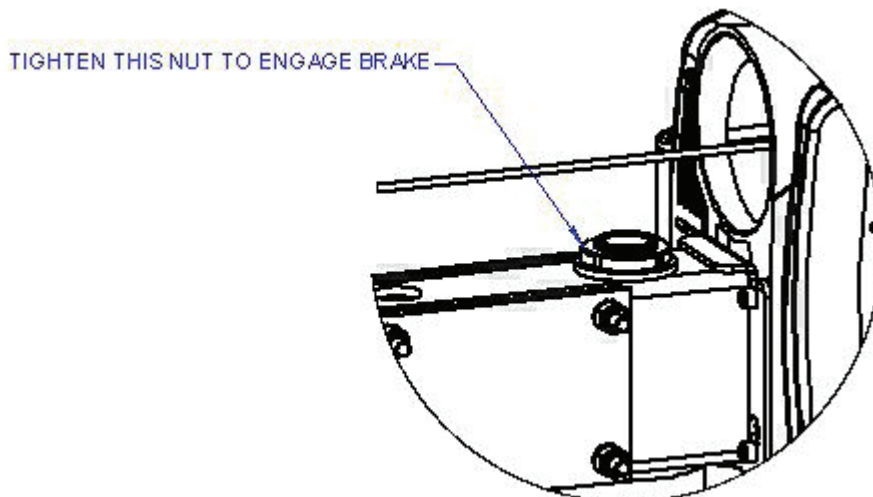


Diagram 8A. Primary arm friction brake adjustment.

STEP 8 - INITIAL POWER-UP (CONTINUED)

- 8.7 Using the handle, rotate the arm assembly and note the feel of the rotation of the secondary arm. If the arm is too loose, tighten the friction brake located on the pivot block at the knuckle end of the arm assembly. This is done by loosening the jam nut and tightening down the setscrew with a clockwise rotation. If the arm is too difficult to rotate, loosen the friction brake. Loosen the jam nut and back the setscrew off by rotating it counter-clockwise. Repeat this procedure until you are satisfied with the rotation of the secondary arm.

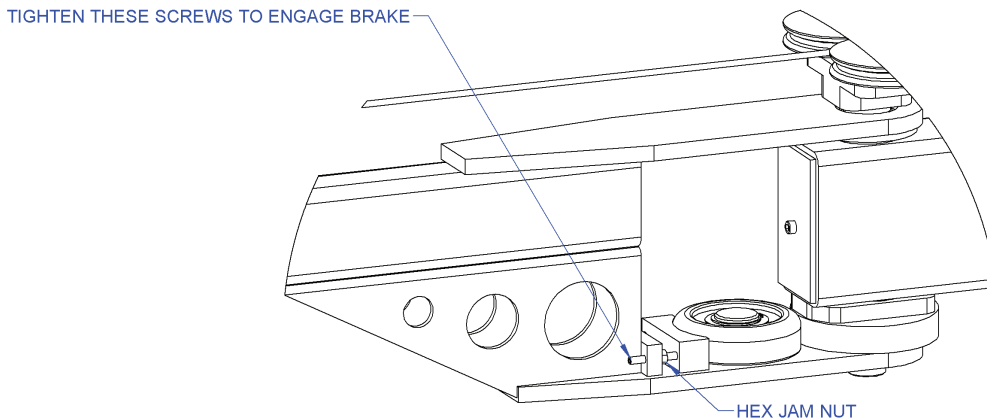


Diagram 8B. Secondary arm friction brake adjustment.

- 8.8 With both the primary and secondary arms adjusted, rotate the crane through its full range of travel and take note of any interference. Determine the desired range of the Easy Arm® and set the rotation stop bolt to limit continuous rotation.

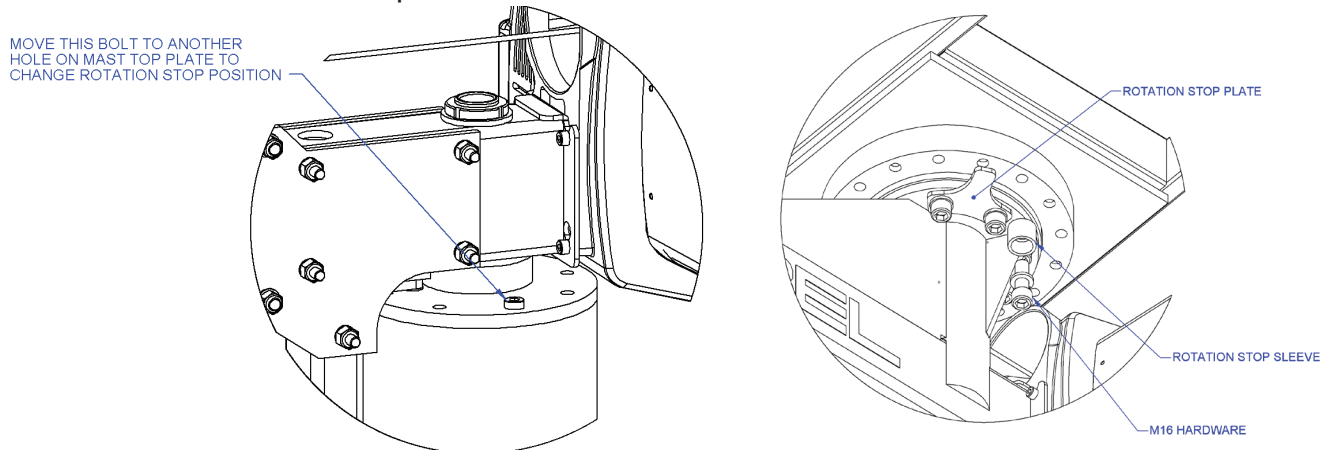


Diagram 8C. Floor mounted arm assembly rotation stop installation.

Diagram 8D. Under Hung arm assembly rotation stop installation.

WARNING

Failure to properly set the rotation stop bolt to limit primary arm rotation to 375° will result in excessive twisting of the main power cord into the actuator assembly and will result in reduced life of the cable.

- 8.9 Finally, test the operation of any special tooling that may have been integrated to the Easy Arm® unit.

WARNING

Gorbel, Inc. does not provide integrated tooling for the Easy Arm®. All tooling related questions should be directed to the tooling manufacturer or supplier.

STEP 9 - AIR CONNECTION (OPTION)

➔ **TIP:** Do not connect to air power until all assembly is complete.

- 9.1 Verify the connection between the air hose and the nycoil air hose in the coil cord.
- 9.2 Verify that the air hose is clamped properly to the arm assembly and that there are no kinks in the hose.
- 9.3 For Floor Mounted units, connect air source to the airline input located at the base of the mast assembly. The standard input airline requires a 1/2" NPT female connector.

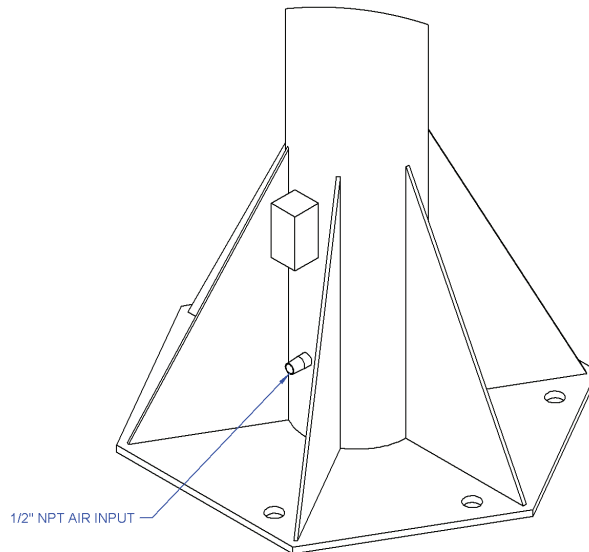


Diagram 9A. Airline inlet.

- 9.4 For Under Hung units, verify that there is a proper loop in the air hose at the knuckle pivot joint of the arm assembly. If the loop does not exist, the air hose will prevent the arm from rotating freely.

STEP 10 - FLOOR MOUNTED PORTABLE BASE INSTALLATION (OPTION)

- 10.1 Fill portable base with concrete (by others) that meets or exceeds 3000psi of compressive force.
- 10.2 Follow the mast installation instructions (a) through (h) from **Step 3.2** to mount the mast to the portable baseplate.
- 10.3 Adjust the portable base as required using the four (4) adjustable legs located in each corner.

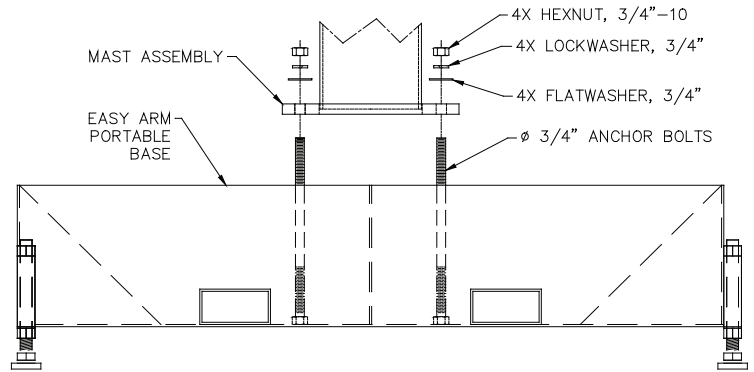


Diagram 10A. Column to portable base assembly.

Note: Portable base shown in diagram is for 165 lb. (75 kg) Easy Arm® with square baseplate. Hex baseplate for 165 lb. (75 kg) Easy Arm® uses (6) 3/4" anchor bolts and 330 lb. (150 kg) Easy Arm® uses (6) 1" anchor bolts.

STEP 11 - UNDER HUNG COLLECTOR (OPTION)

- 11.1 After the crane has been attached to the mounting platform, remove four of the M16 mounting screws and lockwashers as shown in **diagram 11A** to make room for the collector mounting bracket. Make sure the crane is firmly attached by the remaining four screws.
- 11.2 Do not tighten the 5/16 nuts holding the collector to the bracket. The collector unit should be free to rotate a small amount relative to the collector bracket. Position the assembly over the collector shaft. Locate the assembly so that the electrical conduit entrance of the collector is in a suitable position. Slide the collector over the collector shaft and push down so that the collector bracket sits firmly on the mounting platform.

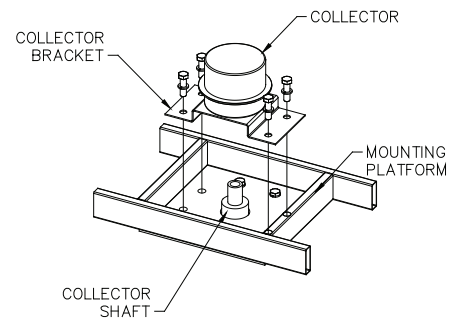


Diagram 11A. Collector Assembly.

➡ **TIP:** If the collector is not free to rotate, loosen the locknuts on the bottom of the assembly until some movement is possible.

- 11.3 Replace and tighten the four M16 mounting screws and lockwashers.
- 11.4 On the lower half of the collector there is a setscrew access port. Remove the plastic port cover and tighten the two setscrews within the assembly. This will enable the collector shaft to drive the inner portion of the collector unit. You will need to rotate the crane to locate each of the two setscrews. Replace the setscrew access port cover.

STEP 12 - FLOAT MODE AND FINAL STEPS

➔ **TIP:** Gorbel® Inside Sales is available from 7am to 7pm Eastern Time Monday - Thursday and 7am to 5pm Eastern Time Friday.

12.1 Float Mode may be activated by simply pressing the G-Force® logo button on the left hand side of the handle (**diagram 12A**). Below is a simple exercise to practice if you are not familiar with the Float feature. (This exercise assumes an in-line slide handle is being used).

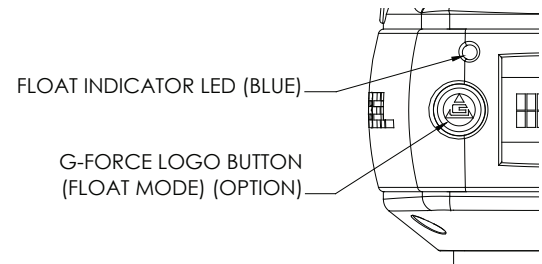


Diagram 12A. Float Mode Button - Slide Handle.

- A) Grasp the handle grip and lift an object weighing at least 20 lbs. (9 kg) to a comfortable height in front of you.
- B) Let go of the handle grip.
- C) Press the G-Force® logo button on the handle. **Note:** Do not hold onto the load. Applying an upward or downward force on the handle or load while initiating Float Mode will give the unit a false reading and cause excessive drift.
- D) After Float Mode is initialized, the “blue” LED light will turn on and the handle with payload should not be moving. The LCD will display RUN MODE FLOAT.
- E) Now grasp the load.
- F) To move the load down, put vertical pressure on the load downward, towards the floor. To move the load up, lift up on the load, towards the ceiling. **Note:** The direction and speed of travel is now being controlled by the amount of force that the operator exerts directly onto the load. The higher the force exerted on the load, the faster the unit moves. **Note:** An over-speed detection routine checks if Float Mode reaches 90% of the maximum fully loaded lifting speed and shuts the unit down. It safely limits the maximum speed of travel in Float Mode.
- G) Run the unit up and down several times (at least 20 times in each direction) to assure proper operation. Float Mode should provide a smooth feel.

CAUTION

Actuating the operator present switch while in Float Mode will cause the unit to exit Float.

- H) Repeat this exercise until you become comfortable with Float Mode.

STEP 12 - FLOAT MODE AND FINAL STEPS (CONTINUED)

WARNING

NEVER remove the load from the Easy Arm® while still in Float Mode. The control system will interpret the removal of the load as operator intent to lift the load. Therefore, the unit will begin to drift up. The speed of the unit drift directly correlates to the weight that was removed from the unit. The heavier the weight, the faster the unit will travel.

WARNING

In Float Mode, the live load weight CANNOT be increased or decreased because this will cause unwanted motion. Float Mode must be reinitiated each time the weight of the live load is changed.

CAUTION

If external forces are applied to the load while Float Mode is being initiated, the Easy Arm® will calculate a baseline weight that is higher or lower than the actual weight being lifted. When the external force is removed, the load will begin to drift in the opposite direction of the load that was applied.

12.2 The speed, acceleration, and other features of the Easy Arm® can be adjusted using the Program Menu available at the handle. ***See the Program Mode section on page 32 for complete details on modifying and programming features.***

12.3 Please contact the Gorbel® factory (585-924-6262) if any of the following occur.
DO NOT ATTEMPT TO REPAIR UNIT YOURSELF.

- Excessive noise
- Unexpected operation
- Change in performance
- Damage or excessive wear to unit components
- Questions about the unit arise

Please do not be limited by these items only.

12.4 Keep Packing List, Installation & Operation Manual, Drawings, and any other inserts filed together in a safe place for future reference.

STEP 13 - EXPANSION I/O BLOCK MOUNTING INSTRUCTIONS (OPTION)

➔ **TIP:** Expansion I/O block mounting instructions only apply to iQ units with an I/O block.

DIMENSIONS

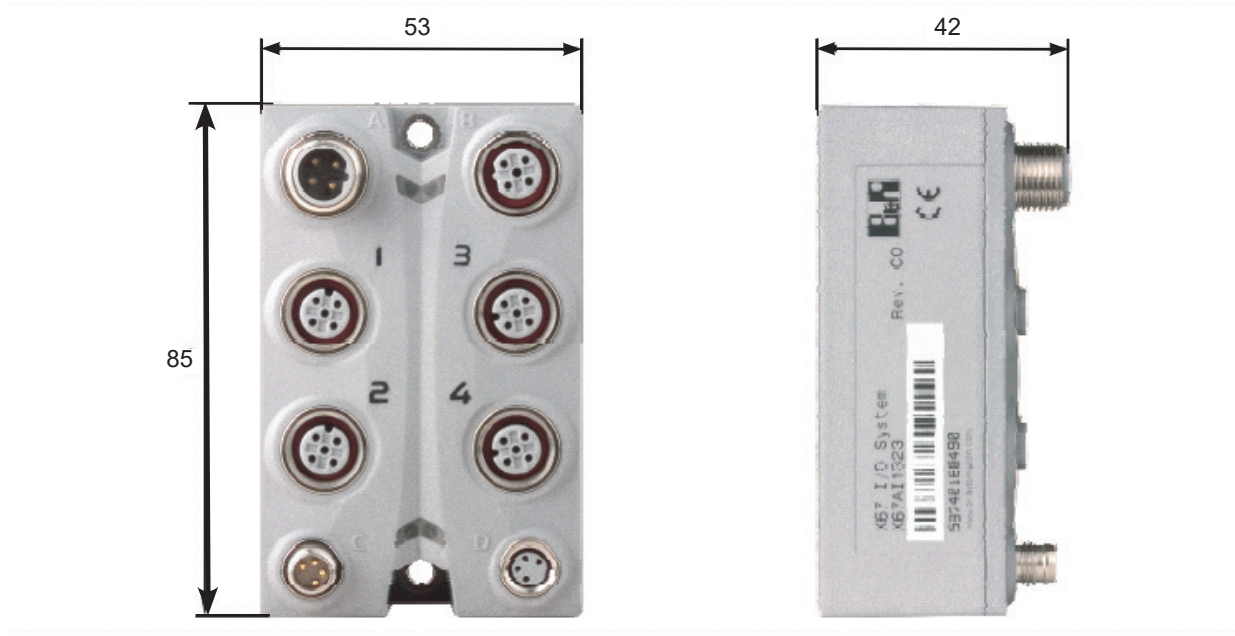


Diagram 13A. Expansion I/O block dimensions (millimeters).

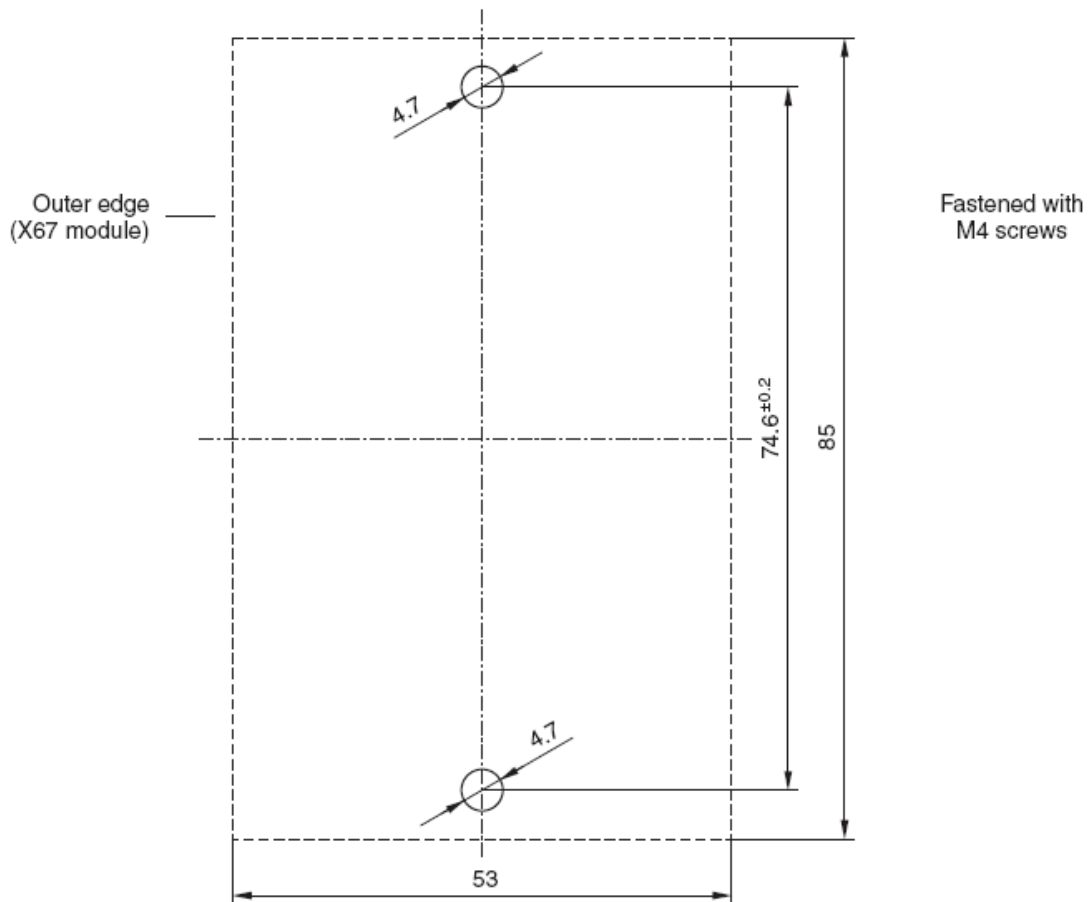


Diagram 13B. Screw fastener drilling template.

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LIFT FUNCTIONALITY

Standard Operation - Slide Handle Configuration:

When the device is in the standard operational mode, the sliding grip of the handle controller commands the z-axis (vertical) direction and speed of the lift (**diagram A**). The handle grip has a center neutral position and can slide up and down to provide up and down speed commands to the control system. The further the handle grip is displaced from the neutral position the faster the servo movement to lift or lower the load. The operator controls the slide handle location by grasping the handle grip and moving it up and down as if it were an extension of the operator's arm. The lift moves slightly slower when a load is lifted, thereby giving the operator some feel for the weight of the load.

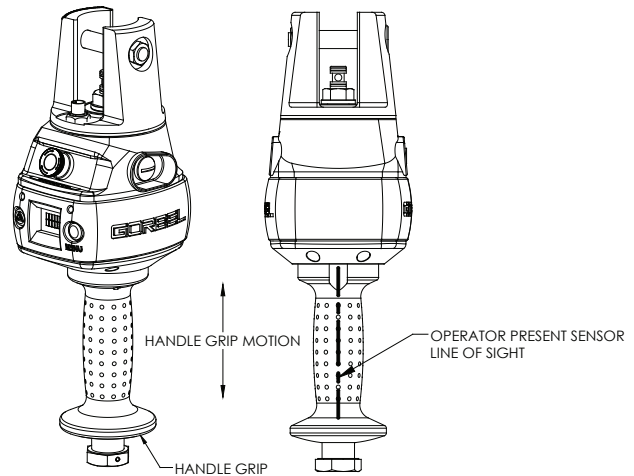


Diagram A. Slide Handle - Handle Grip and Operator Present Sensor Line-of-Sight.

For safety, an operator present sensor (OPS) within the slide handle must be activated by the operator before the motor will activate (**diagram A**). If the operator removes their hand from the OPS' line-of-sight, the Easy Arm® and payload will be brought to a safe stop.

WARNING

Do not mount any objects to the Easy Arm® slide handle grip (i.e. switches). Additional objects may interfere with the travel of the sliding handle grip and affect the overall speed and functionality of the unit.

Standard Operation - Pendant Handle Configuration: When the device is in the standard operational mode, the up and down levers command the z-axis direction and speed of the lift (**diagram C**, page 29). The further the up or down lever is depressed, the faster the servo movement to raise or lower the load.

Standard Operation - Force Sensing Slide Handle: The grip on the handle is connected to a force sensing device so that when the user applies force up or down along the central axis of the handle this is interpreted as intent to move. Speed of the unit is proportional to the amount of force applied. Forces in lateral directions are not detected. **Note:** There is no traditional OPS. When the force applied to the handle exceeds a small threshold, the unit activates.

Standard Operation - Force Sensing Hub Handle: Handlebars (Gorbel® optional kit 74630, or by others) are attached to a mounting plate which in turn is connected to a force sensing device so that when the user applies a vertical force up or down, this is interpreted as intent to move. Speed of the unit is proportional to the amount of force applied. Forces in lateral directions are not detected. **Note:** There is no traditional OPS. When the force applied to the handle exceeds a small threshold, the unit activates.

Emergency Stop Button: When depressed, the emergency stop (E-stop) button disables the actuator. The E-stop button is located on the face of the handle (**diagram B**, page 29). The Easy Arm® will operate only when the E-stop has been reset. The LCD will display E-STOP ENGAGED.

Float Mode: In this mode, the operator can simply maneuver the payload directly and cause the load to raise or lower by applying either an upward or downward force on the load. The greater the force applied, the faster the load will move. Note: There is a standard setting in the controls that safely limits the maximum speed of travel in Float Mode; this setting is not adjustable. If the limit is exceeded, the unit will return to standard operation and the LCD will display LIFT READY.

Float Mode is initiated by simply pressing the G-Force® logo button on the left side of the handle (**diagram B** or **C**, page 29). See Step 12, page 24, for complete details on Float Mode operation.

Program Mode: In this mode, the operator can control speed, acceleration, service features and other variable settings (**diagram B** or **C**, page 29). **See the Program Mode section, page 32, for complete programming functionality located at the handle.**

LIFT FUNCTIONALITY (CONTINUED)

Float Mode LED (Blue): If the unit is equipped with Float Mode (option), the “Float Mode” enabled LED will illuminate when the G-Force® logo button is pressed on the hand controller and Float Mode has been correctly initiated. This LED is located just above the G-Force® logo button (*diagram B* or *C*).

System Fault LED (Red): The “System Fault” LED flashes when basic faults have been detected by the control system. If a fault has occurred, the system will be disabled. This LED is located just above the MENU button (*diagram B* or *C*).

Diagnostic Mode: The Diagnostic Mode is a special program within the Program Mode under the Service menu that will allow a technician to measure or monitor the state of select switches and other electronic components in the actuator and either the slide or pendant handle. It is intended to be used for troubleshooting purposes only. The user can choose a single or multiple components. The E-stop must be cycled off/on to exit this particular program.

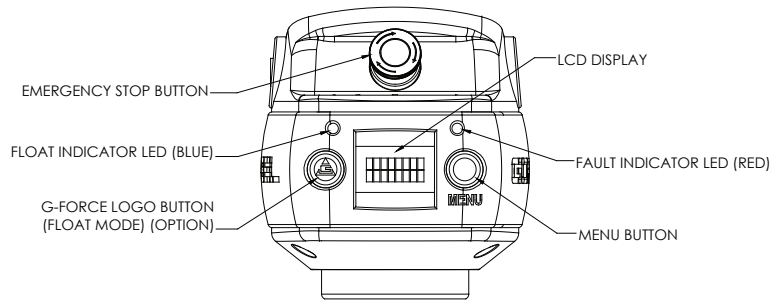


Diagram B. Slide Handle - G-Force® Logo (Float Mode), MENU and Emergency-Stop Buttons and LEDs.

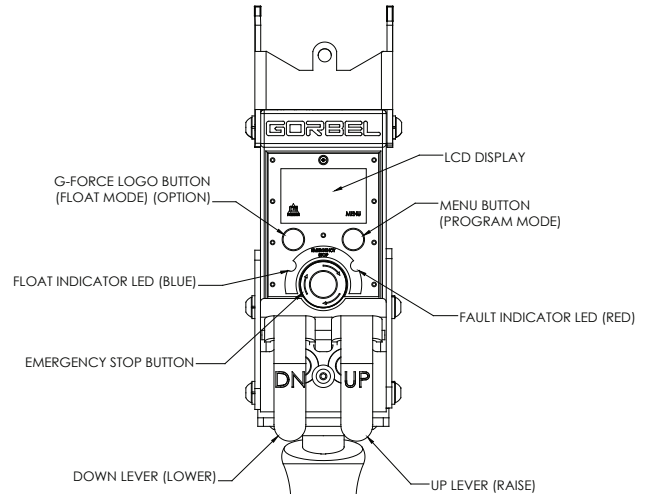


Diagram C. Pendant Handle - G-Force® Logo (Float Mode), MENU and Emergency-Stop Buttons and LEDs.

WARNING

In Float Mode, the live load weight cannot be increased or decreased because this will cause unwanted motion. Float Mode must be reinitiated each time the weight of the live load is changed.

WARNING

Enabling the operator present sensor while in Float Mode will cause the unit to exit float.

Overload: The servo controller will prevent the lift from moving upward if loaded beyond the maximum capacity of the Easy Arm®. When an overload condition is sensed the lift is prevented from moving upward. The red and blue LEDs will flash and LIFT OVERLOAD will be displayed on the LCD to indicate to the operator the unit is overloaded. The lift may be moved down to allow for the safe removal of the load.

Limit Switches: The Easy Arm® is equipped with both mechanical upper and lower limit switches, located in the actuator assembly. When the upper limit switch is triggered, the upward motion of the lift stops quickly at a controlled deceleration rate. The controlled deceleration rate guarantees the load cannot come off the hook. When the upper limit is triggered the lift will move down but not up. The lower limit is set so that a minimum of two full wraps of wire rope remain on the drum pulley at all times. When the lower limit switch is triggered, the downward motion of the lift stops quickly at a controlled deceleration rate. When the lower limit is triggered, the lift will only move up and not down.

LIFT FUNCTIONALITY (CONTINUED)

Slack Switch: The Easy Arm® is equipped with a slack switch that senses tension in the wire rope and trips when the wire rope develops slack. The switch is located inside the actuator assembly. When the slack switch senses slack in the wire rope, downward movement of the lift is stopped to minimize the amount of wire rope unwound from the drum pulley. When slack in the wire rope is sensed, the lift will only move up but not down.

Remote Mounted Handle (System Option): The lifting device is capable of operating with the handle displaced from the wire rope (not in-line with the wire rope). For example, if an end user has tooling that is too large for the operator to safely reach and operate the handle in the standard in-line position, remote mounting the handle is recommended. The tooling must be mounted (and balanced) on the end of the wire rope, while the handle can be remote mounted to the tooling.

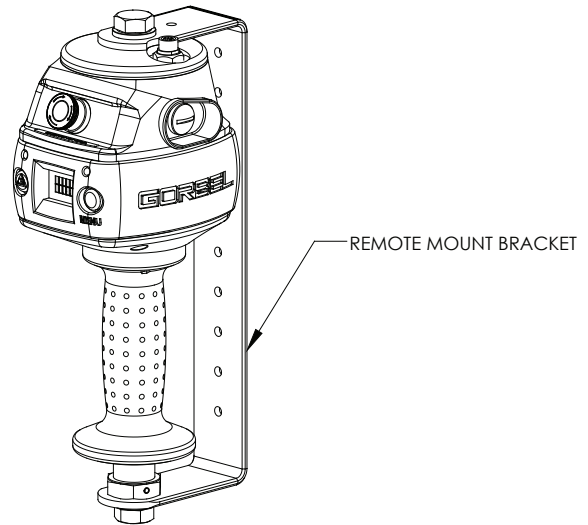


Diagram D. Remote Mounted Slide Handle with Gorbels® Bracket.

WARNING

The tooling **MUST** be attached to the end of the wire rope with the G360™ swivel assembly (supplied by Gorbels, Inc.). Failure to mount the tooling with a swivel assembly can result in premature failure of both the wire rope and the coil cord.

WARNING

All tooling must be retained to the G360™ assembly utilizing the M16 thread and locking pin provided.

The remote mounted handle is linked to the coil cord via an extension cable. The handle operates exactly the same as if it were mounted in-line. The end user must supply Gorbels with the required length of the extension cable such that it can be safely routed and clamped to the tooling.

CAUTION

Always include the distance for bends and turns when providing the extension length.

WARNING

Ensure that the slide handle is supported properly in remote mounted handle applications by restraining the slide handle at both the top and bottom mounting points (**diagram D**).

CONTROLS INTERFACE FEATURES

The jog switch push buttons and communications connector are protected by a cover (**diagram E**). To access the jog switch push buttons and communications connector, loosen the M4 screw and slide the shield back towards the wire rope. **Note:** Do not fully unthread the M4 screw. When finished, slide the shield back into place and re-tighten the M4 screw.

Jog Switch Push Buttons: The jog switch buttons allow qualified personnel to replace the wire rope on the unit. To effectively operate the jog switch buttons, all electrical cables must be connected and power on. Depressing the “Up” jog switch button will enable the motor and cause the system to reel the wire rope into the actuator and onto the drum pulley. Depressing the “Down” jog switch button will enable the motor and cause the system to pay out the wire rope from the actuator and off of the main pulley. Jog switch push buttons override all motion control from a handle or tooling.

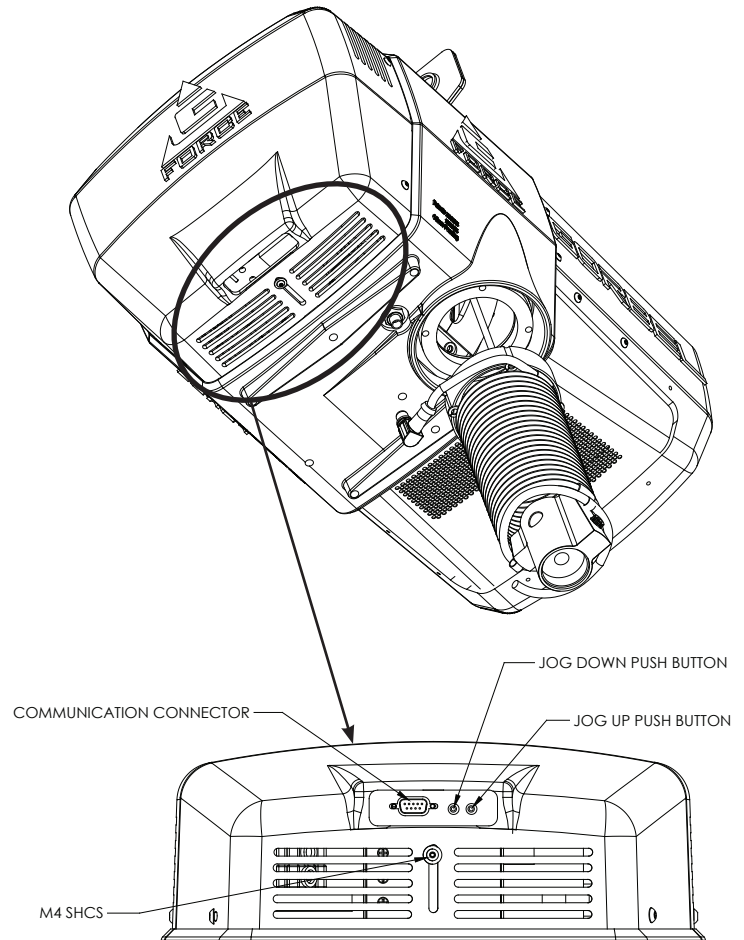


Diagram E. Actuator - Controls Interface Display (as viewed from bottom of actuator).

WARNING

The jog switch buttons are for system maintenance and load testing use only and should not be manipulated during normal operation of the Easy Arm®. Operation of the jog switch buttons during normal operation increases the risk of personal injury to the operator.

Service Mode: This operation mode is similar to the “safe mode” of a PC. In this state all handle motion control and Q & iQ custom features are disabled, all digital outputs are turned off, and only basic jog up, jog down, LCD display and safety program mode are available. It allows a minimum safe operation on a unit with a damaged handle, broken I/O electronics or other damaged peripheral control components that would make it dangerous to run the unit if the component is used. The unit is still inoperative if actuator components such as the drive, motor, or jog switches are damaged. To activate service mode, with the handle E-stop pushbutton released and the LCD screen displaying LIFT READY, press and hold both jog pushbuttons on the actuator for ten seconds. Both the blue and red LEDs flash once per second and the LCD displays SERVICE MODE when the operation mode is ready.

Communications Connector: This connector is the communications port for the Easy Arm®. With the program kit (option), provided by Gorbelt, users may connect to the Easy Arm® to upload software programs or use the G-Force® Visual Basic program.

PROGRAM MODE

Overview (Software Version R1.07.1)

Program Mode is used to control and adjust all of the features on the Q and iQ series Easy Arm®. Before entering Program Mode review the **Program Mode Menu outline, Chart D, pages 37-41**.

Note: Force Sensing Handles are not supported on units running software version R1.07.2 or earlier. Contact Gorbel for information on software updates.

Using Program Mode

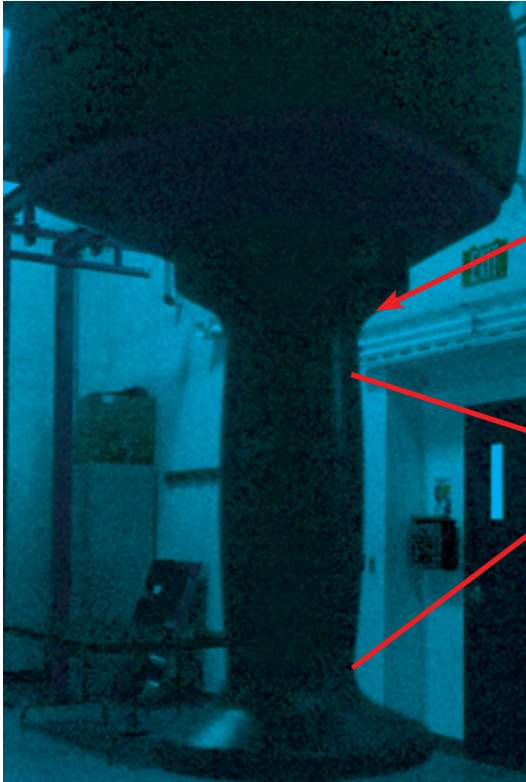
Program Mode is initiated by following the steps below. Reference **diagrams B** and **C** on page 29 for button locations.

Entering Program Mode (chart A, page 34):

1. **Press and Hold** the MENU button (right-hand side of handle) for two seconds to activate Program Mode.
2. After two seconds, release the MENU button. The red and blue LEDs will illuminate and “PROGRAM MODE” will be displayed for one second. Then the first menu will be displayed.
 - Q unit: SPEED MENU (default). **Note:** If the Virtual Limits Package has been ordered, the Virtual Limits Menu (V-LIMITS) will appear first.
 - iQ unit: V-LIMITS MENU
3. Press the MENU button to toggle between menus. The LCD will display the corresponding programmable menus:
 - V-LIMITS MENU - Virtual Limits menu (**option**)
 - SPEED MENU - Lift Speed adjustment
 - RESPONSE MENU - Lift Response (acceleration) adjustment
 - SETTINGS MENU - Programmable Features on both the Q and iQ units
 - SETTINGS MENU 2 - Programmable Features on iQ units only (**iQ only**)
 - LED MENU - Program the LED lights (**iQ only**)
 - SERVICE MENU - Customize and manage maintenance and service features
 - CONFIGUR MENU - Special unit features and hardware configurations
4. Once you have reached the menu you would like to enter, press the G-Force® logo button.
5. The first programmable feature in that menu will be displayed. **Chart D**, pages 37-41, displays a full list of all the menus and programmable features under each menu.
6. To move to the second programmable feature press the G-Force® logo button again.
7. **Note:** If the MENU button is pressed after Step 4, the selection is cleared and the LCD displays the next program menu.
8. Once the desired feature is selected wait three seconds.
9. After displaying the feature text for three seconds, the request is executed. The LCD will flash the feature text several times to indicate the command is being executed.
10. After the command is executed, the system returns to standard operation, and the LCD displays “LIFT READY”.

PROGRAM MODE (CONTINUED)

Handle Operation

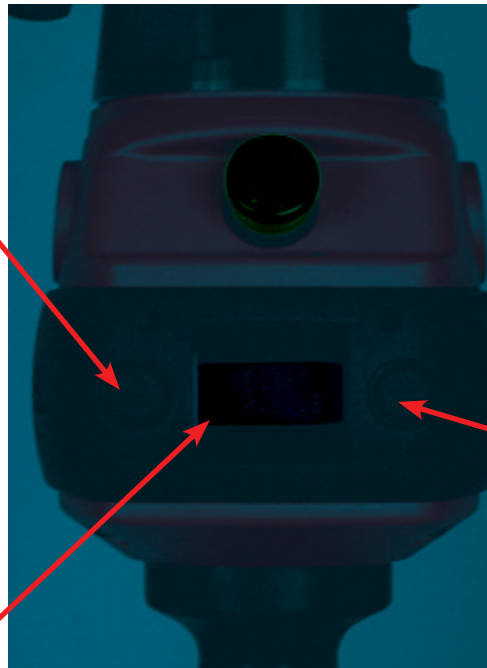


Make sure to keep fingers clear of the photo sensor area when in program mode. Breaking the photo sensor will drop the unit out of program mode and you will need to start over again.

When making changes in program mode, do not break the beam of the photo sensor until the new setting has been completed. The display must be allowed to flash three times before the handle is gripped. Breaking the sensor beam before the display flashes three times will cancel the change and drop the unit out of program mode and you will have to start over.

When the unit is not in program mode, press and release this button to initiate float mode.

When the unit is in float mode, use this button to select the desired item within the menu by pressing and releasing to advance to the next selection



Press and hold this button for approximately three seconds until the unit enters program mode. Once in program mode, this button is used to select the desired menu. Press and release this button to advance to the next menu. If you happen to accidentally pass by a menu, it will come around again if you continue to press and release this button.

If you stay on a menu item selection for approximately three seconds, the display will blink three times and the change will be made. Keep advancing through the menu items quickly until you are certain of the change you want to make. Otherwise, you may accidentally make an undesired change.

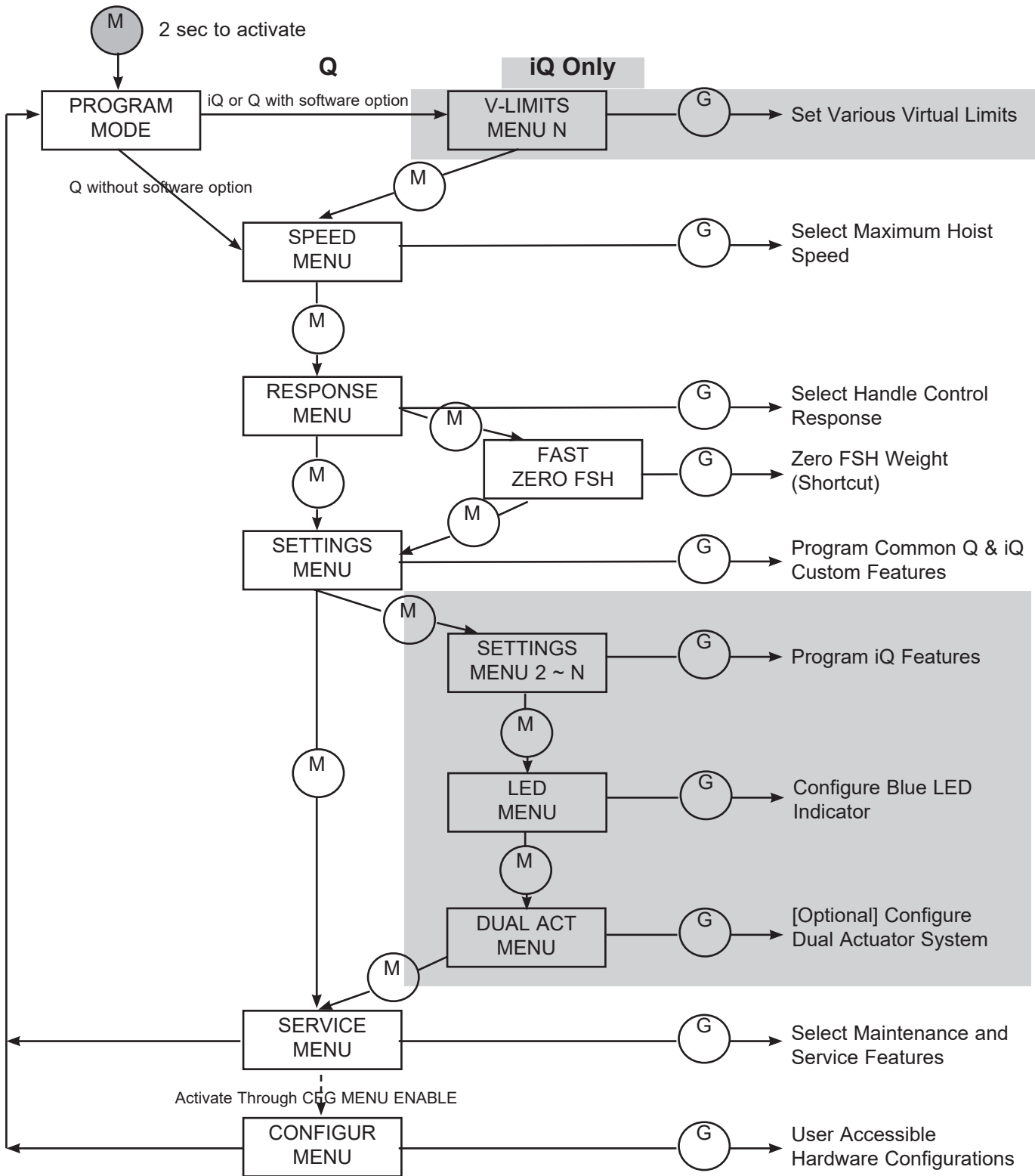
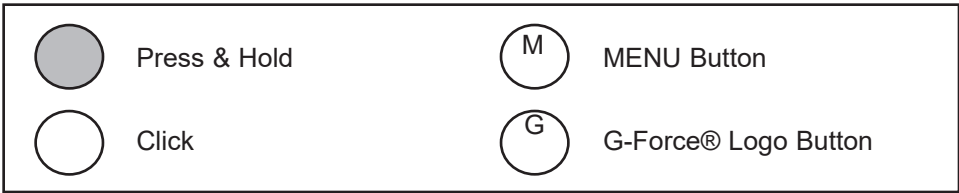


Chart A. Program Mode Process.

PROGRAM MODE (CONTINUED)

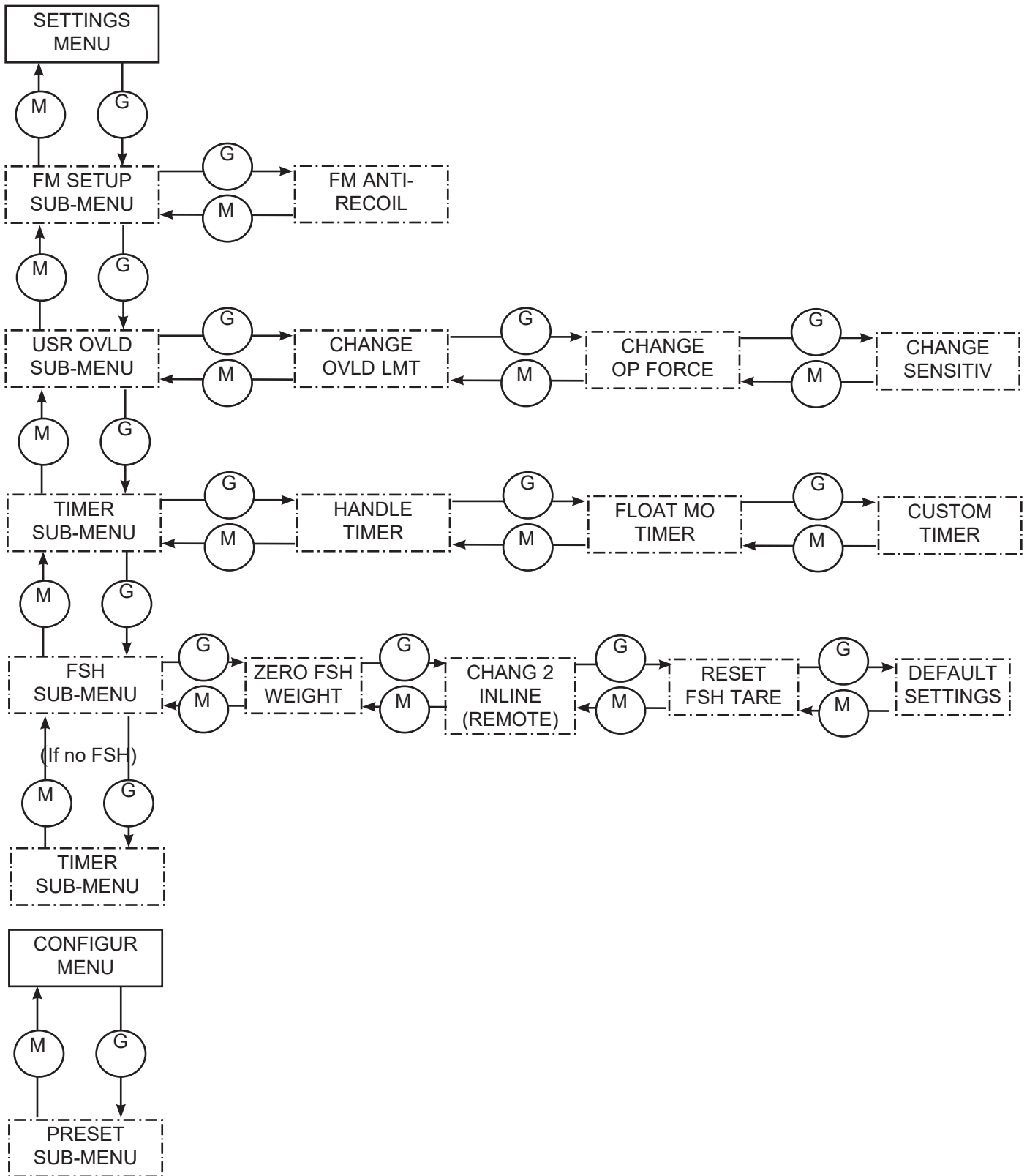


Chart B. Program Mode Main Menu (Solid Border) and Sub-Menu (Dotted Border) Layouts.

PROGRAM MODE (CONTINUED)

Lockout Feature (chart C)

To prevent tampering in Program Mode, a Lockout Feature is available.

To Lockout Program Mode:

1. Press both the G-Force® logo button and the MENU button simultaneously for five seconds.
2. The LCD will display “LOCKOUT CHECK” while both buttons are being depressed.
3. After five seconds, “PROGRAM LOCKED” will be displayed to confirm the Lockout was successful.

If Program Mode is requested after the Lockout has been enabled, the LEDs will flash twice to indicate Program Mode is not accessible and “PROGRAM LOCKED” will be displayed again.

To Unlock Program Mode:

1. Press both the G-Force® logo button and the MENU button simultaneously for five seconds.
2. The LCD will display “UNLOCK CHECK” while both buttons are being depressed.
3. After five seconds, “PROGRAM UNLOCKED” will be displayed to confirm the Lockout was successful.

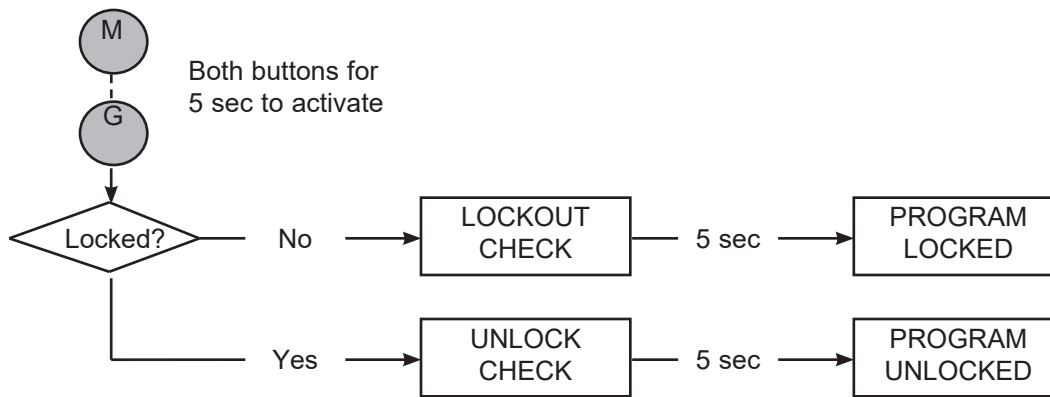


Chart C. Lockout Feature Process.

Safety Program Mode

If the G-Force® has detected a fault or is running in SERVICE MODE, only a limited set of menus are accessible.

For example, if the G-Force® records a fault, when Program Mode is activated the LCD will display “LIMITED PRG MODE” rather than “PROGRAM MODE”. Safety Program Mode can be navigated just as Program Mode would be, however the only menus available are:

- V-LIMITS MENU - Virtual Limits menu (**option**)
- SPEED MENU - Lift Speed adjustment
- RESPONSE MENU - Lift Responsiveness (Acceleration) adjustment
- SERVICE MENU - Customize and manage maintenance and service features

VIRTUAL LIMITS WARNINGS

WARNINGS

If the upward speed reduction point is being used to reduce the impact of engaging the load “on the fly” (i.e. catching the load with a hook while the G-Force® is already in motion in the upward direction), care must be taken to ensure the speed reduction takes place before the load is engaged. Please program the Upper Slow Down Reduction point at least half an inch below the exact point of pick-up.

Note: Setting the upper and lower virtual limits to the same position will cause the unit to not travel in either direction.

PROGRAM MODE (CONTINUED)

| Program Mode | Menu | LCD Text | Feature Description |
|--|------------------------------|--------------------------------------|---|
| Virtual Limits (VL) Menu^{*, **, ***} (also available for Q unit with Software Package) | V-LIMITS MENU ^{1,2} | UPPER LIMIT | Program the upper virtual limit (load must be at desired position for upper limit). |
| | | LOWER LIMIT | Program the lower virtual limit (load must be at desired position for lower limit). |
| | | LOWER SLOW DN | Program the lower slow down reduction point (load must be at position where slow-down begins when descending). |
| | | UPPER SLOW DN | Program the upper slow down reduction point (load must be at position where slow-down begins when raising load). |
| | | UPPER RESUME | Program the upper speed resume point (load must be at position where system will resume normal speed when raising load). |
| | | VL MENU -RESET!- | Reset all programmed virtual limits in this menu. |
| Lift Speed Setting | SPEED MENU | SPD MENU SPD 10% ~ SPD 100% | Maximum hoist speed selection, [1 ~ 10] correspond to lowest and highest speed. |
| Lift Responsiveness (Acceleration) Setting | RESPONSE MENU | RESPONSE LOW | Set the lowest handle control response corresponding to about 75% of the highest responsiveness setting. |
| | | RESPONSE MEDIUM | Set the medium handle control response corresponding to about 85% of the highest responsiveness setting. |
| | | RESPONSE HIGH | Set the highest handle control responsiveness setting. |
| Force Sensing Handle Settings | FAST ZERO FSH | FAST ZERO FSH | This menu provides a short cut to tare the Force Sensing Handle. Clicking the Float Mode button will perform the tare process. This menu will not be displayed unless a Force Sensing Handle is connected. |
| | FSH SUB MENU | ZERO FSH HNDL | Tare the handle. |
| | | CHANGE 2 INLINE (REMOTE) | Change the handle between Inline and Remote type. This should be done when swapping one style of Force Sensing handle for another. The setting must match the handle type. |
| | | RESET FSH | Un-tare the handle. The load cell signal will be returned to its original value. Usually command warning 11008 will display since the handle will be out of tare. |
| | | DEFAULT SETTING | Revert to default handle setting: unit will be configured for Inline Slide Force Sensing handle. |
| Q & iQ Custom Features | SETTINGS MENU | ZERO WT DISP | Record and tare out the handle weight for weight readout calculation. |
| | | WEIGHT READ ON READ OFF | Toggle between enabling and displaying the load weight. Once enabled, weight is displayed two seconds into standard operation (unit idling). |
| | | DISPLAY METRIC ENGLISH | Toggle the unit of the weight readout display between pounds (English) and kilograms (Metric). |
| | | FM SETUP SUB-MENU | Access Float Mode Configuration Setup Sub-Menu. |
| | | USR OVL SUB-MENU | User Programmable Overload Setup Sub-Menu. |
| | | TIMER SUB-MENU | Excessive Pause Timer Setup Sub-Menu. |
| | | SETTINGS -RESET!- | Reset above Custom Features, i.e. reset tarred handle weight, weight readout off, and readout display back to English unit. |
| [SUB-MENU] Float Mode Configuration Setup | FM SETUP SUB-MENU | FM SETTINGS | Startup prompt screen when this sub-menu is accessed. |
| | | ENABLE DISABLE FLOAT MO ³ | Enable or Disable running Float Mode related features, such as Standard Float Mode, Remote-Mount Float Mode Trigger, Dual Float Mode Weights, etc. |
| | | FM ANTI-RECOIL | Float Mode Anti-Recoil Configuration Sub-Menu. |
| | | UNLOAD STOP ON STOP OFF | Optional feature utilizing Anti-Recoil detection. When user sets a weight onto a surface in Float Mode, it is terminated if Anti-Recoil detects an unloading. This can be useful for applications needing a quick Float Mode exit to an idle state to allow user to work on the part. Note: As a result of the extra detection, Float Mode is <u>likely</u> to terminate when the upper limit switch is hit while unit is running at a fast speed. This false detection can be avoided or reduced by running the unit at a low speed. |

Chart D. (continued on pages 38-41) Program Mode Menu and Selection Settings.

PROGRAM MODE (CONTINUED)

| Program Mode | Menu | LCD Text | Feature Description |
|--|-------------------|----------------------|--|
| [SUB-MENU] Float Mode Anti-Recoil Configuration Setup | FM ANTI-RECOIL | AT OVER FORCE SPEED | Startup screen when this sub-menu is accessed. The correct configured Anti-Recoil detection method is displayed (see next item for details on the detection methods). |
| | | TO OVER FORCE SPEED | Toggle Anti-Recoil detection method between standard over-speed and over-force detections. Anti-Recoil protects against a dropped weight while running Float Mode causing the unit to speed upward until hitting an object or a push force equivalent to the dropped weight. Over-Speed Detection: Unit terminates Float Mode if speed exceeds maximum Float Mode speed at 90% of unit loaded speed. Over-Force Detection: Unit terminates if user's operating force exceeds the maximum force limit or a dropped weight is detected by evaluating the force profile. Different from Over-Speed Detection, unit can run at the maximum Float Mode speed. a. Maximum force limit defaults at 35 lbs. b. A dropped weight profile assumes the operator has both hands off the weight (tooling) as the unit speeds upward. Detection ability may reduced if user attempts to stop the unit or if the tooling swings heavily. c. If the total lifted weight (e.g. tool and part) is less than the maximum force limit, Over-Speed Detection is applied. |
| | | MX FORCE 15 ~ 45 LBS | Set Anti-Recoil Over-Force Detection maximum force limit between 15 and 45 lbs. |
| | | DEFAULT SETTINGS | Unit reset to the default setup according to the configured detection method. For example, unit configured with Over-Force Detection defaults to 35 lbs. maximum force limit, dropped weight profile checkup and conditional Over-Speed Detection. UNLOAD STOP option is turned off for both methods. |
| | | | |
| [SUB-MENU] User Programmable Overload Setup | USR OVLD SUB-MENU | USR OVLD SETUP | Startup prompt screen when this sub-menu is accessed. Please activate weight readout while setting an overload limit, to ensure that the load cell is properly calibrated and the desired overload limit is within the acceptable range. Please see WEIGHT READ ON under SETTINGS MENU for additional details. |
| | | CHANGE OLVD LMT | Program an overload limit. |
| | | CHANGE OP FORCE | Configure operating force limit for moving a load in air. |
| | | CHANGE SENSITIV | Configure overload detection sensitivity. |
| | | DEFAULT SETTINGS | Apply factory default overload settings. Overload limit is set as the maximum limit either at the rated capacity plus 5 lbs for G-Force® 165#, Easy Arm® 165# and G-Jib™ 330# models, or 101% of the rated capacity plus 5 lbs for all other models. The operating force limit is set at 15 lbs and detection sensitivity is set to 5 (high). |
| Program an Overload Limit | CHANGE OVLD LMT | AT OVLD LBS NNNN | Startup prompt screen displaying the programmed overload limit. User Overload feature adjusts the detection and over limit parameters proportional to programmed Overload Limit. The over limit when overload is triggered is at M% above the Overload Limit plus the Operating Force Limit (see CHANGE OP FORCE section for info). An over limit is roughly set at: G-Force®: 102% x Overload Limit + OP FORCE EasyArm®: 105% x Overload Limit + OP FORCE G-Jib™: 103% x Overload Limit + OP FORCE |
| | | TARE OVLD LMT | Tare the total lifted weight as Overload Limit. When selected, unit tares the total lifted weight supported by the wire rope as the Overload Limit. This value can be monitored thru the weight readout feature without zeroing the reading (see SETTINGS MENU). The maximum limit is either the rated capacity plus 5 lbs for G-Force® 165#, Easy Arm 165# and G-Jib™ 330# models, or 101% of the rated capacity plus 5 lbs for all other models. The minimum limit is 25% of the rated capacity. A warning is triggered if the tare weight is outside this range. Overload limit is capped at one of these bounds. |
| | | SET LIMIT LBS NNNN | Set Overload Limit to the selected NNNN lbs limit. TARE OVLD LMT section lists a range of the maximum and minimum limits for Overload Limit. Clicking the G-Force® Logo pushbutton decrements the limit from the maximum down to the minimum, one lb at a time. The button can be pressed and held to decrease the count at a faster rate. Once the minimum value is reached, click the pushbutton to restart from the setup screen; otherwise, the minum limit is applied after the pushbutton is released. |

Chart D. (continued from page 37 & continued on pages 39-41) Program Mode Menu and Selection Settings.

PROGRAM MODE (CONTINUED)

| Program Mode | Menu | LCD Text | Feature Description |
|--|---------------------------------|-----------------------------|---|
| Configure Operating Force Limit for Moving a Load in Air | CHANGE OP FORCE | AT FORCE LBS NNNN | Startup prompt screen displaying the programmed Operating Force Limit. Operator's push and pull force is an extra loading to the system, especially when handle is mounted on the tooling. This sub-menu allows one to set a Force Limit to account for different user's operating force thus reducing chance of false overload detection. The limit should not be set larger than necessary as it reduces detection capability. By default, the limit is set at 15 lbs. |
| | | TO FORCE LBS NN | Set Operating Force Limit to between 5 and 25 lbs in 1 lb increments. |
| Configure Overload Detection Sensitivity | CHANGE SENSITIV | AT LEVEL 5 (HIGH) ~ 1 (LOW) | Startup prompt screen displaying the programmed Detection Sensitivity. This feature may falsely detect varying weight as overloaded, for example, on a system with unbalanced or elongated tooling that sways easily during usage, or a less rigid supporting structure that induce much vibration. The sensitivity parameter can be reduced to prevent false detection when operating a load at no greater than the Overload Limit. However, do not reduce the sensitivity unless it is necessary due to actual usage. A reduced sensitivity increases the time to detect a legitimate overload condition that may result in damages or failure to the unit. By default, Detection Sensitivity is set at 5 (HIGH). |
| | | TO LEVEL 5 (HIGH) ~ 1 (LOW) | Set Detection Sensitivity to between 5 (HIGH) and 1 (LOW) one level decrements at a time. |
| [SUB-MENU] Excessive Pause Timer Setup Sub-Menu | TIMER SUB-MENU ³ | PAUSE TIMER | Startup prompt screen when this sub-menu is accessed. |
| | | HANDLE TIMER | Change timer setting for the slide and pendant handle. |
| | | FLOAT MO TIMER | Change timer setting for Float Mode. |
| | | CUSTOM TIMER | Change timer setting for custom motion such as Auto Home or a profiled movement. |
| | | DEFAULT SETTINGS | Apply default excessive pause timer settings: slide and pendant handle (45 seconds), Float Mode (60 seconds) and custom motion (20 seconds). |
| Change Time Setting for the Selected Run Mode | HANDLE FLOAT MO or CUSTOM TIMER | AT LIMIT SEC NN MIN M | Startup prompt screen displaying the current timer limit between 1 ~ 59 seconds or 1 ~ 5 minutes. |
| | | SET LIMIT SEC NN MIN M | Set pause timer limit. Clicking the G-Force® Logo pushbutton increments the setting from 1 to 59 seconds, followed by 1 to 5 minutes. Press-and-hold the pushbutton does a quick scroll-thru on these limits. |
| iQ Features*,** | SETTINGS MENU 2 | DUAL FM TOOL WT | (Float Mode feature enabled) Record tooling weight for the Dual Float Mode weights feature. |
| | | DUAL FM LOAD WT | (Float Mode feature enabled) Record tooling and load weights for the Dual Float Mode weights feature. |
| | | ANTIDROP TOOL WT | Tare tooling weight for anti-drop feature. The minimum difference between unloaded and loaded tool weight is 20 lbs. for G-Force®, 25 lbs. for Easy Arm® and 25 lbs. for G-Jib™. |
| | | MENU 2 SET HOME | Program the auto home tracking position (load must be at desired position for the limit). |
| | | MENU 2 -RESET!- | Reset above custom features including the dual Float Mode, anti-drop, and auto home features. |
| LED Config Menu*,**: Programs the blue LED as an indicator) | LED MENU | RESET LEDS | Disable any custom feature (e.g. anti-drop) from utilizing the blue LED as an indicator. |
| | | ANTI DROP | Enables the blue LED on the control handle to act as an indicator for the anti-drop function. When this function is enabled and the anti-drop output is off (off is typically the grip/clamp state of the tooling), the blue LED will flash until the anti-drop output turns on (on is typically the release state of the tooling). |
| | | SLACK ANTIDROP | Set Slack Anti-Drop to use the blue LED for indication identical to ANTI-DROP above. This selection is not available by default because this is a disabled built-in feature. |

Chart D. (continued from pages 37 & 38, and continued on pages 40 & 41) Program Mode Menu and Selection Settings.

PROGRAM MODE (CONTINUED)

| Program Mode | Menu | LCD Text | Feature Description | | | | | | | | | | | | | | | | | | |
|--|---|----------------------|---|----------|------|--------|------------|----------|------------|--------------|------|------------|----------------|------|------------|------------|----------|----------|---------------|------|------------|
| Dual Actuator Configuration Menu*,*** (Dual Actuator option required) | DUAL ACT MENU ³ | MOTION INDEPEND SYNC | Item is only selectable if the dual-actuator system is set to manual configuration, SETUP MANUAL. | | | | | | | | | | | | | | | | | | |
| | | SETUP MANUAL AUTO | A dual-actuator system defaults to AUTO configuration, i.e. the system automatically configures the various run mode controls to INDEPEND or SYNC linking. If MANUAL option is selected, user can choose to overwrite some of the controls to a specific mode as programmed through MOTION INDEPEND\SYNC. The breakdowns are as such: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>RUN MODE</th> <th>AUTO</th> <th>MANUAL</th> </tr> </thead> <tbody> <tr> <td>Jog Switch</td> <td>INDEPEND</td> <td>SELECTABLE</td> </tr> <tr> <td>Slide Handle</td> <td>SYNC</td> <td>SELECTABLE</td> </tr> <tr> <td>Pendant Handle</td> <td>SYNC</td> <td>SELECTABLE</td> </tr> <tr> <td>Float Mode</td> <td>INDEPEND</td> <td>INDEPEND</td> </tr> <tr> <td>Custom Motion</td> <td>SYNC</td> <td>SELECTABLE</td> </tr> </tbody> </table> | RUN MODE | AUTO | MANUAL | Jog Switch | INDEPEND | SELECTABLE | Slide Handle | SYNC | SELECTABLE | Pendant Handle | SYNC | SELECTABLE | Float Mode | INDEPEND | INDEPEND | Custom Motion | SYNC | SELECTABLE |
| | | RUN MODE | AUTO | MANUAL | | | | | | | | | | | | | | | | | |
| Jog Switch | INDEPEND | SELECTABLE | | | | | | | | | | | | | | | | | | | |
| Slide Handle | SYNC | SELECTABLE | | | | | | | | | | | | | | | | | | | |
| Pendant Handle | SYNC | SELECTABLE | | | | | | | | | | | | | | | | | | | |
| Float Mode | INDEPEND | INDEPEND | | | | | | | | | | | | | | | | | | | |
| Custom Motion | SYNC | SELECTABLE | | | | | | | | | | | | | | | | | | | |
| SETUP -RESET! | Default dual-actuator feature settings to SYNC linking mode and AUTO configuration setup. | | | | | | | | | | | | | | | | | | | | |
| Service Menu: Maintenance and Service Features | SERVICE MENU | SRV MENU UP CYCLE | Program upper limit for the cycle count. | | | | | | | | | | | | | | | | | | |
| | | SRV MENU LO CYCLE | Program lower limit for the cycle count. | | | | | | | | | | | | | | | | | | |
| | | DISPLAY SYS INFO | Enable/disable displaying of usage data. When enabled, text display cycles between system time, run time, cycle counts, and the software version number once per second. | | | | | | | | | | | | | | | | | | |
| | | CLEAR COUNT | Reset cycle count to zero. | | | | | | | | | | | | | | | | | | |
| | | CLEAR RUN TIME | Reset run time to zero. | | | | | | | | | | | | | | | | | | |
| | | SRV WARN OFF | Reset the warning or the time limit of the Maintenance Service Indicator* feature. Does not reset the current run time. Note: The warning can also be reset by selecting CLEAR RUN TIME. | | | | | | | | | | | | | | | | | | |
| | | SRV WARN 500 HRS | Configure the time limit of the Maintenance Service Indicator* feature on I/O point 7 (see diagram F) to 500 hours. | | | | | | | | | | | | | | | | | | |
| | | SRV WARN 1000 HRS | Configure the time limit of the Maintenance Service Indicator* feature on I/O point 7 (see diagram F) to 1000 hours. | | | | | | | | | | | | | | | | | | |
| | | SRV WARN 1500 HRS | Configure the time limit of the Maintenance Service Indicator* feature on I/O point 7 (see diagram F) to 1500 hours. | | | | | | | | | | | | | | | | | | |
| | | CFG MENU ENABLE | When the LCD screen asks to enter a key code, click the Menu button three times followed by another three clicks on the G-Force® Logo button to access the Configuration Menu. | | | | | | | | | | | | | | | | | | |
| | | STANDARD DIAGNOSE | Standard Diagnostic Mode displays all handle pushbuttons, sliding gripper or pendant lever position, load cell weight reading, and limit switches status on the LCD screen. | | | | | | | | | | | | | | | | | | |
| | | LIFT I/O DIAGNOSE | iQ Actuator Input/Output Module Diagnostic Mode displays the status of the eight configurable inputs and outputs on the LCD screen. The inputs statuses are displayed in the first screen followed by those for the outputs. The I/O Point number of the input that measures incoming 24VDC or output that is turned on to provide 24VDC is displayed in each screen as numerical numbers, 1 ~ 8. | | | | | | | | | | | | | | | | | | |
| | | I/O BLK1 DIAGNOSE | [iQ Only] First (Primary) Expansion Input/Output Block Diagnostic Mode displays the status of the eight configurable inputs and outputs on the LCD screen. The inputs statuses are displayed in the first screen followed by those for the outputs. The I/O Point number of the input that measures incoming 24VDC or output that is turned on to provide 24VDC is displayed in each screen as numerical numbers, 1 ~ 8. | | | | | | | | | | | | | | | | | | |
| | | I/O BLK2 DIAGNOSE | [iQ Unit with Custom or Reconfigured Program] Second Expansion Input/Output Block Diagnostic Mode displays the status of the eight configurable inputs and outputs on the LCD screen. The inputs statuses are displayed in the first screen followed by those for the outputs. The I/O Point number of the input that measures incoming 24VDC or output that is turned on to provide 24VDC is displayed in each screen as numerical numbers, 1 ~ 8. | | | | | | | | | | | | | | | | | | |

Chart D. (continued from pages 37-39 and continued on page 41) Program Mode Menu and Selection Settings.

PROGRAM MODE (CONTINUED)

| Program Mode | Menu | LCD Text | Feature Description |
|---|---------------------------------|-------------------|---|
| Service Menu: Maintenance and Service Features (Continued) | SERVICE MENU (Continued) | I/O BLK3 DIAGNOSE | [iQ Unit with Custom or Reconfigured Program] Third Expansion Input/Output Block Diagnostic Mode displays the status of the eight configurable inputs and outputs on the LCD screen. The inputs statuses are displayed in the first screen followed by those for the outputs. The I/O Point number of the input that measures incoming 24VDC or output that is turned on to provide 24VDC is displayed in each screen as numerical numbers, 1 ~ 8. |
| | | SRV MENU -RESET! | Reset all programmed features in this menu such as the upper and lower cycle limits and the service indicator time limit if the feature is available. Does not clear the run time and cycle counts. |
| Special Unit Features and Hardware Configurations | CONFIGUR MENU | RECORD CONFIG | Record the current unit system configuration settings such as unit type and capacity setting, factory overload settings, loadcell calibration parameters, virtual limit software package enabling flag for Q unit, burn-in status and all the custom feature setup parameters. |
| | | ZERO LOD BIAS | Set loadcell bias signal with no weight attached to define a "zero" value (requires Float Mode option). |
| | | CALIBRAT LOD COEF | Set loadcell signal slope coefficient with a lifted weight equal to the rated capacity of the unit below the wire rope. Any different lifting weight will result in false calibration and inaccuracy such as weight readout feature (requires Float Mode option). <u>This step must be performed after zero load bias.</u> |
| | | PRESET SUB-MENU | Access predefined sets of Q/iQ feature configurations including factory default setup. |
| [SUB-MENU] Preset Feature Configuration List | PRESET SUB-MENU ³ | PRESET 1* | I/O Expansion I/O Block (Assignment for one I/O Anti-Drop) 1 Input - Dual Float Mode 2 Input - Anti-Drop 3 Output - Anti-Drop 4 Input - Auto Home 5 Input - External device control (combine with Actuator I/O Module point 5) 6 Input - External device control (combine with Actuator I/O Module point 6) 7 Output - mimic OPS 8 Output - mimic stack WARN: A unit equipped with a custom program would have its custom features disabled and reconfigured to the above settings. |
| | | PRESET 2* | I/O Expansion I/O Block (Assignment for two I/O Anti-Drop) 1 Input - Dual Float Mode 2 Input - Anti-Drop (Clamp) 3 Input - Anti-Drop (Unclamp) 4 Input - Auto Home 5 Input - External device control (combine with Actuator I/O Module point 5) 6 Input - External device control (combine with Actuator I/O Module point 6) 7 Output - Anti-Drop (Clamp) 8 Output - Anti-Drop (Unclamp) WARN: A unit equipped with a custom program would have its custom features disabled and reconfigured to the above settings. |
| | | PRESET 3* | I/O Expansion I/O Block (Two I/O Anti-Drop & System Switches Output) 1 Input - Dual Float Mode 2 Input - Anti-Drop (Clamp) 3 Input - Anti-Drop (Unclamp) 4 Input - Auto Home 5 Output - Handle Operator Present Sensor Status 6 Output - Slack or Down Travel Limit Switch Status 7 Output - Anti-Drop (Clamp) 8 Output - Anti-Drop (Unclamp) The external device control feature previously on I/O5 and 6 is disabled; therefore its corresponding outputs on Actuator I/O Module I/O points 5 and 6 are disabled as well. WARN: A unit equipped with a custom program would have its custom features disabled and reconfigured to the above settings. |
| | | FACTORY DEFAULT | Reset feature resets back to factory default equivalent PRESET 2. A unit equipped with a custom program is reset to its default configuration with its custom features enabled. |

* Indicates this feature is only available on iQ units.

** Additional details are available in the Input/Output Functionality section.

*** This menu is hidden unless the optional feature is purchased and installed.

¹ Two (2) virtual limit sets are available with a standard iQ unit. More virtual limit sets are possible with custom programming.

² The minimum distance between any two Virtual Limits is 1", 1/2", 1/4" and 1/8" for any 75Kg, 150Kg, 300Kg, and 600Kg actuators correspondingly, with the exception that the gap between the Upper and Lower Virtual Limits must be greater than 1". The motion control position accuracy to any Virtual Limit is as follows:

+/- 1/4" for G-Force®, Easy Arm®, G-Jib™ 150Kg; +/- 1/16" for G-Jib™ 300Kg, +/- 1/8" for G-Force® 300Kg, +/- 1/16" for G-Force® 600Kg

Note that the actual total accuracy is motion control accuracy plus any mechanical component accuracy constraints. For example, if mechanical component accuracy is +/- 1/4", the total cumulated accuracy is +/- 1/2" for G-Force® 75Kg unit.

³ This entire section or item selection requires cycling the main 220 VAC power for the setting(s) to take effect.

Chart D. (continued from pages 37-40) Program Mode Menu and Selection Settings.

PROGRAM MODE (CONTINUED)

iQ Actuator Input/Output Module Functionality

| I/O Point | Assigned Function | Description | Settings (see chart A for instructions on navigating and setting menu functions) |
|-----------|---|--|--|
| 1 | Input - Dual virtual limit sets | When this input is turned on, the G-Force® switches to a second independent set of virtual limits. See chart C for instructions on setting each of these limit sets. | Second set of virtual limits is done the same as the standard set but with this input on. |
| 2 | Future expansion - no default functionality assigned | Functionality may be assigned via custom programming to meet application requirements. Contact your Gorbel® dealer for more details. | |
| 3 | Future expansion - no default functionality assigned | Functionality may be assigned via custom programming to meet application requirements. Contact your Gorbel® dealer for more details. | |
| 4 | Future expansion - no default functionality assigned | Functionality may be assigned via custom programming to meet application requirements. Contact your Gorbel® dealer for more details. | |
| 5 | Output - External device control (requires optional expansion 8-point input/output block) | This output is controlled by input number 5 on the optional expansion 8-point input/output block. When that input is on, output 5 on the iQ actuator input/output module is on and vice versa. | |
| 6 | Output - External device control (requires optional expansion 8-point input/output block) | This output is controlled by input number 6 on the optional expansion 8-point input/output block. When that input is on, output 6 on the iQ actuator input/output module is on and vice versa. | |
| 7 | Output - Service indicator | This output turns on when service is required (based on hours of use and set at the factory) and may be used to turn on an external service indicator (supplied by others). | The reset function for this output is in the SERVICE MENU, items CLEAR RUN TIME or SRV WARN OFF. |
| 8 | Output - Fault indicator | This output turns on when a command fault or drive fault occurs. It does not turn on due to a command warning. | |

Chart E. iQ Actuator Input/Output Module Standard Functionality.

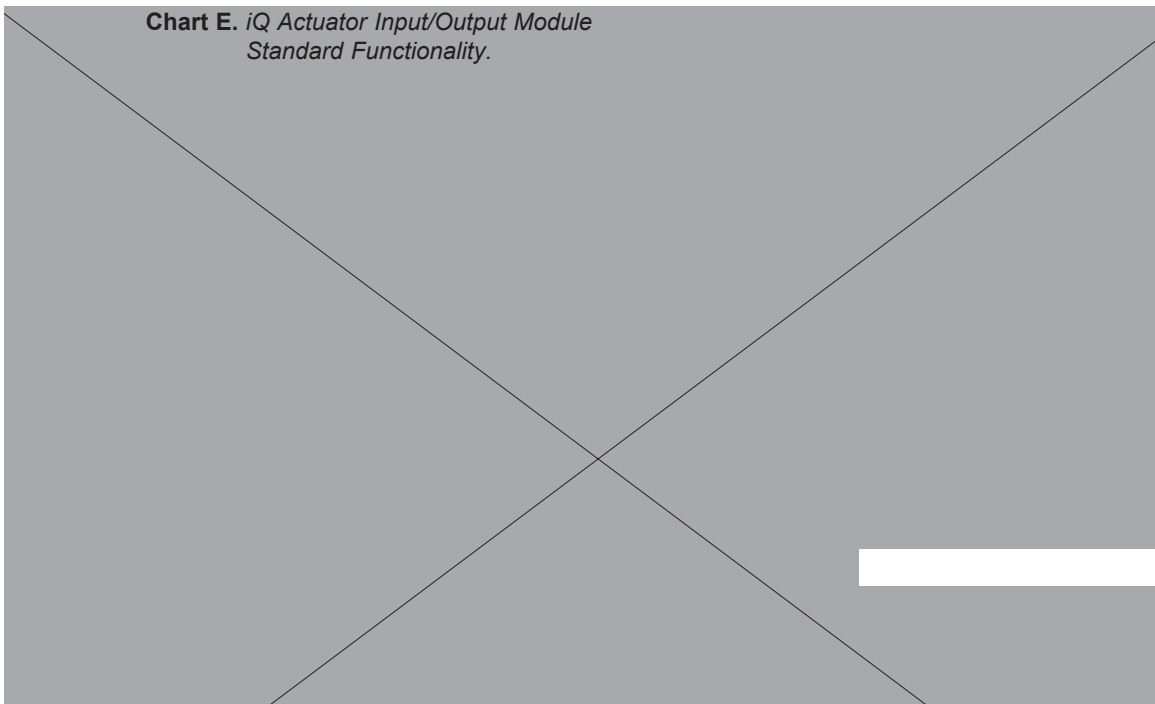


Diagram F. Actuator CPU Input/Output Block.

PROGRAM MODE (CONTINUED)

Expansion 8-Point Input/Output Block Functionality

| I/O Point | Assigned Function | Description | Settings (see chart A for instructions on navigating and setting menu functions) |
|-----------|--|---|---|
| 1 | Input - Dual load weight Float Mode* | When the G-Force® is in float mode, this input allows switching from one pre-programmed load weight to another. These two weights must remain fixed; otherwise, some drifting can occur if the weight is different than the programmed value. | The two Float Mode load weights programmed are located in SETTINGS MENU 2 - DUAL TOOL WT and DUAL FM LOAD WT. The desired load weight must be suspended from the G-Force® when performing each setting. |
| 2 | Input - Anti-drop feature (Clamp request) | This input is typically wired to a clamp request pushbutton. When the input is on, Output #7 (see I/O Point 7) turns on and Output #8 turns off regardless of the tooling loading state. | See I/O Point 3 Settings description. |
| 3 | Input - Anti-drop feature (Unclamp request) | This input is typically wired to an unclamp request pushbutton. When the input is on, Output #8 (see I/O Point 8) turns on only if Anti-Drop algorithm determines the suspended load is at or below the set weight (ANTIDROP TOOL WT). If Output #8 turns on, Output #7 is turned off. | Programming to tare weight is locked at SETTINGS MENU 2 - ANTIDROP TOOL WT. The empty tooling (including handle controller and other accessories) without a pickup part must be suspended solely by the wire rope when tarring. The minimum difference between unloaded and loaded tool weight is 20 lbs. for G-Force®, 25 lbs. for Easy Arm®, and 25 lbs. for G-Jib™ products. |
| 4 | Input - Auto Home | When this input is toggled (momentarily turned on then off again), the G-Force® automatically travels to the set home position in the vertical travel. Tracking stops when obstruction is detected, i.e. Q/iQ G-Force® stops at 10-25 lbs. depending on unit capacity. | The Auto Home position programming is located at SETTINGS MENU 2 - MENU 2 SET HOME. Move the G-Force® to the desired position in the vertical travel before selecting the position setting in this menu. |
| 5 | Input - External device control (used in conjunction with actuator output 5) | This input controls input 5 on the actuator input/output module. When this input is on, output 5 on the iQ actuator input/output module is on and vice versa. | |
| 6 | Input - External device control (used in conjunction with actuator output 6) | This input controls input 6 on the actuator input/output module. When this input is on, output 6 on the iQ actuator input/output module is on and vice versa. | |
| 7 | Output - Anti-drop feature (Clamp Control) | This output is typically wired to actuate the clamping mechanism of an end effector tooling. It turns on when Input #2 (see I/O Point 2) is on and remains latched on when the input is released. It can be turned off by Input #3 (see I/O Point 3). | See I/O Point 3 Settings description. |
| 8 | Output - Anti-drop feature (Unclamp Control) | This output is typically wired to actuate the unclamping mechanism of an end effector tooling. It turns on when Input #3 (see I/O Point 3) is on and the Anti-Drop algorithm determines the suspended load is at or below the set weight (ANTIDROP TOOL WT). If it is not turned on, the input can be held momentarily (do not hold on indefinitely) until the tooling is unloaded then the output is turned on. Once the output turns on, it remains latched on when the input is released. It is always turned off with Input #2 (see I/O Point 2). | See I/O Point 3 Settings description. |

Chart F. Expansion 8-Point Input/Output Block.

* G-Force® must have Float Mode feature enabled for this feature to work.

WARNING

Please be aware that software versions prior to R1.07.0 use I/O block model X67BC7321, while those with R1.07.0 and newer require the X67BC7321-1 model. The model number can be found at the left side of the block when placed in the orientation as shown in the diagram. The running software version can be checked through DISPLAY SYS INFO selection under SERVICE MENU in PROGRAM MODE.

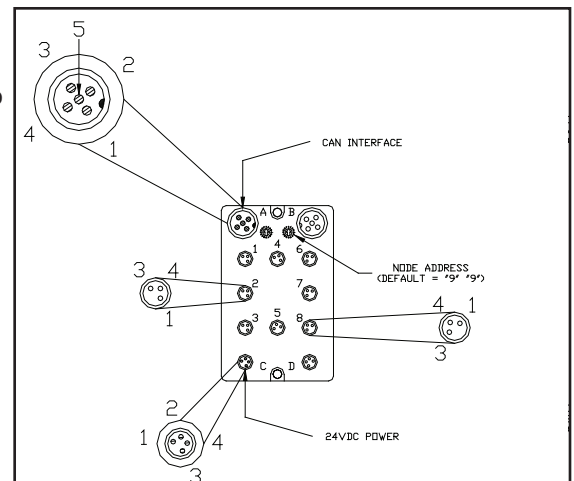
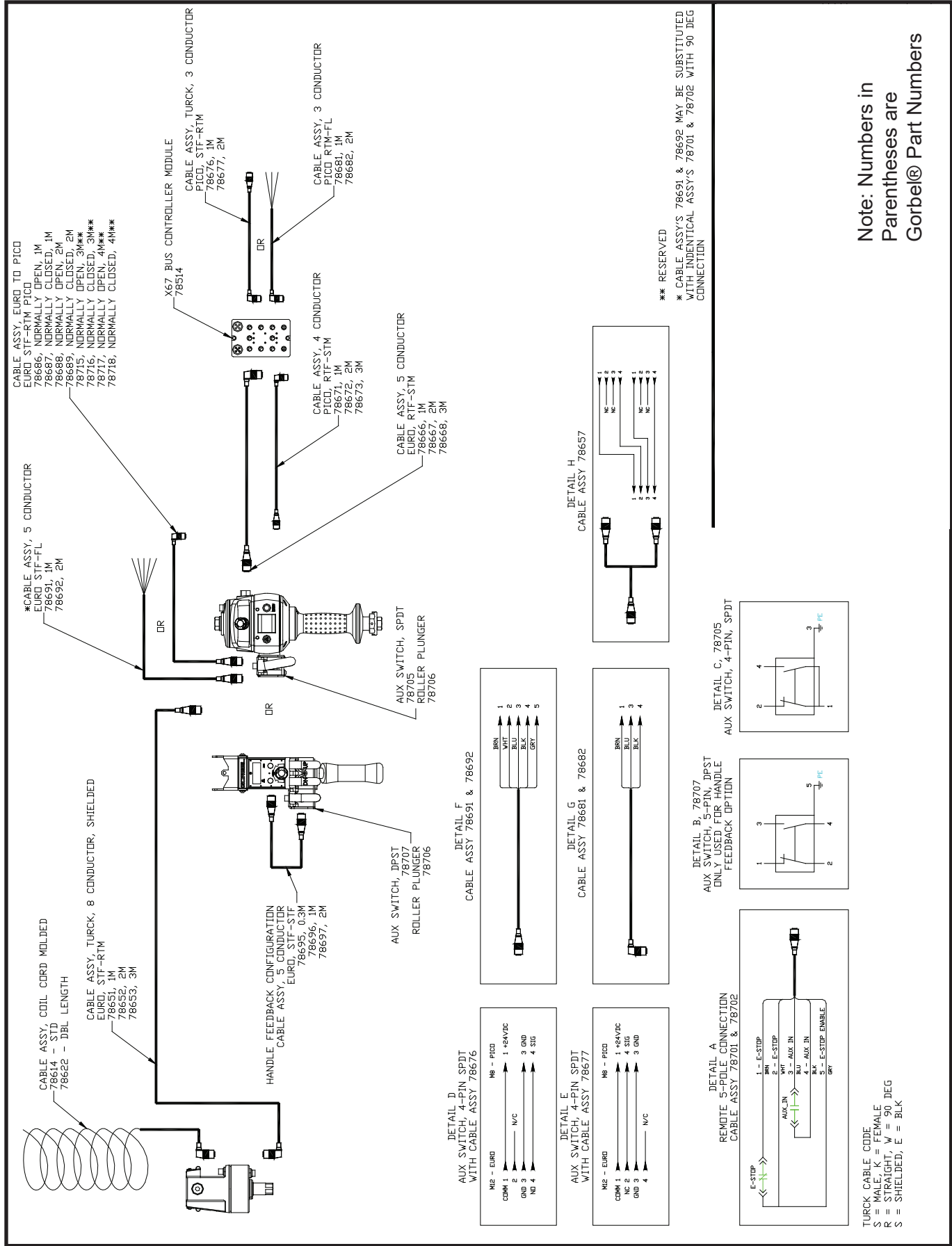
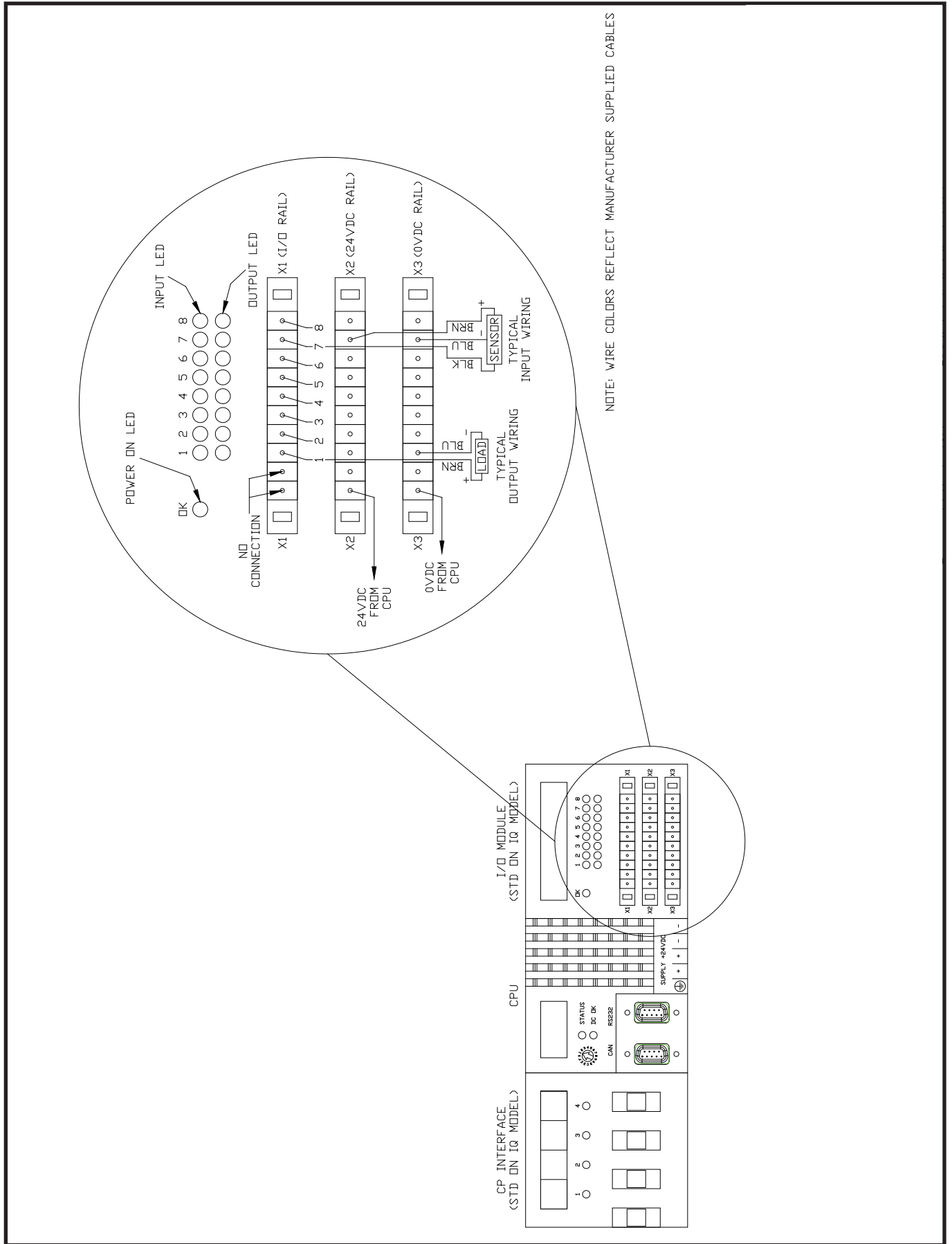


Diagram G. Handle Input/Output Block.



Note: Numbers in Parentheses are Gorbels® Part Numbers

Diagram H. Q-iQ Handle Configurations.



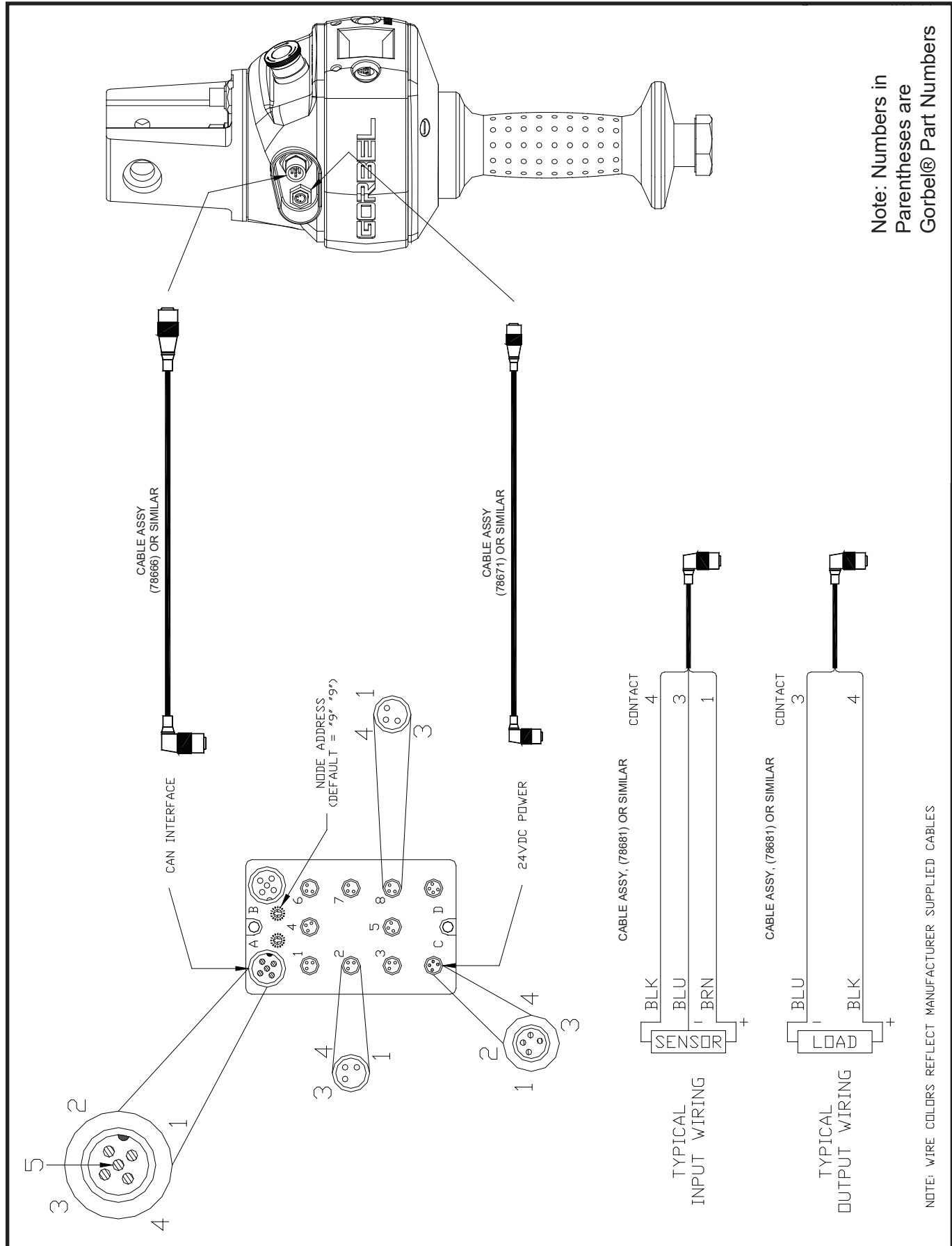


Diagram J. Handle IO Detail, Slide Model.

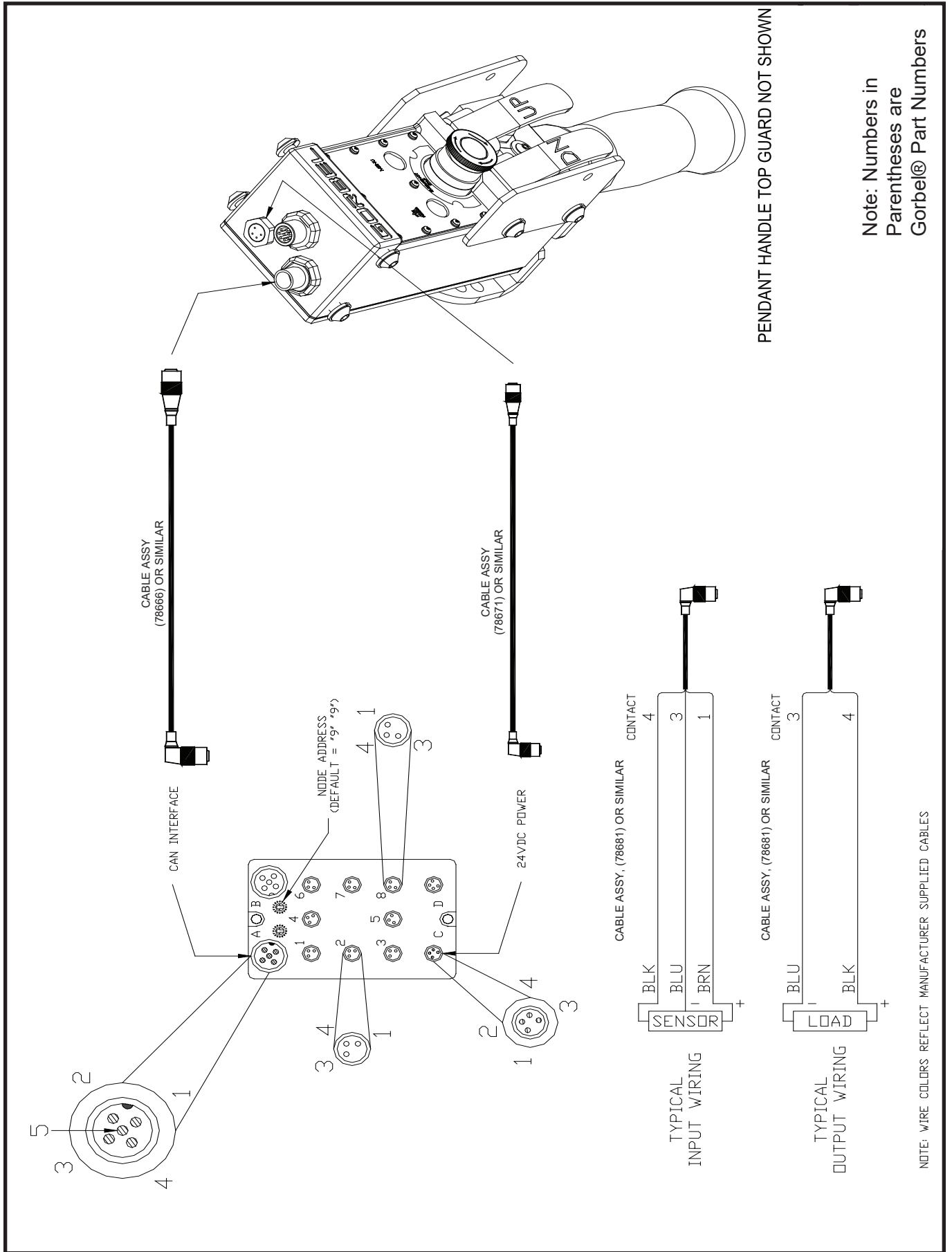


Diagram K. Handle IO Detail, Pendant Model.

TROUBLESHOOTING

Basic Troubleshooting

| Failure | Possible Solution |
|--|---|
| There is no display on the LCD screen on the handle. | <p>Note: The LCD screen will go into screen saver mode after 10 minutes of non-use.</p> <ul style="list-style-type: none"> • Verify the correct AC power to the actuator. • Check the coil cord connections at both the handle and actuator. • Check the overall condition of the coil cord. Look for broken or exposed wiring. |
| There is a fault or warning message displayed on the LCD screen on the handle. | <ul style="list-style-type: none"> • Clear the fault per the instructions on the LCD. • Reset the E-stop on the handle. • Recycle the AC power. Note: AC power must be disconnected from the actuator by unplugging the actuator from the AC power source or disconnecting power by using a circuit breaker or similar method. |
| The red or blue LED, or both, on the control handle are either on or flashing. | <ul style="list-style-type: none"> • Refer to System Fault Diagnostics Charts on the following pages. |
| The unit will not raise or lower the load. | <ul style="list-style-type: none"> • Make sure you are in the RUN MODE. • Check the virtual limits settings if equipped with that option. • Check that you are not in an overloaded condition. • If you are wearing dark gloves, remove them and try the sliding handle again. • Check the coil cord connections at both the handle and the actuator. • Check that the sliding handle grip or pendant handle levers move smoothly. • Check for any interference between the handle and any foreign objects, work surfaces, etc. |
| The unit is too slow or too fast. | <ul style="list-style-type: none"> • Adjust the speed in PROGRAM MODE. • Check for speed reduction setting in virtual limits program if equipped with that option. |
| The unit does not accelerate at the desired rate. | <ul style="list-style-type: none"> • Adjust the response in PROGRAM MODE. • Make sure you are not attempting to “snatch” the load. • Check the weight of the load. If you are close to the overload limit, try lifting at a reduced speed. |
| Unit will not raise or lower the load to the desired height. | <ul style="list-style-type: none"> • Check the virtual limits settings in PROGRAM MODE. • Check for wire rope damage. • Check whether or not you have an extended wire rope with a standard length coil cord. • Check to see if the wire rope has been modified (shortened) for any reason). • Check for any interference with foreign objects, tooling, work surfaces, etc. |
| The actuator is extremely noisy. | <ul style="list-style-type: none"> • Check the condition of the wire rope. • Check for any external damage to the actuator covers. |
| Float Mode does not function correctly. | <p>Note: Refer to Technical Specifications, page 51, for maximum speed of Easy Arm® Float Mode.</p> <ul style="list-style-type: none"> • Check that your system has the Float Mode option. • Check that the blue LED on the handle is illuminated. • Check to see if the LCD screen indicates you are in Float Mode. • Check that Float Mode has not timed out because the system has not been used for 60 seconds. • Ensure the unit is stable when Float Mode is initiated. • Check that the load data is reading accurately on the LCD screen. • Verify the bridge capacity. Check for excessive deflection in the bridge. • Check for obvious interference with the coil cord or handle. |
| Unit only goes in the up direction. | <ul style="list-style-type: none"> • Check the virtual limits settings if equipped with that option. • Check that the wire rope is not in a slack condition. • Check for any obvious interference with the load or the handle. • Check that you are not at the lower limit of the system. • Check the coil cord connections at both the handle and actuator. • Check the overall condition of the coil cord. Look for broken or exposed wiring. |
| Unit only goes in the down direction. | <ul style="list-style-type: none"> • Check the virtual limits settings if equipped with that option. • Check that you are not at the lower limit of the system. • Check that you are not in an overload condition. • Check for any obvious interference with the load or the handle. • Check the coil cord connections at both the handle and actuator. • Check the overall condition of the coil cord. Look for broken or exposed wiring. |
| 7219 / 4005 codes. | <ul style="list-style-type: none"> • The AC power is too low. If it approaches ~ 200VAC the system will not operate properly. |
| 501 / 11000 codes. | <ul style="list-style-type: none"> • Limit switch fault: <ol style="list-style-type: none"> 1. Insure there is weight on the hook. 2. Disconnect AC power. 3. Reapply AC power. |
| ##### ##### | <ul style="list-style-type: none"> • Two rows of # signs indicate poor cable connection anywhere from handle to the internal CPU. Check all external cable connections. |

If possible solutions do not work, refer to the optional Service Manual available from Gorbel.

TROUBLESHOOTING (CONTINUED)

System Fault Diagnostics Chart

Under certain conditions, a system fault or warning message may appear on the LCD screen or the Easy Arm® handle along with either the red or blue LED flashing. The system fault or warning message can be one of the following:

1. Command fault - describes faults detected by the PLC while executing a command that results in a system shutdown with a message displayed on the LCD screen.
2. Command warning - describes a condition that will allow the system to continue to operate with a message being displayed on the LCD screen until that message is cleared using Program Mode. **Note:** The warning is cleared through Program Mode or cycling the power or E-stop if the warning is not repetitive.
3. ACOPOS Drive fault - describes faults detected in the drive that result in a shutdown and a drive fault message displayed on the LCD screen.

The recovery from these may require the cycling off/on of the E-stop switch or AC power source. **Note: The latter must be done by disconnecting the AC power cord, using an electrical disconnect device or a circuit breaker.**

It is also possible that the fault clearance may require a more specific corrective action such as reloading system software (see optional Service Manual), replacing the wire rope, checking certain external input/output modules or some other service-related task. If necessary, check with your Gorbels® distributor or contact Gorbels® Customer Service at 800-821-0086 for assistance.

Use the following table to identify the appropriate corrective action for the specific faulted condition:

| Fault Category | LCD Error # Displayed | LCD Error Message | Corrective Action |
|------------------------|--|--------------------------|---|
| Command Faults | 1 - 9, 100 - 105, 110 - 122, 300 - 310 | DOWNLOAD PROGRAM | Cycle Power |
| | 200, 201, 203, 204 | CHK PLC HARDWARE | Cycle Power |
| | 202, 205, 206 | CHK DRIV STATUS | Cycle Power |
| | 1600 | EXTD S# NNNN | Cycle E-stop |
| | 0 ~ 9998 | | Cycle Power |
| Command Warnings | 10400, 10401, 10402, 10403, 11001 | CONTACT GORBEL | Cycle Power |
| | 10500 | REPLACE BATTERY | Cycle Power |
| | 11000 | RELEASE SWITCHES | Service is Required |
| | 11002 | RE-PROGM OVERLOAD | Follow Overload Program Instructions |
| | 11003 | CHK HNDL HARDWARE | Cycle Power |
| | 11008 | | |
| | 11009 | N/A | Re-Zero FSH |
| | 11010 | N/A | [FSH] Check Handle Cable |
| | 11011 | N/A | [FSH] Check Handle Bar Weight |
| | 11700, 11701 | REPLACE WIREROPE | Clear Cycle Count after wire rope replacement |
| | 11800, 11801, 11802 | CHK HNDL ELECTRIC | Cycle E-stop |
| | 11803, 11804, 11805 | CHK LCD ELECTRIC | Cycle Power |
| | 11806, 11807, 11808 | CHK I/O MODULE | Cycle Power |
| 11000 ~ 65534 | | Cycle E-stop | |
| Drive Faults | 5034, 7045, 7046 | ENCODER ERROR | Cycle E-stop Reprogram Position |
| All Other Drive Faults | 1 ~ 64506 | | Cycle E-stop or Power |

If corrective action does not work, refer to the optional Service Manual available from Gorbels.

TROUBLESHOOTING (CONTINUED)

LED Chart: The chart below shows the status of LED lights in different states.

| ID | Program State | Sub-State | Blue | Red | LCD Text Display | |
|------|---------------------------|-------------------|------------|------------|--|--|
| 1 | Engaged E-stop | | Off | Off | Displays "E-STOP ENGAGED". This state can also be used for troubleshooting if the E-stop is turned off intentionally. | |
| 2 | Programming Mode | | On | On | Overwrites fault, warning or service warning messages to allow correction of the cause of the messages. Displays "PROGRAM MODE", various menu screens and selection items. Please see "Program Mode" section for more details. | |
| 3 | Fault Mode or Drive Fault | | Off | On | LCD displays if unit is in command or drive fault, followed by a fault number and a corrective message. Unit is shut down until a corrective action is taken or cycling the E-stop or main AC power. | |
| 4 | Warning | | Off | Fast Flash | LCD displays unit is in warning fault, followed by a fault number and a corrective message. Unit is still allowed to run but warning messages overwrite other normal running messages defined in the latter cases. | |
| 5 | Service Warning | | Fast Flash | Off | Displays warnings for parts replacement recommendations and those that require immediate attention, e.g. wire rope replacement or PLC low battery | |
| 6 | Service Mode | | Slow Flash | Slow Flash | Because SERVICE MODE is meant to run for special diagnostic purposes, it is shown before Service Warnings such as cycle count warnings. Multiple diagnostic messages are likely to be displayed here such as output a live handle connection, pushbutton states (only a special Jog Mode is running), etc. | |
| 7 | Startup Process | Before Ready Mode | On | On | Displays "UNIT POWER UP". Unit is starting up (power up) and executing necessary settings and self diagnostics. | |
| 10.a | Run Mode | Overload | Previous | Slow Flash | Indicates unit is overloaded (factory or user defined) while lifting. | |
| 10.b | | Still Motion | Previous | Slow Flash | Indicates unit maintains still for an extensive time while running in a Run Mode application such as handle mode, Float Mode, etc. | |
| 10.c | | Over-Speed | Previous | Slow Flash | Indicates Float Mode control exceeded the over speed limit and the unit is shutting down. | |
| 10.d | | Handle Mode | Previous | Previous | Previous | Displays run mode specific message such as RUN MODE JOG, HANDLE, PENDANT or CUSTOM |
| | | Float Mode | On | Off | Off | Displays run mode specific messages such as "--RECORD-- --DATA--" and RUN MODE FLOAT. The first message indicates when the unit is collecting loadcell data to perform Float Mode. |
| 11.a | Custom Feature #N | Display 1 | On | Off | Displays custom feature messages for a custom motion feature (Run Mode) that also requires using LEDs for indication. More information may be found in the Custom Feature description section. | |
| 11.b | | Display 2 | On | On | | |
| 11.c | | Display 3 | Slow Flash | Off | | |
| 11.d | | Display 4 | Off | Slow Flash | | |
| 20 | Ready Mode | | Off | Off | Displays LIFT READY to indicate unit is idling and waiting for response. | |
| 20.a | Custom Feature #N | Display 1 | On | Off | Displays custom feature messages for a custom feature that also requires using LEDs for indication while the unit is idling (in Ready Mode). More information may be found in the Custom Feature description section. | |
| 20.b | | Display 2 | On | On | | |
| 20.c | | Display 3 | Slow Flash | Off | | |
| 20.d | | Display 4 | Off | Slow Flash | | |

TECHNICAL SPECIFICATIONS

| Series | Q Series | iQ Series | Q Series | iQ Series |
|--|--|--|--|--|
| Maximum Capacity (Load & Tool) | 330 lb 150 kg | 330 lb 150 kg | 165 lb 75 kg | 165 lb 75 kg |
| Standard Crane Spans | 6, 8, 10, 12, and 14 ft. 1.83, 2.44, 3.05, 3.66 and 4.28 m | 6, 8, 10, 12, and 14 ft. 1.83, 2.44, 3.05, 3.66 and 4.28 m | 6, 8, 10, 12, and 14 ft. 1.83, 2.44, 3.05, 3.66 and 4.28 m | 6, 8, 10, 12, and 14 ft. 1.83, 2.44, 3.05, 3.66 and 4.28 m |
| Standard Crane HUH (Height Under Hook) | 6, 8, 10, and 11 ft. 1.83, 2.44, 3.05, and 3.35 m | 6, 8, 10, and 11 ft. 1.83, 2.44, 3.05, and 3.35 m | 6, 8, 10, and 11 ft. 1.83, 2.44, 3.05, and 3.35 m | 6, 8, 10, and 11 ft. 1.83, 2.44, 3.05, and 3.35 m |
| Degree of Arm Rotation | Primary Arm: 355° Secondary Arm: 320° | Primary Arm: 355° Secondary Arm: 320° | Primary Arm: 355° Secondary Arm: 320° | Primary Arm: 355° Secondary Arm: 320° |
| Arm Rotation Friction Brakes | Yes | Yes | Yes | Yes |
| Maximum Lifting Speed Unloaded | 90 ft/min 27 m/min | 90 ft/min 27 m/min | 180 ft/min 55 m/min | 180 ft/min 55 m/min |
| Maximum Lift Speed Fully Loaded | 75 ft/min 23 m/min | 75 ft/min 23 m/min | 125 ft/min 38 m/min | 125 ft/min 38 m/min |
| Maximum Float Mode (Option) Lifting Speed | 65 ft/min 20 m/min | 65 ft/min 20 m/min | 103 ft/min 31 m/min | 103 ft/min 31 m/min |
| Primary Lift Voltage (VAC) | 220 +/- 10% | 220 +/- 10% | 220 +/- 10% | 220 +/- 10% |
| Maximum Current (Amps) | 10 | 10 | 10 | 10 |
| Duty Cycle | H5 | H5 | H5 | H5 |
| Power Available for Tooling | Not Available | 24VDC @ 0.5A | Not Available | 24VDC @ 0.5A |
| Lifting Media | 3/16" dia. 19x7 Preformed Stainless Steel Wire Rope | 3/16" dia. 19x7 Preformed Stainless Steel Wire Rope | 3/16" dia. 19x7 Preformed Stainless Steel Wire Rope | 3/16" dia. 19x7 Preformed Stainless Steel Wire Rope |
| | 4.76mm dia. 19x7 Preformed Stainless Steel Wire Rope | 4.76mm dia. 19x7 Preformed Stainless Steel Wire Rope | 4.76mm dia. 19x7 Preformed Stainless Steel Wire Rope | 4.76mm dia. 19x7 Preformed Stainless Steel Wire Rope |
| Operating Temperature Range | 41 - 122° F 5 - 50° C | 41 - 122° F 5 - 50° C | 41 - 122° F 5 - 50° C | 41 - 122° F 5 - 50° C |
| Operating Humidity Range (Non-Condensing) | 35 - 90% | 35 - 90% | 35 - 90% | 35 - 90% |
| Virtual Limits (Upper Limit, Power Limit, Speed Reduction) | Optional | Standard | Optional | Standard |
| Weight Display Accuracy (option with Float Mode) | *2% +/- 0.5% per ft. | *2% +/- 0.5% per ft. | *2% +/- 0.5% per ft. | *2% +/- 0.5% per ft. |
| UL/CSA Certified | N/A | N/A | N/A | N/A |
| CE Certified | Optional | Optional | Optional | Optional |
| I/O Actuator | | | | |
| Number of Inputs, Type | N/A | 8, Sinking | N/A | 8, Sinking |
| Input Current @ 24 VDC | N/A | 6ma | N/A | 6ma |
| Number of Outputs, Type | N/A | 8, FET | N/A | 8, FET |
| Continuous Current/Channel (Amps) | N/A | 0.5 | N/A | 0.5 |
| Module Maximum Current (Amps) | N/A | 0.5 | N/A | 0.5 |
| Handle with I/O Module | | | | |
| Number of Inputs, Type | N/A | 8, Sinking | N/A | 8, Sinking |
| Input Current @ 24 VDC | N/A | 4ma | N/A | 4ma |
| Number of Outputs, Type | N/A | 8, FET | N/A | 8, FET |
| Continuous Current/Channel (Amps) | N/A | 0.5 | N/A | 0.5 |
| Module Maximum Current (Amps) | N/A | 0.5 | N/A | 0.5 |

*The percentage values reference the unit rated capacity. The first percent value is the worst case weight repeatability when returning to the same height. Weight may also vary for every foot of travel and thus the +/- percentage. An upward movement resulted in "+" whereas downward movement resulted in "-". The amount of fluctuation is dependent on the installation of a coil cord, air hose, load weight, and the angle between the primary and secondary arms.

WIRE ROPE INSPECTION

1. Frequent Inspection

The operator or other designated person should visually inspect all ropes at the start of each shift. These visual observations should be concerned with discovering gross damage, such as listed below, which may be an immediate hazard:

- distortion of the rope such as kinking, crushing, unstranding, birdcaging, main strand displacement, or core protrusion;
- general corrosion;
- broken or cut strands;
- number, distribution, and type of visible broken wires (see next section on rope replacement).

When such damage is discovered, the rope shall either be removed from service or given an inspection as detailed in the next section.

2. Periodic Inspection

The inspection frequency shall be determined by a qualified person and shall be based on such factors as expected rope life as determined by experience on the particular installation or similar installations; severity of environment; percentage of capacity lifts; frequency rates of operation; and exposure to shock loads. Inspections need not be at equal calendar intervals and should be more frequent as the rope approaches the end of its useful life.

A designated person shall perform periodic inspections. This inspection shall cover the entire length of rope. The individual outer wires in the strands of the rope shall be visible to this person during the inspection. Any deterioration resulting in appreciable loss of original strength, such as described below, shall be noted, and determination shall be made as to whether further use of the rope would constitute a hazard:

- points listed in previous section on frequent inspection;
- reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.
- severely corroded or broken wires at end connections;
- severely corroded, cracked, bent, worn, or improperly applied end connections.

Special care should be taken when inspecting sections of rapid deterioration, such as the following:

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

WIRE ROPE MAINTENANCE

1. Rope should be stored to prevent damage, contamination, and deterioration.
2. Rope shall be unreeled or uncoiled in a manner to avoid kinking of or inducing a twist in the rope.
3. Before cutting rope, means shall be used to prevent unlaying of the strands.
4. During installation, care should be observed to avoid dragging of the rope in dirt or around objects that will scrape, nick, crush, or induce sharp bends.

CAUTION

Rope should be maintained in a well-lubricated condition. Gorbel recommends using chain and cable penetrating oil for lubrication. Lubricant applied as part of a maintenance program shall be compatible with the original lubricant (PreLube 6). Lubricant applied shall be of the type that does not hinder visual inspection. Immediately after inspection, lubricant shall be applied before rope is returned to service. Those sections of rope that are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating ropes. The object of rope lubrication is to reduce internal friction and to prevent corrosion.

WIRE ROPE REPLACEMENT CRITERIA

1. No precise rules can be given for determination of the exact time for rope replacement since many factors are involved. Once a rope reaches any one of the specified removal criteria, it may be allowed to operate to the end of the work shift, based on the judgment of a qualified person. The rope shall be replaced after that work shift, at the end of the day, or at the latest time prior to the equipment being used by the next work shift.
2. Removal criteria for the rope replacement shall be as follows:
 - in running ropes, 12 randomly distributed broken wires in one lay or four broken wires in one strand in one lay (**diagram L**);
 - one outer wire broken at the contact point with the core of the rope, which has worked its way out of the rope structure and protrudes or loops out from the rope structure;
 - wear of one-third the original diameter of outside individual wires;
 - kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure;
 - evidence of heat damage from any cause;
 - reductions from nominal diameter greater than 1/64" (.4 mm) for 1/4" (6.35 mm) diameter rope or 3/16" (4.76 mm) diameter rope.
3. Broken wire removal criteria applies to wire rope operating on steel sheaves and drums. However, results of internal testing have shown that rope replacement follows the same criteria regardless of sheave or drum material.
4. Attention shall be given to end connections. Upon development of two broken wires adjacent to a socketed end connection, the rope should be resocketed or replaced. Resocketing shall not be attempted if the resulting rope length will be insufficient for proper operation.
5. Replacement rope and connections shall have strength rating at least as great as the original rope and connection furnished by the hoist manufacturer. A rope manufacturer, the hoist manufacturer, or a qualified person shall specify any deviation from the original size, grade, or construction.

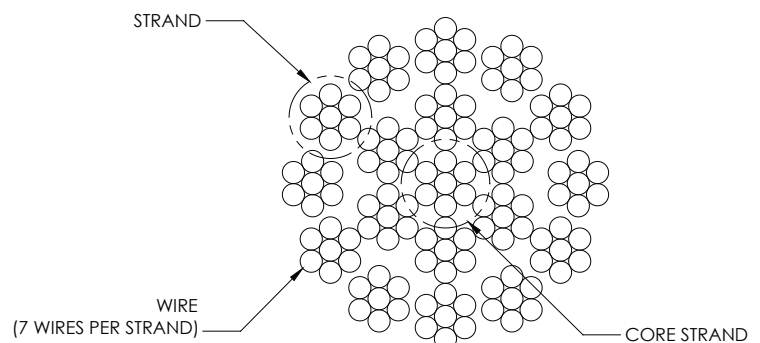


Diagram L. 19x7 Preformed Wire Rope Composition.

WIRE ROPE REPLACEMENT INSTRUCTIONS

WARNING

Wire rope replacement is to be performed by qualified maintenance personnel only.

Removal of Existing Wire Rope:

1. A. Ensure there is no load on handle, weighted load hook (pendant) or end effector.
- B. If using slow down setting, clear (reset) on handle or pendant handle menu screen. If using virtual limits, clear (reset) on handle or the pendant handle's menu screen.
- C. Remove end tool.

- a. Slide handle/G360™

(diagram M): Using a 19mm socket, remove the M12 jam nut from the handle's socket head shoulder screw, then use an M8 hex wrench and remove (unthread) socket head 16mm shoulder bolt from handle. This will detach it from wire rope thimble. Set handle down on bench or table to support it and not stretch the coil cord.

- b. Pendant handle **(diagram N):** Remove the weighted hook or end effector from rope by removing the cotter pin and clevis pin and set aside.

2. Using a 3mm hex wrench, completely remove the four button head screws on actuator front cover (shorter blue cover).
3. Remove front cover from actuator and set aside upward to use as a bowl to hold future parts. **Note:** Be careful not to contact circuit board.
4. Going in the down direction, unspool rope from drum using jog down button while keeping tension on wire rope with other hand wearing a glove. Continue until lower limit is engaged.
5. Face the unit with circuit board on your left and wire rope on the right.

Note: The next two steps must be done at the same time.

6. Using a long screwdriver or hex wrench, reach through front of actuator and locate upper socket head cap screw head facing you next to the lower limit switch. Fully push the screw in until it cannot move anymore (it is spring loaded). Keep pressure on it **(diagram O)**. Simultaneously apply force to your right to take the unit out of slack. You will hear the limit switch click when it is pushed enough.

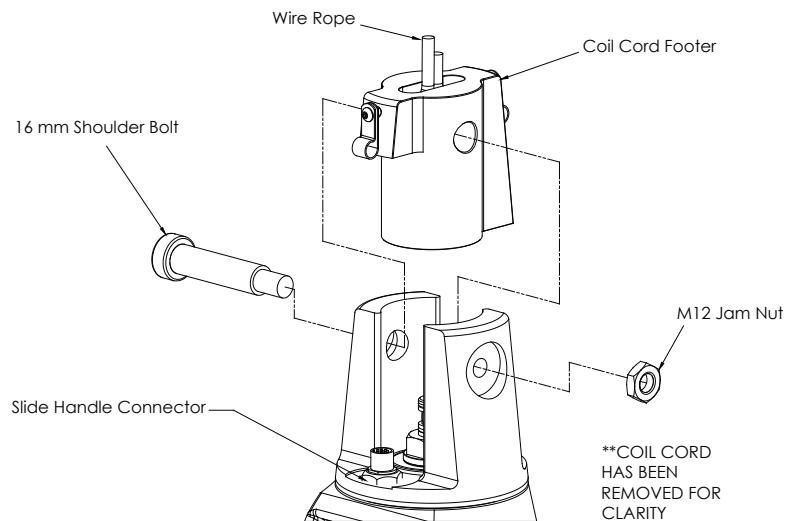


Diagram M. Removing wire rope from Slide Handle/G360™.

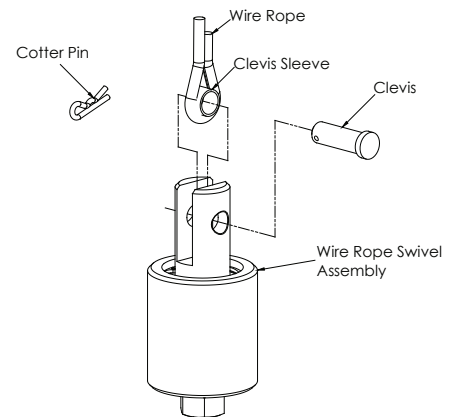


Diagram N. Removing wire rope from Pendant Handle.

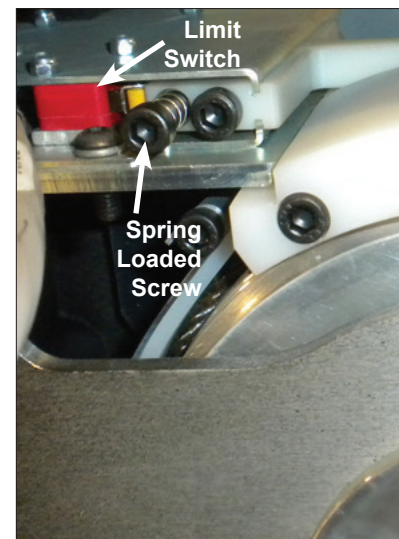


Diagram O. Locate socket head cap screw head and fully push it in until it can not move anymore.

WIRE ROPE REPLACEMENT INSTRUCTIONS (CONTINUED)

Removal of Existing Wire Rope (Continued):

7. Using your right hand, press the jog down button while watching the drum rotate two full turns in the clockwise direction. The drum should stop automatically with the wire rope retainer visible at the 12 o'clock position on the drum.
8. From the limit switches is a gray colored lead that plugs into the circuit board. Its connected location is on the top side of the circuit board labeled "limits". Gently pull out the plug lead to disconnect plug from board (**diagram P**).
9. Using 13mm open-end wrench, loosen, not remove, the two flange nuts and remove reinforcement bracket (330# units only).
10. Using a 4mm hex wrench, remove four M5 socket head cap screws that fasten the swiveling circuit board bracket to the front support plate. Two screws are located on the left side and two are on the right side of bracket. Place screws in plastic front cover. Swing bracket downwards carefully (**diagrams Q and R**).
11. Using an M5 hex wrench, remove two M6 socket head cap screws from the drum gates. Slide the unthreaded gate out towards you. Place gate and hardware in front cover (**diagram S**).
12. Using an M3 hex wrench, remove the two M5 socket head cap screws from the rope retainer and slide retainer off of rope end towards you. Place retainer and screws in front cover (**diagram T**).
13. Grasp wire rope with right hand where it exits actuator. Keep rope from bending while pushing rope to the left to unseat the stop sleeve from the anchor channel. If this does not work, use a medium screwdriver (flat) sliding it upward between rope and drum to progressively pry rope out of anchor channel while still pushing up on rope. Remove rope from actuator through opening at bottom once unseated.
14. Remove one M12 shoulder bolt from one of the knuckle pulleys (**diagram U**) and M6 and M12 shoulder bolts from pulley block (**diagram V**) at end of arm. With the pulley block removed, remove the three M4 screws holding the halves of the block together. The old wire rope can now be removed completely.

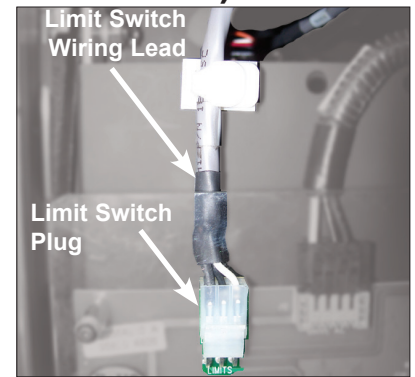
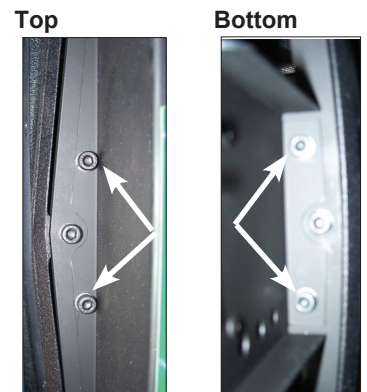


Diagram P. Gently pull out the grey limit switch wiring lead to disconnect plug from board.



Diagrams Q & R. Remove four M5 socket head cap screws (two on top, two on bottom) that fasten the swiveling circuit board bracket to the front support plate.

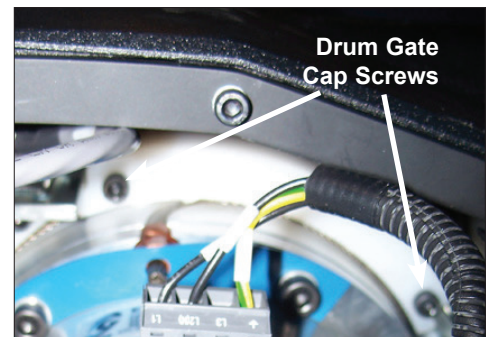


Diagram S. Remove two M6 socket head cap screws from the drum gates.

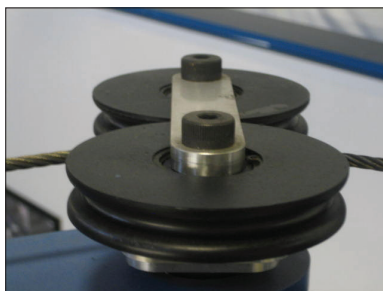


Diagram U. Knuckle pulley.

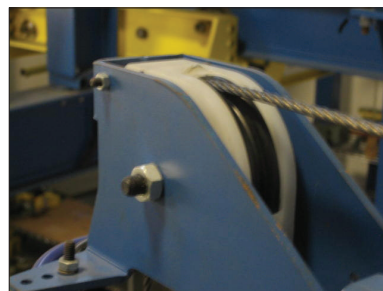


Diagram V. Pulley block at end of arm.

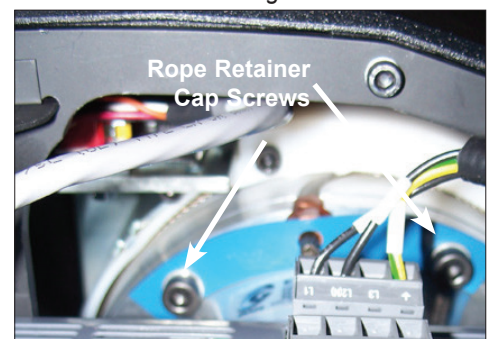


Diagram T. Remove the two M8 socket head cap screws and slide retainer off of rope end towards you. Configuration may vary depending on capacity.

WIRE ROPE REPLACEMENT INSTRUCTION (CONTINUED)

Installation of New Wire Rope:

1. Grasp anchor end of rope (not thimble) and make a crimp in gloved hand approximately three inches from the end (try to kink rope to make a bend radius).
2. Insert the rope into the actuator up through the wear ring using right hand while seating the end crimp into the locker with your left hand. This will involve seating the rope into the radius channel afterwards.
3. Pull down on the rope at the exit location of the actuator to seat the crimp into the locker fully.
4. Install the rope retainer plate over the rope end and install the two M5 socket head cap screws and lockwashers. Torque hardware to fully compress lockwashers.
5. Ensure that rope is seated in radius channel and install rope gate back in the unit making sure the rope guide (cutout) side is inserted first and the ends are sliding on guide rails freely. Fasten the rope gate assembly together using the previously removed hardware. Torque hardware to compress lockwashers.
6. Install (slide) the reinforcement bracket studs into channels and tighten the two 13mm flange nuts (330# units only). Next, swing circuit board bracket closed towards plate and fasten to plate using the four previously removed socket head cap screws and lockwashers. Torque hardware to compress lockwashers.
7. Plug limit switch lead into circuit board "limits" receptacle making sure retention tab on plug is facing you.
8. Using a clean cotton cloth wrapped around rope loosely near actuator entrance, pull down on rope and press jog up button allowing rope to pass through cloth cleaning it as it is being wrapped onto the drum. Continue loading rope onto drum using jog button until three drum revolutions are completed.
9. Install front cover onto actuator making sure all four screws are aligned with tabs before threading.
10. If using coil cord, make sure rope is inserted down through the middle of the coils.
11. Attach wire rope to handle, weighted hook, or end effector in reverse order of disassembly.
12. Reassemble pulley block with new wire rope fed through it and reinstall block at end of arm. Reinstall pulleys at arm knuckle with new wire rope fed between them.
13. Reset virtual limits and/or slow down settings.

SLACK SPRING ADJUSTMENT

1. Turn off the power to unit by unplugging or locking out at power source. Remove the rear cover from the longer side of the Easy Arm® by using an M3 hex wrench to remove the M5 button head cap screws and lockwashers. Carefully slide the rear cover away from the actuator casting.
2. Locate the slack spring over the motor, next to the housing (**diagram T**). Slack spring is held in place by a bracket on one side and an eyebolt on the other. To adjust the slack spring, use an M10 (or 7/16") wrench to loosen the inside nut on the eyebolt and then tighten the outside nut while holding the eyebolt stationary to prevent it from spinning with the nut (**diagram U**). It should only take a few turns to increase the spring force.

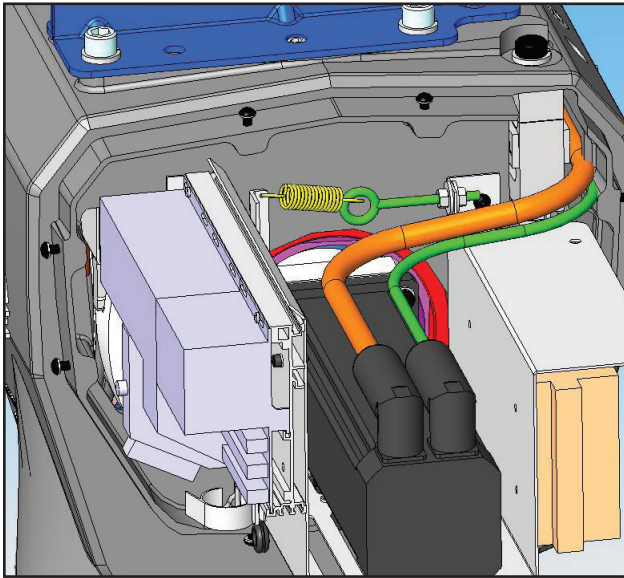


Diagram T.

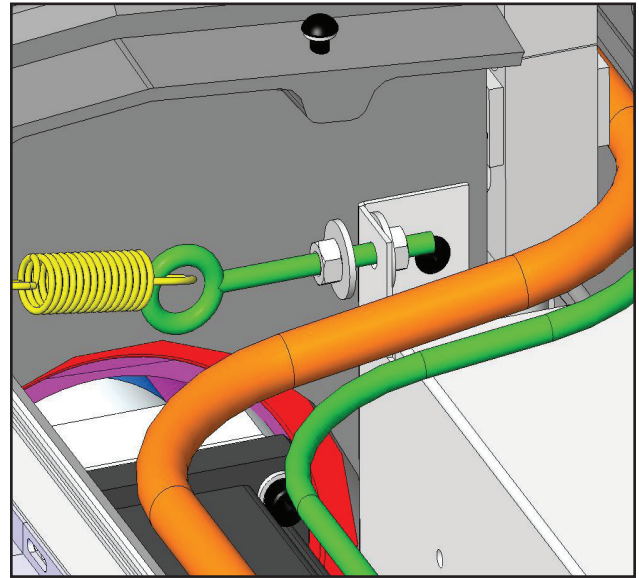


Diagram U.

3. If the spring is too tight, you might experience some chatter when trying to move an unloaded G360™ down from the top of its stroke. If possible test this before putting the cover back on.
4. After adjusting the spring, remember to tighten the inside nut back down to ensure that the slack spring stays in place after it has been adjusted.
5. Replace the rear cover by carefully sliding the rear cover over the motor, CPU and power supply and aligning holes with brackets attached to the actuator casting. Install the M5 button head cap screws and lockwashers.

RECOMMENDED SPARE PARTS KITS

Here is a list of the Spare Parts Kits we recommend. We encourage you to have spare parts on hand to limit the potential downtime if your unit experiences issues. To order any of these kits, please consult your authorized Gorbel® distributor.

You will have to know your system specification such as Capacity, Trolley Saddle Height, Height Under Hook and Span (if applicable to your unit).

Level One Kit includes:

One Wire Rope Assembly
One Coil Cord Assembly

Level Two Kit includes:

One Wire Rope Assembly
One Coil Cord Assembly
One Hardware Kit

Level Three Kit includes:

One Wire Rope Assembly
One Coil Cord Assembly
One Hardware Kit
One Swivel Kit*

* If your system is equipped with a Suspended Pendant Handle you can use the Level Two Kit because you will not need the Swivel Kit.

- All kits can be used on either G-Forces or Easy Arms regardless of their capacity.

LIMITED WARRANTY

It is agreed that the equipment purchased hereunder is subject to the following LIMITED warranty and no other. Gorbel Incorporated ("Gorbel") warrants the manual push-pull Work Station Cranes, Jib Crane, and Gantry Crane products to be free from defects in material or workmanship for a period of ten years or 20,000 hours use from date of shipment. Gorbel warrants the Motorized Work Station Cranes and Jib Crane products to be free from defects in material or workmanship for a period of two years or 4,000 hours use from the date of shipment. Gorbel warrants the G-Force® and Easy Arm™ products to be free from defects in material or workmanship for a period of one year or 2,000 hours use from the date of shipment. This warranty does not cover Gantry Crane wheels. This warranty shall not cover failure or defective operation caused by operation in excess of recommended capacities, misuses, negligence or accident, and alteration or repair not authorized by Gorbel. No system shall be field modified after manufacture without the written authorization of Gorbel, Inc. Any field modification made to the system without the written authorization of Gorbel, Inc. shall void Gorbel's warranty obligation. OTHER THAN AS SET FORTH HEREIN, NO OTHER EXPRESS WARRANTIES, AND NO IMPLIED WARRANTIES, ORAL OR WRITTEN, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE BY GORBEL WITH RESPECT TO ITS PRODUCTS AND ALL SUCH WARRANTIES ARE HEREBY SPECIFICALLY DISCLAIMED. GORBEL SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY INCIDENTAL, SPECIAL AND/OR CONSEQUENTIAL DAMAGES WHATSOEVER, WHETHER OR NOT FORESEEABLE, INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOST PROFITS AND ALL SUCH INCIDENTAL, SPECIAL AND/OR CONSEQUENTIAL DAMAGES ARE HEREBY ALSO SPECIFICALLY DISCLAIMED. Gorbel's obligation and Purchaser's or end user's sole remedy under this warranty is limited to the replacement or repair of Gorbel's products at the factory, or at the discretion of Gorbel, at a location designated by Gorbel. Purchaser or end user shall be solely responsible for all freight and transportation costs incurred in connection with any warranty work provided by Gorbel hereunder. Gorbel will not be liable for any loss, injury or damage to persons or property, nor for damages of any kind resulting from failure or defective operation of any materials or equipment furnished hereunder. Components and accessories not manufactured by Gorbel are not included in this warranty. Purchaser's or end user's remedy for components and accessories not manufactured by Gorbel is limited to and determined by the terms and conditions of the warranty provided by the respective manufacturers of such components and accessories.

A) DISCLAIMER OF IMPLIED WARRANTY OF MERCHANTABILITY

Gorbel and Purchaser agree that the implied warranty of merchantability is excluded from this transaction and shall not apply to the goods involved in this transaction.

B) DISCLAIMER OF IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE

Gorbel and Purchaser agree that the implied warranty of fitness for particular purpose is excluded from this transaction and shall not apply to the goods involved in this transaction.

C) DISCLAIMER OF EXPRESS WARRANTY

Gorbel's agents, or dealer's agents, or distributor's agents may have made oral statements about the machinery and equipment described in this transaction. Such statements do not constitute warranties, and Purchaser agrees not to rely on such statements. Purchaser also agrees that such statements are not part of this transaction.

D) DISCLAIMER OF SPECIAL, INCIDENTAL AND CONSEQUENTIAL DAMAGES

Gorbel and Purchaser agree that any claim made by Purchaser which is inconsistent with Gorbel's obligations and the warranty remedies provided with Gorbel's products, and in particular, special, incidental and consequential damages, are expressly excluded.

E) DEALER OR DISTRIBUTOR NOT AN AGENT

Gorbel and Purchaser agree that Purchaser has been put on notice that dealer or distributor is not Gorbel's agent in any respect for any reason. Gorbel and Purchaser also agree that Purchaser has been put on notice that dealer or distributor is not authorized to incur any obligations or to make any representations or warranties on Gorbel's behalf other than those specifically set forth in Gorbel's warranty provided in connection with its product.

F) MERGER

This warranty agreement constitutes a final and complete written expression of all the terms and conditions of this warranty and is a complete and exclusive statement of those terms.

G) PAINTING

Every crane (excluding components) receives a quality paint job before leaving the factory. Unfortunately, no paint will protect against the abuses received during the transportation process via common carrier. We have included at least one (1) twelve ounce spray can for touchup with each crane ordered (unless special paint was specified). If additional paint is required, contact a Gorbel® Customer Service Representative at 1-800-821-0086 or 1-585-924-6262.

Title and Ownership:

Title to the machinery and equipment described in the foregoing proposal shall remain with Gorbel and shall not pass to the Purchaser until the full amount here agreed to be paid has been fully paid in cash.

Claims and Damages:

Unless expressly stated in writing, goods and equipment shall be at Purchaser's risk on and after Seller's delivery in good shipping order to the Carrier. Gorbel shall in no event be held responsible for materials furnished or work performed by any person other than it or its authorized representative or agent.

Cancellations:

If it becomes necessary for the purchaser to cancel this order wholly or in part, he shall at once so advise Gorbel in writing. Upon receipt of such written notice all work will stop immediately. If the order entails only stock items, a flat restocking charge of 15% of the purchase price will become due and payable by Purchaser to Gorbel. Items purchased specifically for the canceled order shall be charged for in accordance with the cancellation charges of our supplier plus 15% for handling in our factory. The cost of material and/or labor expended in general fabrication for the order shall be charged for on the basis of total costs to Gorbel up to the time of cancellation plus 15%.

Returns:

No equipment, materials or parts may be returned to Gorbel without express permission in writing to do so.

Extra Charge Delay: If Purchaser delays or interrupts progress of Seller's performance, or causes changes to be made, Purchaser agrees to reimburse Gorbel for expense, if any, incident to such delay.

Changes and Alterations:

Gorbel reserves the right to make changes in the details of construction of the equipment, as in its judgment, will be in the interest of the Purchaser; will make any changes in or additions to the equipment which may be agreed upon in writing by the Purchaser; and Gorbel is not obligated to make such changes in products previously sold any customer.

Third Party Action:

Should Gorbel have to resort to third party action to collect any amount due after thirty (30) days from date of invoice, the Purchaser agrees to pay collection costs, reasonable attorney's fees, court costs and legal interest.

OSHA Responsibilities:

Gorbel agrees to fully cooperate with Purchaser in the design, manufacture or procurement of safety features or devices that comply with OSHA regulations. In the event additional equipment or labor shall be furnished by Gorbel, it will be at prices and standard rates then in effect, or as may be mutually agreed upon at the time of the additional installation.

Equal Employment Opportunity:

Gorbel agrees to take affirmative action to ensure equal employment opportunity for all job applicants and employees without regard to race, color, age, religion, sex, national origin, handicap, veteran, or marital status. Gorbel agrees to maintain non-segregated work facilities and comply with rules and regulations of the Secretary of Labor or as otherwise provided by law or Executive Order.

CE Declaration of Conformity

Hereby, Gorbels Inc., declares that this material handling equipment is in compliance with the essential requirements and other relevant provisions listed below.

| | | |
|-------------------------------|-------------------|---|
| EMC Directive: | 2004/108/EC | |
| Generic Emissions Standard: | EN 61000-6-4:2001 | |
| Product Specific Emissions: | EN 55011 | Generic Immunity Standard: |
| Immunity: | EN 61326-1:1997 | EN6100-6-2: 2001 |
| | EN 61000-4-2 | Electrostatic Discharge |
| | EN 61000-4-3 | Radiated Susceptibility |
| | EN 61000-4-4 | Electrical Fast Transient/Burst |
| | EN 61000-4-5 | Surge |
| | EN 61000-4-6 | Conducted Susceptibility |
| Low Voltage Directive: | 98/68/EEC | |
| Standard: | EN 61010 | Equipment for Measurement, Control, & Laboratory Use |
| Machinery Directive: | 98/37/EEC | |
| Standard: | EN 60204 | Safety of Machinery |
| | EN 81-3:2000 | “Safety rules for the construction and installation of lifts- Part: 3 Electric and hydraulic service lifts |
| | prEN 81031 | “Safety Rules for the construction and installation of lifts- Lifts for the transport of goods only- Part: 31 Accessible goods only lifts |

Manufacturer's Name: **Gorbels**
Manufacturer's Address: 600 Fishers Run
P.O. Box 593
Fishers, NY 14453-0593
Product: Easy Arm
Model Number: Q
Accessories: All

Signature: _____

Blake Reese
Product Development Electrical Engineer
Gorbels, Inc.
600 Fishers Run, PO Box 593
Fishers, NY 14453
Phone: 585-924-6262
Fax: 585-924-6273



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| | |
|-------------------------|---|
| Manufacturer's Name: | Gorbels |
| Manufacturer's Address: | 600 Fishers Run P.O. Box 593 Fishers, NY 14453-0593 |
| Product: | Easy Arm |
| Model Number: | iQ |
| Accessories: | All |

Signature: _____

Blake Reese
Product Development Electrical Engineer
Gorbels, Inc.
600 Fishers Run, PO Box 593
Fishers, NY 14453
Phone: 585-924-6262
Fax: 585-924-6273



INSPECTION AND MAINTENANCE SCHEDULE

| GORBEL® EASY ARM® INSPECTION AND MAINTENANCE SCHEDULE | | | |
|---|----------------------------|---|--|
| ITEM | COMPONENT | MAINTENANCE | FREQUENCY* |
| 1 | Wire Rope | Check for distortion of the rope such as kinking, crushing, unstranding, birdcaging, main strand displacement or core protrusion, general corrosion, broken or cut strands, and number, distribution, and type of visible broken wires. | Start of Each Shift |
| 2 | Wire Rope | Maintenance listed in (1) as well as reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires; severely corroded or broken wires at end connections; or severely corroded, cracked, bent, worn, or improperly applied end connections. | Periodically (to be determined by qualified persons only) |
| 3 | Pulley | Inspect the idler pulleys for excessive wear. Replace pulleys immediately if excessive wear or damage is present. | Every 90 days |
| 4 | Limit Switches | Verify that the upper and lower limit switches are operating properly. Verify that the slack switch is operating properly. Replace switches immediately if they are faulty. | Start of Each Shift |
| 5 | Coil Cord Assembly | Check to make sure there is no excessive wearing of the coil cord caused by the wire rope. Check for excessive bends or pinching. Check that quick-disconnect connectors are secured properly. Assure the strain relief at both the handle and actuator are properly tightened. | Start of Each Shift |
| 6 | Handle | Check for smooth operation of the handle. <ul style="list-style-type: none"> Slide Handle Only - Check operator present sensor for correct operation. Verify proper handle swivel functionality. Pendant Handle Only - Check levers to make sure they function smoothly. | Start of Each Shift |
| 7 | Arm Rotation | Verify that both the secondary arm pivot and head assembly pivot are functioning correctly. | Start of Each Shift |
| 8 | Easy Arm® Assembly | Conduct a visual inspection of the entire Easy Arm® unit. | Start of Each Shift |
| 9 | Main Bearing (Under Hung) | Lubricate bearing using SKF LGEP2 grease or equivalent. | Every 6 months |
| 10 | Rotation Stop (Under Hung) | Check to make sure the hardware is properly tightened on both the rotation stop sleeve and the rotation stop plate. Check for major wear, deformation, or indentations. Replace if necessary. | Start of Each Shift |
| 11 | Hardware | Perform routine inspection of all hardware connections, verifying that all lockwashers are compressed and nuts tightened to manufacturer's specifications. Be sure to verify the jam nuts located between the swivel assembly and handle/tooling are properly torqued. | Every 90 days |

* Federal, state and local codes may require inspection and maintenance checks more often. Please check the federal, state and local code manuals in your area.

WARNING

Any changes in rotating effort or unusual noises must be immediately identified and corrected.

For service information, please consult the Easy Arm® Q and iQ Series Service Manual available from Gorbel or go to: www.ErgonomicPartners.com.



GORBEL®
A CLASS ABOVE
600 Fishers Run, P.O. Box 593
Fishers, NY 14453-0593
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