



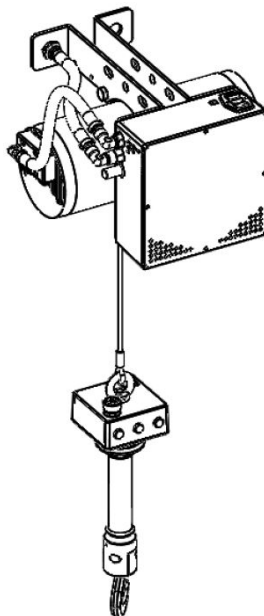
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Edition 1

June 2021

# Zero Gravity Air Balancer Control Kit

## ZG Series



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## User Manual

- EN** User Manual
- ES** Manual del Usuario
- FR** Manuel d'utilisation
- DE** Benutzerhandbuch
- PT** Manual do Usuário



Save These Instructions

When product life has expired, it is recommended to:

- disassemble the product
- degrease the product
- separate product parts by material for correct recycling

Product repair and maintenance should be conducted by an authorized service center.

Refer all communications to the nearest **Ingersoll Rand** office or distributor.

Manuals are available at [ingersollrand.com](http://ingersollrand.com)

**Table 1. Product Information Manuals**

Publication	CCN
Product Safety Manual	16598831
Product Information Manual	54072541
Product Parts Information Manual	16598849
Product Installation Manual	47646669001
Product Maintenance Manual	16598856
Declaration of Conformity	47646667001

## Product Description

This control kit is designed for use with an air balancer. It provides the ability to electronically move loads up and down using handle actuators or applying force directly to a lifted load.

### WARNING

- **Controller must be used by a single operator. Simultaneous command inputs may result in hazardous movements.**
- **Do not use this product or attached equipment for;**
  - lifting, supporting or transporting people
  - lifting or supporting loads over people
- **Do not operate this product in wet or explosive environments.**

### CAUTION

- **To reduce the risk of electric shock, do not expose to rain. Store indoors.**

## Specifications

This device needs to be connected to a standard E type plug or B type plug (for other option, contact factory). It works from 100-150V AC at 50 to 400Hz and the power consumption is 3.5A max. This system is protected by 2 fuses (characteristics: T type, dimension 5x20mm, 3.15A 250V AC.). Working pressure of 100 PSI (6.9bars) dry and clean air only (30 microns filter must be use).

## Model Code Explanation

Example:                      ZG                      W                      020                      120                      00

### Type of Control Kit

ZG = Zero Gravity

### Wire

W = Wire Rope

### Capacity

015 = 150 lb. (68 kg)

020 = **200 lb. (91 kg)**

035 = 350 lb. (158 kg)

050 = 500 lb. (227 kg)

### Inches of Travel

80 = 80 in. (203 cm)

120 = **120 in. (305 cm)**

### Type of Suspension Kit

00 = **No Suspension**

AT = ZRAT Rail

A1 = ZRA1 Rail

A2 = ZRA2 Rail

HM = Top Hook Mount

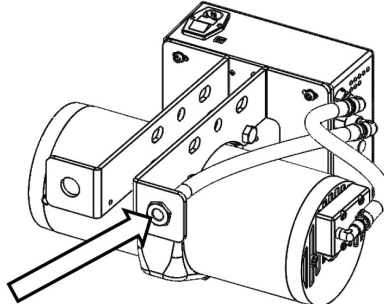
## Installation

### WARNING

- **Prior to installation, refer to Product Safety Information Manual for all sections of installation.**

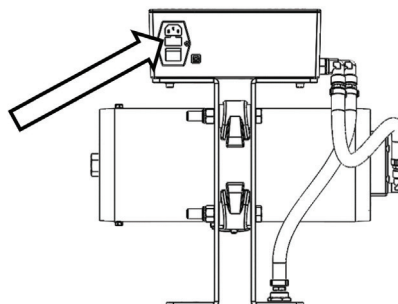
1. To mount the Balancer, use brackets provided.
2. Connect air supply line to main air inlet using a 3/8 inch coupling.

Fig. A



3. Connect power cord to the controller.
  - a. Power Supply 100-150V AC, 50-400 Hz.

Fig. B

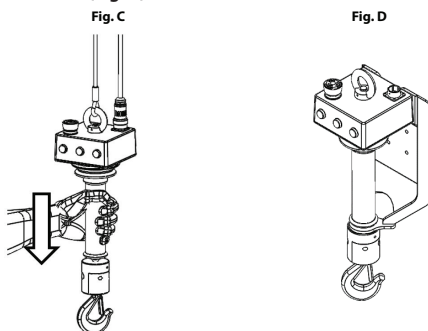


**NOTICE**

- To make sure balancer operates as intended, it is not recommended to use balancing mode at the balancer's mechanical down limit.

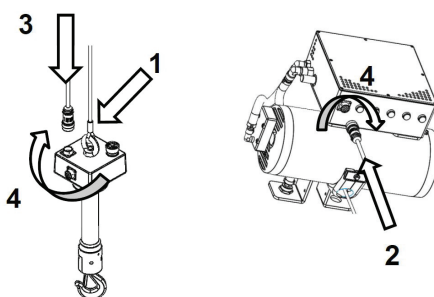
**Handle Installation****NOTICE**

- Control handle can be installed inline with wire rope and the load (Fig. C) or mounted in a remote location using mounting brackets (Fig. D).

**Handle Connection**

1. Connect the handle eye bolt to the wire rope eyelet.
2. Connect the electric spiral wire to the electronic box.
3. Connect the electric spiral wire to the plug on top of handle.
4. Fasten the ring clockwise for a secure connection.

Fig. E

**Turn on Power**

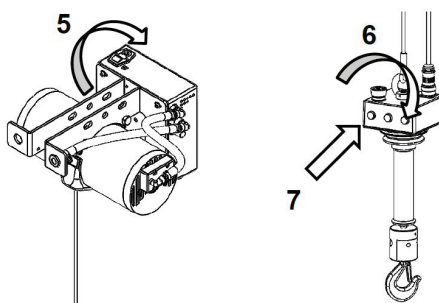
5. Switch on the Zero Gravity Controls using the power switch on the main box.
  - a. To disengage the operation, press the Emergency Stop Button (ESB) located on top of the handle.

**WARNING**

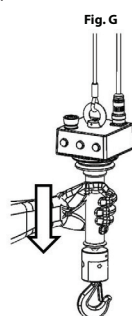
- Do not touch the control handle during initialization of the controller kit.

6. Release E-stop button by rotating clockwise until it pops.
7. Push the green button on the handle to begin operation.

Fig. F

**Deflate the Chamber**

8. Three yellow lights indicate completion of initialization of controller. When lit, pull down sleeve of handle to deflate the chamber.



## Balancer Hook Adjustment

If Command Handle is remotely mounted, refer to Product Information Manual 54072541.

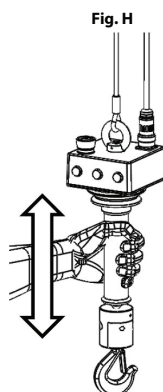
### Operation

#### WARNING

- Press Emergency Stop button to stop movement in case of an emergency.
- Make sure electrical wiring to the balancer conforms to all relevant safety codes and regulations.
- Make sure all electrical connections are secure before applying power.
- Never operate equipment with damaged, frayed or twisted electrical cables.
- Before each shift or initial use, inspect balancer for visible wear and damage.
- Immediately disconnect main power if balancer is damaged.
- Only licensed electrical technicians, trained on this product, should be allowed to access electrical components to perform troubleshooting and/or repair.
- Troubleshooting of the system by licensed electrical technicians is limited to visual inspection of components and sub assemblies once the enclosures are opened.
- Before accessing electrical components, follow 'lock-out, tag-out' procedures to make sure that power to the system has been disconnected.
- Disconnect air supply to balancer prior to maintenance.

### Standard operation

Move loads up and down with the sliding portion of the handle.



### Float Mode

#### Engage Float Mode

To engage float mode, release handle. Float mode will be triggered by lack of contact with handle. While float mode is engaging, red light will appear on Zero Gravity controller. Do not touch handle while controller is calculating load. Float mode is engaged and calculation complete when three yellow lights appear on controller.

#### WARNING

- Do not apply force on the load (upward / downward) while float mode is calculating as this will cause faulty calculation of the weight and drift of the load.

Move loads up and down by acting directly on the load itself.

#### Disengage Float Mode

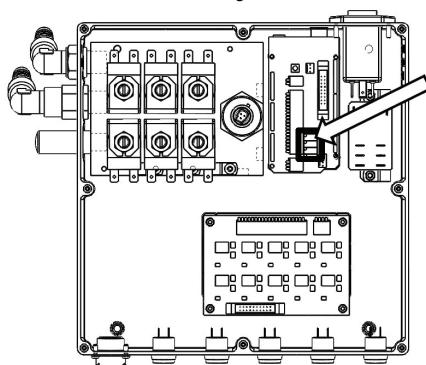
Float mode disengages automatically once handle is touched resulting in yellow lights on the controller to turn off. When yellow lights turn off, use handle sleeve to move load upward/downward.

### No Load Balancing

Use no load balancing if a handling device is permanently suspended to the unit. This will keep the handling device balanced, in float mode, and help to prevent damaging the part during loading/unloading.

- Turn off power switch on controller box.
- Disconnect the electric power supply.
- Remove the cover of the controller box.
- Connect the controller main box to a laptop to begin Serial Communication. Refer to Software Communication section on page 9.
- Turn clockwise the no load balancing trimmer for the correct weight adjustment on the laptop screen (value must be the gripper weight).
- Close the cover of the controller main box.
- Reconnect electric power supply.
- Turn on the controller. Refer to Turn On Power section.
- Use the handle to move the handling device **down**.
- When handling device touches the ground, the controller should stop the down movement.

Fig. J



## Over Pressure

Controlled pressure within the chamber will prevent fast upward movement if there is a blockage of the load or gripper, or sudden release of the load.

- Turn off power switch on the controller box.
- Disconnect the electric power supply.
- Remove the cover of the controller box.
- Connect the controller main box to a laptop to begin Serial Communication. Refer to Software Communication section on page 10.
- Turn counter clockwise the pressure max trimmer for the correct weight adjustment on the laptop screen (value must be the gripper + max load weight).
- Close the cover of the controller main box.
- Reconnect electric power supply.
- Turn on the controller. Refer to Turn On Power section.
- Use the handle sleeve to move the handling device **up**.
- When the handling device is in the **up** position, the controller should stop the up movement.

## Interlock

The interlock feature will not allow the handling device to open while it is suspended. Activation of this option is indicated by three yellow lights on the controller.

- 1 yellow light indicates that the part is clamped.
- 2 yellow lights indicates that the part is released.
- 3 yellow lights indicates that the part is ready to be removed from controller, load is no longer supported.

## Interlock Adjustment

The interlock must be adjusted to your application regarding the example as follow:

If your handling device is 20kg, and your load 25kg, you must adjust the interlock to 20kg (the interlock will not allow the handling device to open once the total load carried by the controller exceeds 20kg).

- Turn off the controller using the power switch on the main box.
- Disconnect the electric power supply.
- Remove the cover of the controller main box.
- Connect the controller main box to the laptop to begin Serial Communication. Refer to Software Communication section on page 10.
- Turn clockwise the Interlock trimmer for correct weight adjustment on the laptop screen (value must be the gripper weight).
- Close the cover of the controller main box.
- Reconnect electric power supply.
- Connect the gripper to the extension plug of the Zero Gravity handle as per the following section (refer to item 8 in Fig. K).

Fig. K



- Turn on the controller. Refer to Turn On Power section.

## Interlock Wiring

### NOTICE

- The interlock activates an available output on the I/O plug at the back of the handle.

Connect your handling device to the controller as follow:

- Pin J and K: Clamp control actuator.
- Pin J and L: Release control actuator.
- Pin J and M: Ready to release information.

Use orange button on the controller handle to activate clamping action. Pull down the sliding part of the handle (bimanual action).

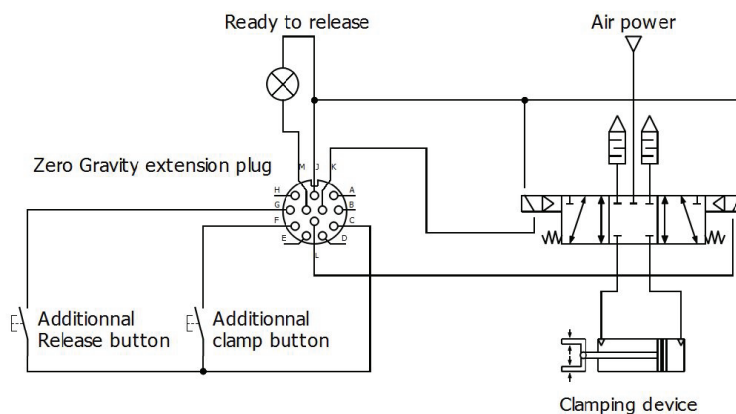
Use black button on the controller handle to activate release action. Pull down the sliding part of the handle (bimanual action).

Orange and black buttons can be wired outside of handle sleeve using connection pins.

- Pin C and F: Additional clamp push button (NO contact).
- Pin C and G: Additional release push button (NO contact).

## Schematics

Fig. L



## Extension Plug Pinout

Pin	Function
A	Not used
B	Not used
C	Ground
D	+5V for input
E	Additional force sensor input
F	Additional clamp button input
G	Additional release button input
H	Input 4
J	+12V for output
K	Clamping output
L	Release output
M	Ready to release output

## Input/Output Hardware

Kit ZGB00-I/O is required to connect to extension plug. Contact your service or sales representative for availability.

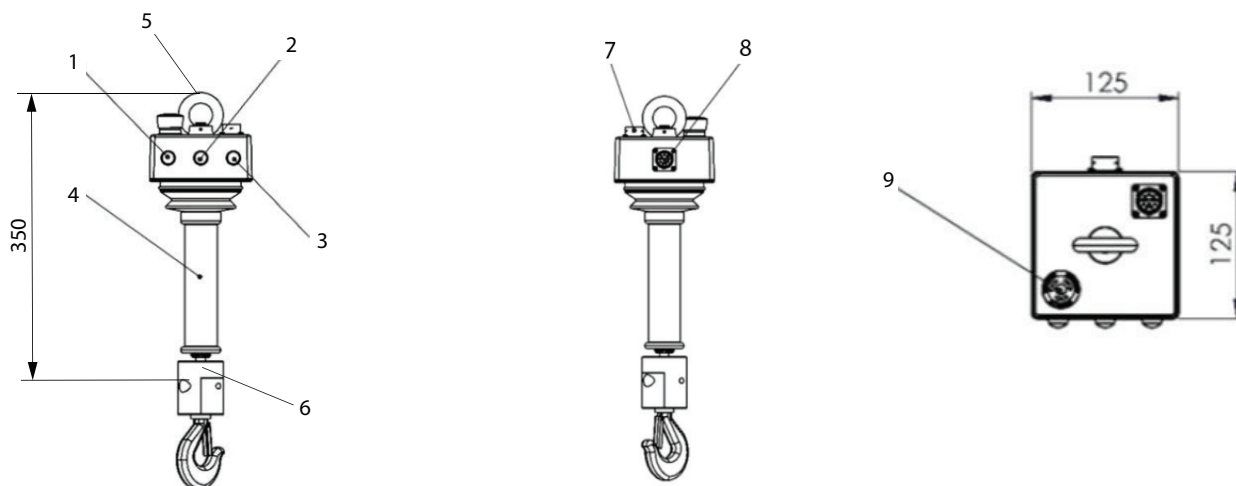
To activate, input switch unit to ground; to deactivate, input switch unit to +5V DC or open wire.

To activate controller, output switch output pin to ground. Output power supply voltage is 12V DC. Do not exceed total of 3A.

## Zero Gravity Handle Review

Refer to Fig. M.

**Fig. M**

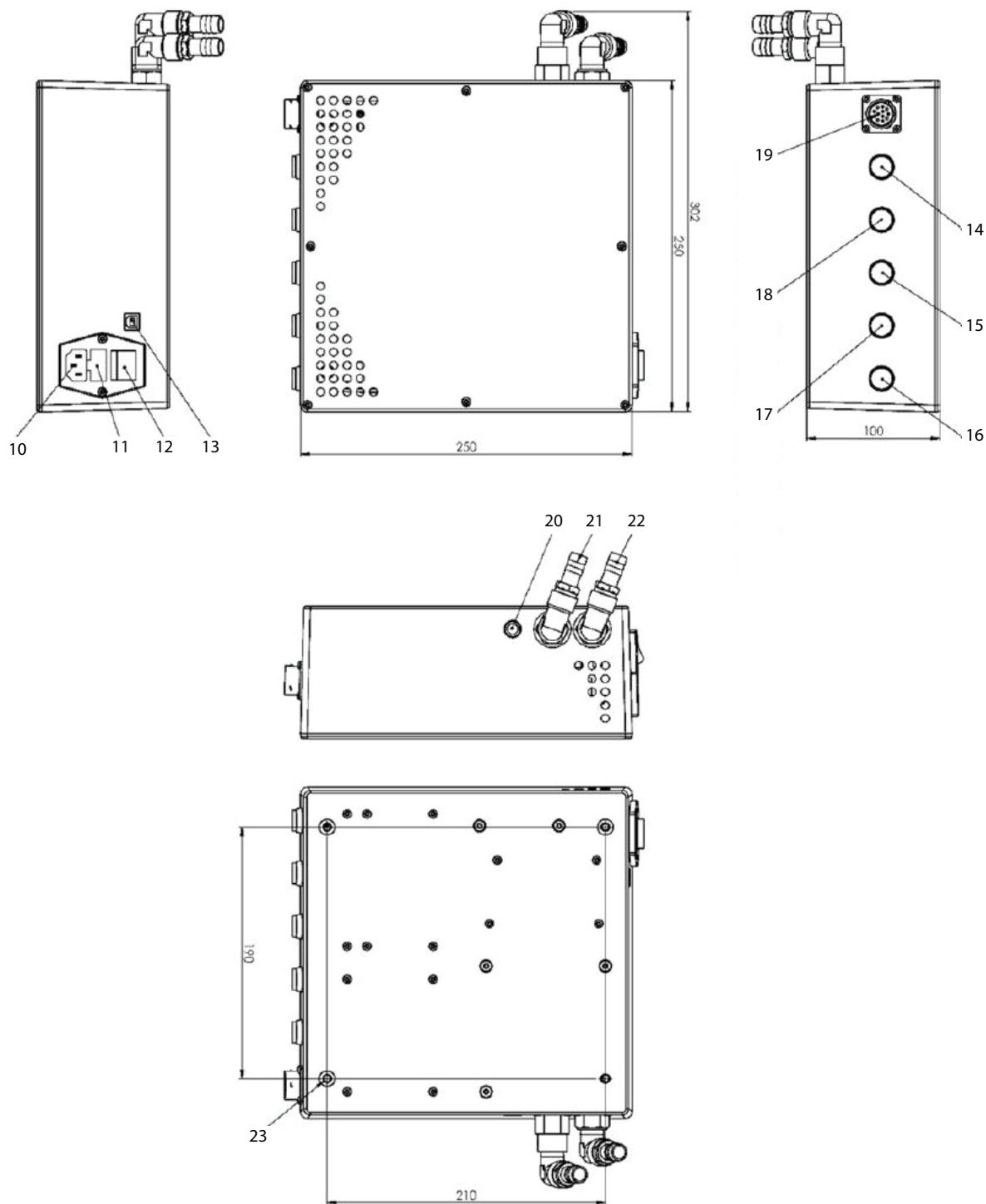


Item Number	Part Description
1	Power Button
2	Clamp Button
3	Release Button
4	Handle Sleeve
5	Top Eyelet
6	Bottom Hook Block
7	Main Plug: to Zero Gravity Control Box
8	Extension Plug: Connection to Input or Output
9	Emergency Stop

## Zero Gravity Control Box Review

Refer to Fig. N.

Fig. N



Item Number	Part Description
10	Power Supply 85-250 V AC
11	Fuses
12	Power Switch
13	USB Connection
14	Power ON Indicator Light
15	Balancing Mode or Part Released Indicator Light
16	Error Indicator Light
17	Balancing Mode or Ready to Release Signal Indicator Light
18	Balancing Mode or Part Clamped Indicator Light
19	Main Plug: to Zero Gravity Handle
20	Muffler
21	Air Supply Port Fitting
22	Balancer Hose Port Fitting
23	Mounting Hole 4xM6



## Software Communication Section

### Installation Requirements

Equipment	Tool
	- Computer
	- Arduino software rev 1.8.x

- Connect your computer to URL: <https://www.arduino.cc/en/Main/Software>
- Select the right OS according to your computer.

### Download the Arduino IDE



- Download and install the software setup.
- Open the program to check the installation.

### Connection

#### Step 1

Required :

Equipment	Tool
Controller main box	Computer
	USB cable type A to type B

- Connect the main box of the Controller to an available USB plug on your computer.

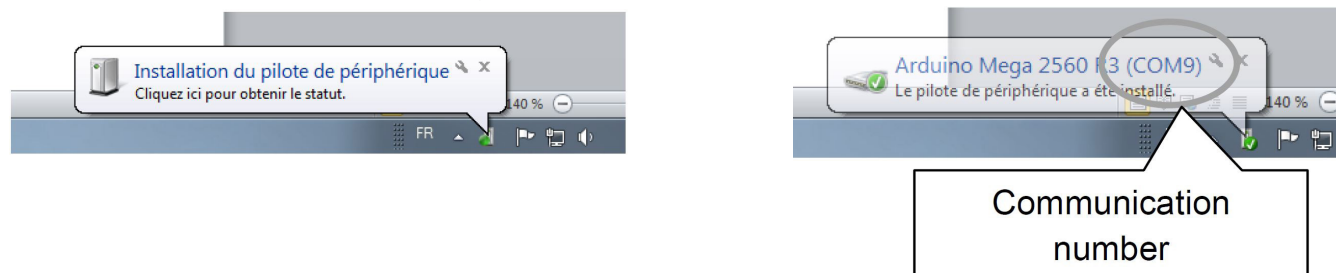
#### Step 2

Required :

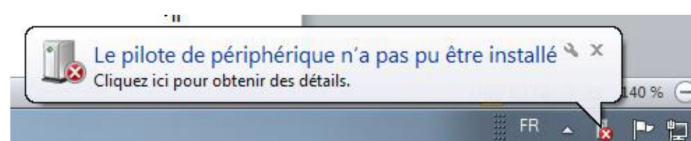
Equipment	Tool
	Computer

Auto installation of the Arduino board's driver:

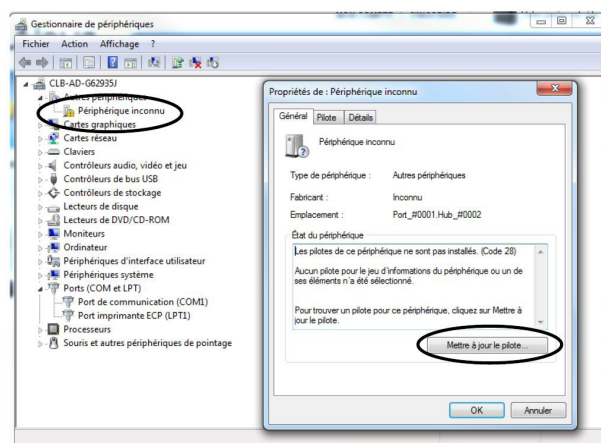
The latest version of Windows will install drivers automatically. When done, please note the communication port number attached to the board.



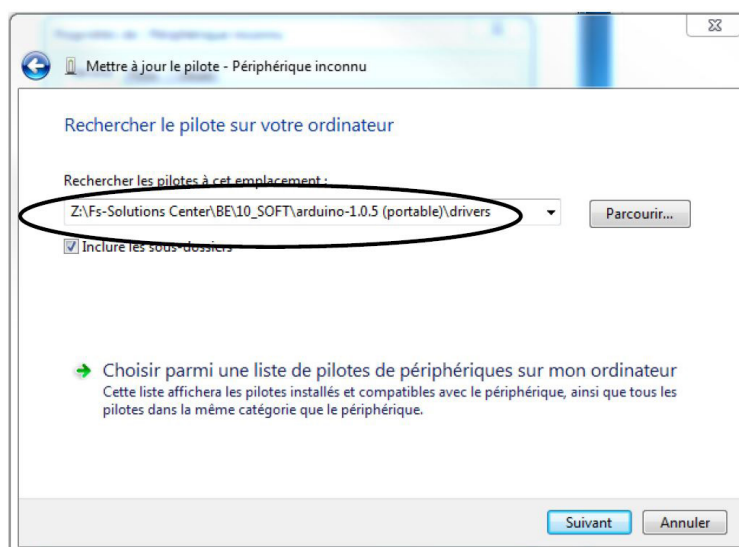
Manual installation:



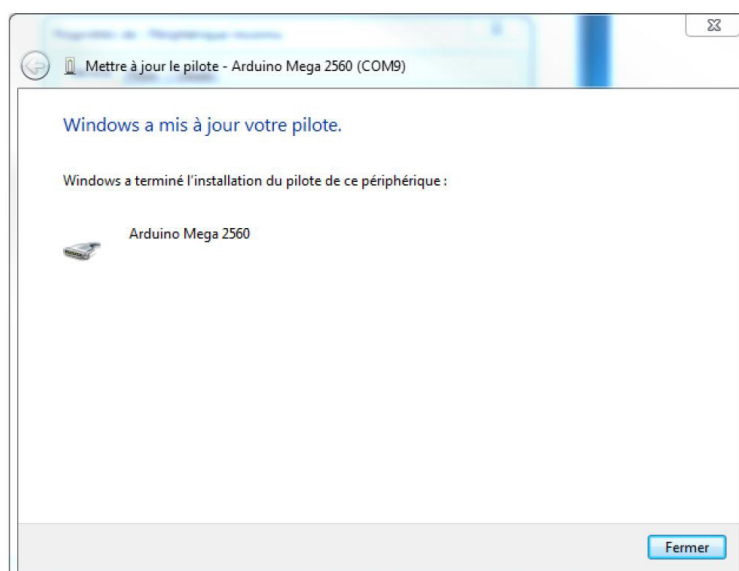
- Open the device manager of the computer: Control panel -> System -> Device manager.
- Open "unknown device" and right click to update the device driver.



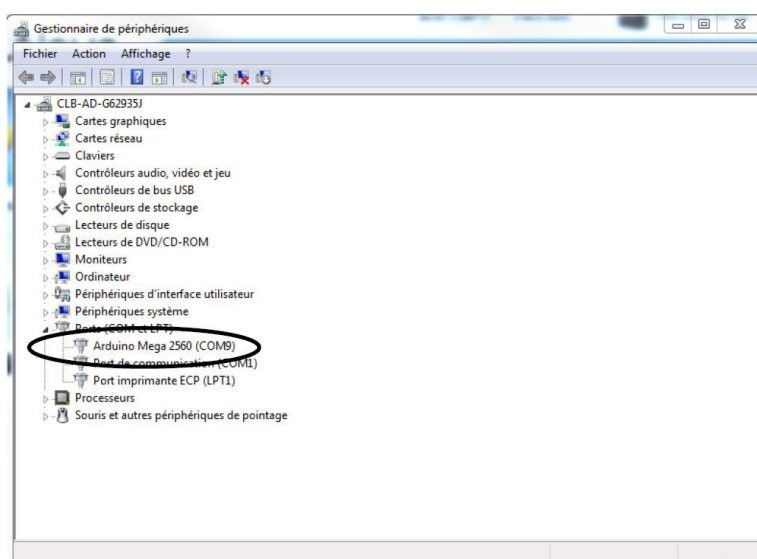
- Click on option: find driver from my computer.
- All drivers are in the folder: \Arduino\drivers\ from the main directory of the Arduino program (usually C:\Program Files\Arduino\drivers).



- Click next.
- A warning message appears, click install.
- After a moment the device is ready for use.



- Come back to the Device Manager and open the communication (COM and LPT). Note the communication number attached to the board Arduino Mega 2560.



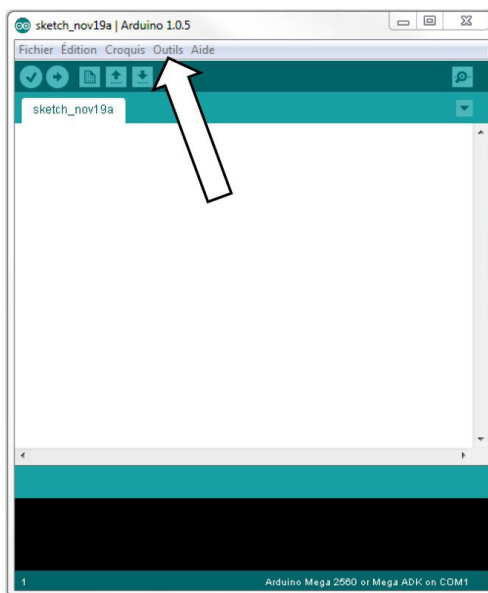
## Serial Communication

### Step 1

Required :

Equipment	Tool
Controller main box	Computer
	USB cable type A to type B
	Arduino software rev 1.8.x

- Open Arduino.exe.
- Click "Tool" menu, then "Type of board".
- Select "Arduino Mega 2560 or Mega ADK".



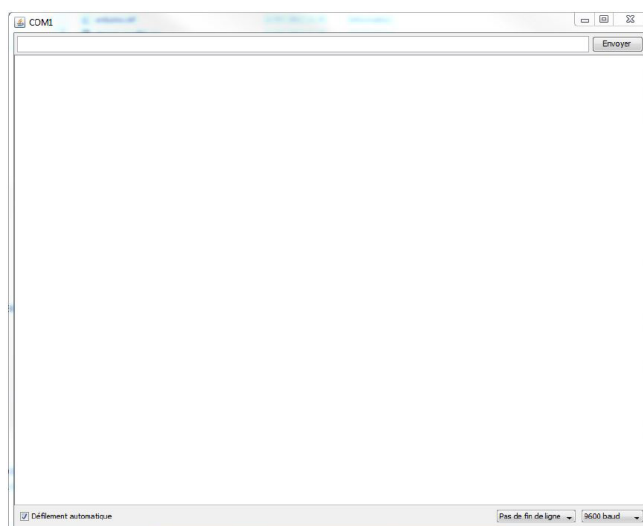
- Click "Tool" menu, then "Port".
- Select the right port's number, previously noted in Connection section.

### Step 2

Required:

Equipment	Tool
Controller main box	Computer
	USB cable type A to type B
	Arduino software rev 1.8.x

- Push Ctrl + Shift + M on keyboard.
- A Serial Communication windows will open.
- The Controller main box will restart and start the communication automatically.



## Maintenance

### Electronics

Steady red light on controller box indicates run error. Restart system to troubleshoot errors. If problem recurs, system will switch to safe mode and red light remains constant. Conduct yearly system check to prevent drifting of the sensor.

### Spiral / Electric Wire

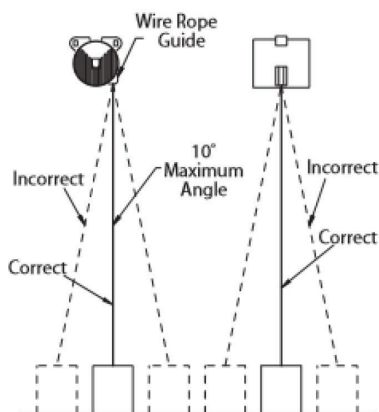
Inspect electric wires daily. Make sure all electric wires are free of rust, dirt, water, oil, and any damage to insulation or plug. Replace spiral wire yearly.

### Wire Rope

Do not yard wire rope more than 10 degrees from vertical center of wire rope guide. Excessive yarding will cause increased wear on the balancer and decrease the life of the components. Replace wire rope if frayed, kinked, or bird caging is visible.

Refer to the Product Maintenance Manual.

Fig. P



## Maintenance Schedule



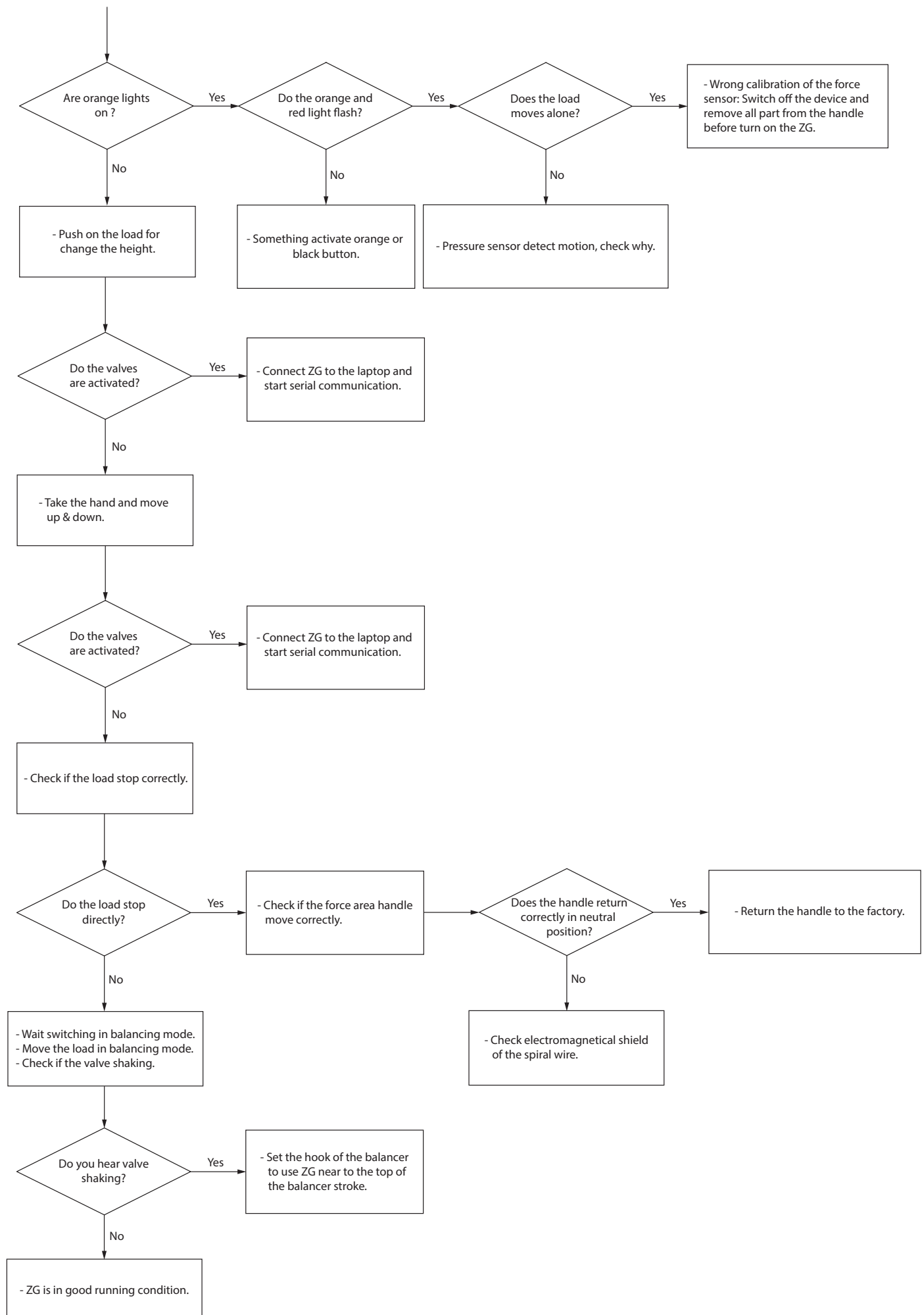
### WARNING

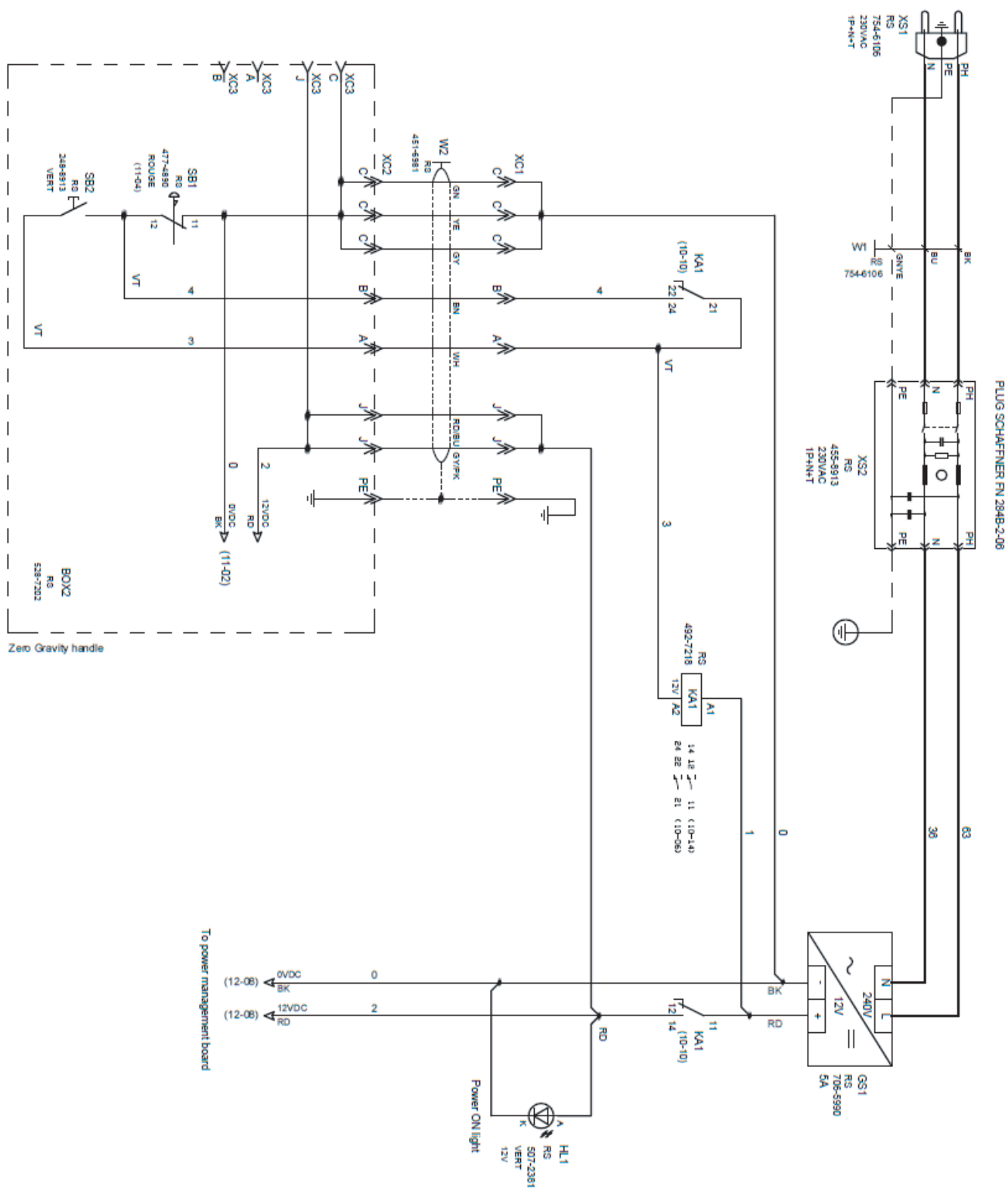
- Disconnect the power supply before working on the equipment. The unit must be repaired by qualified personal, risk of electric shock.

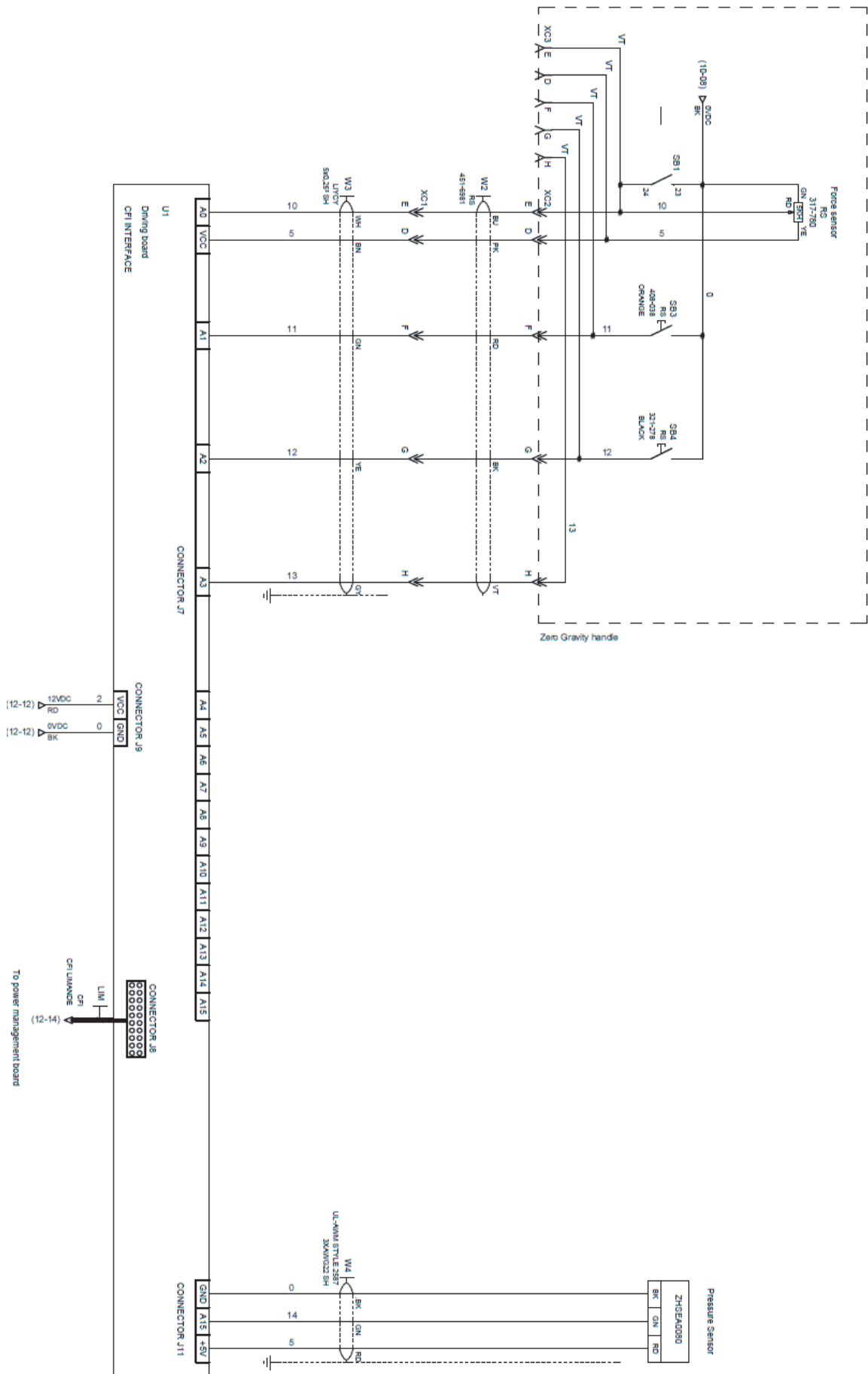
Component	Inspection	Criteria for operation	Daily	Frequent (6 months)	Periodic (1 year)
Spiral Wire	Damages	No visible damage on entire length or on plugs.	X	X	X
	Kinks	No visible kinks on entire length.	X	X	X
Power Cord	Damages	No visible damage on entire length or on plugs.	X	X	X
	Kinks	No visible kinks on entire length.	X	X	X
Control Box	Valves leaks	Load doesn't move when the system is switched off.		X	X
	Pressure sensor damages	Balancing mode operational.		X	X
Command Handle	Force sensor damage	Load doesn't move when handle is free and power on.	X	X	X
	Gap between sensitive area and handle	No resistance in motion, only axial motion must be possible.			X
	Emergency stop	Good operation of this part.	X	X	X
	Control buttons	No visible looseness, or sticking of buttons.	X	X	X

# Troubleshooting

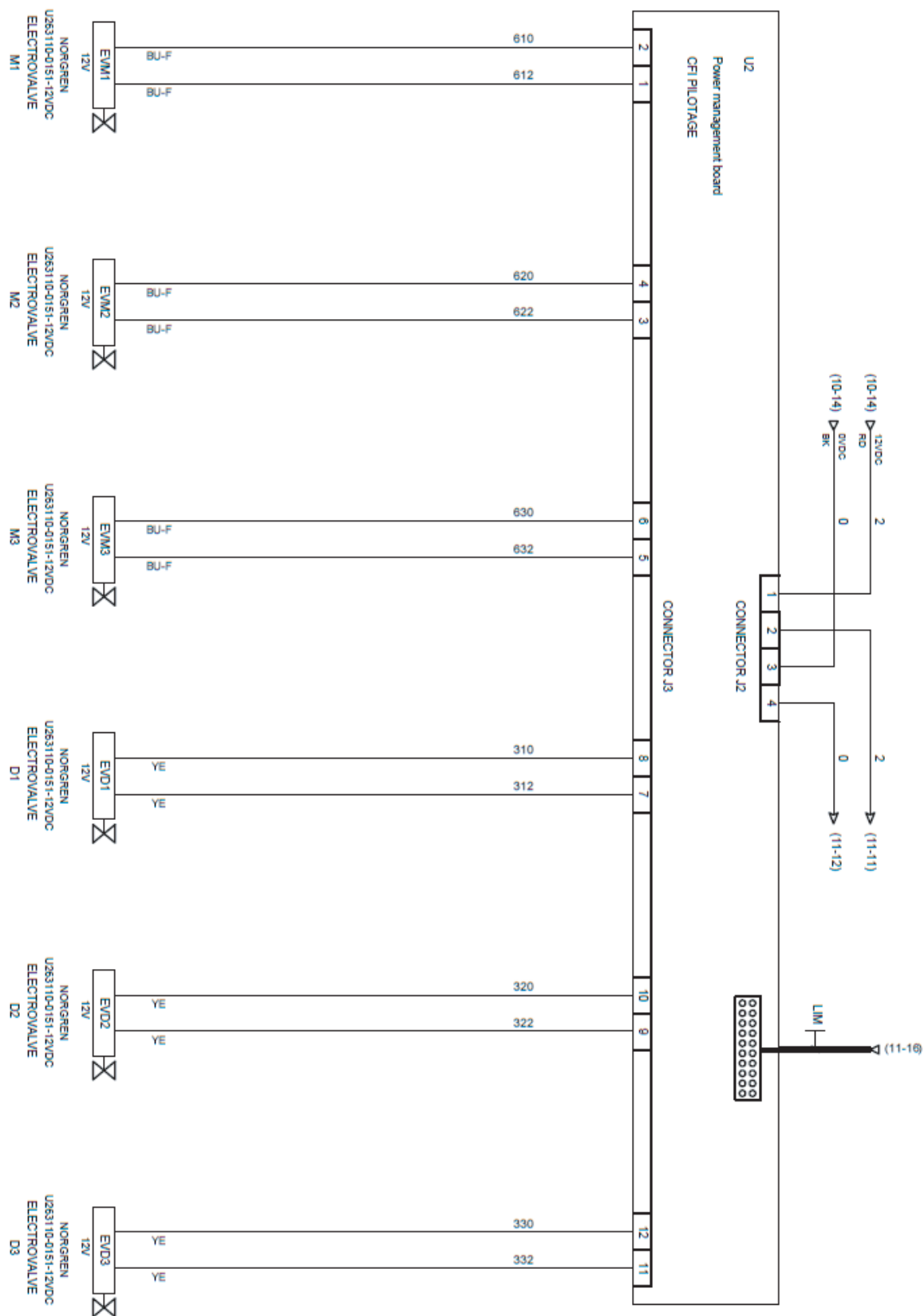


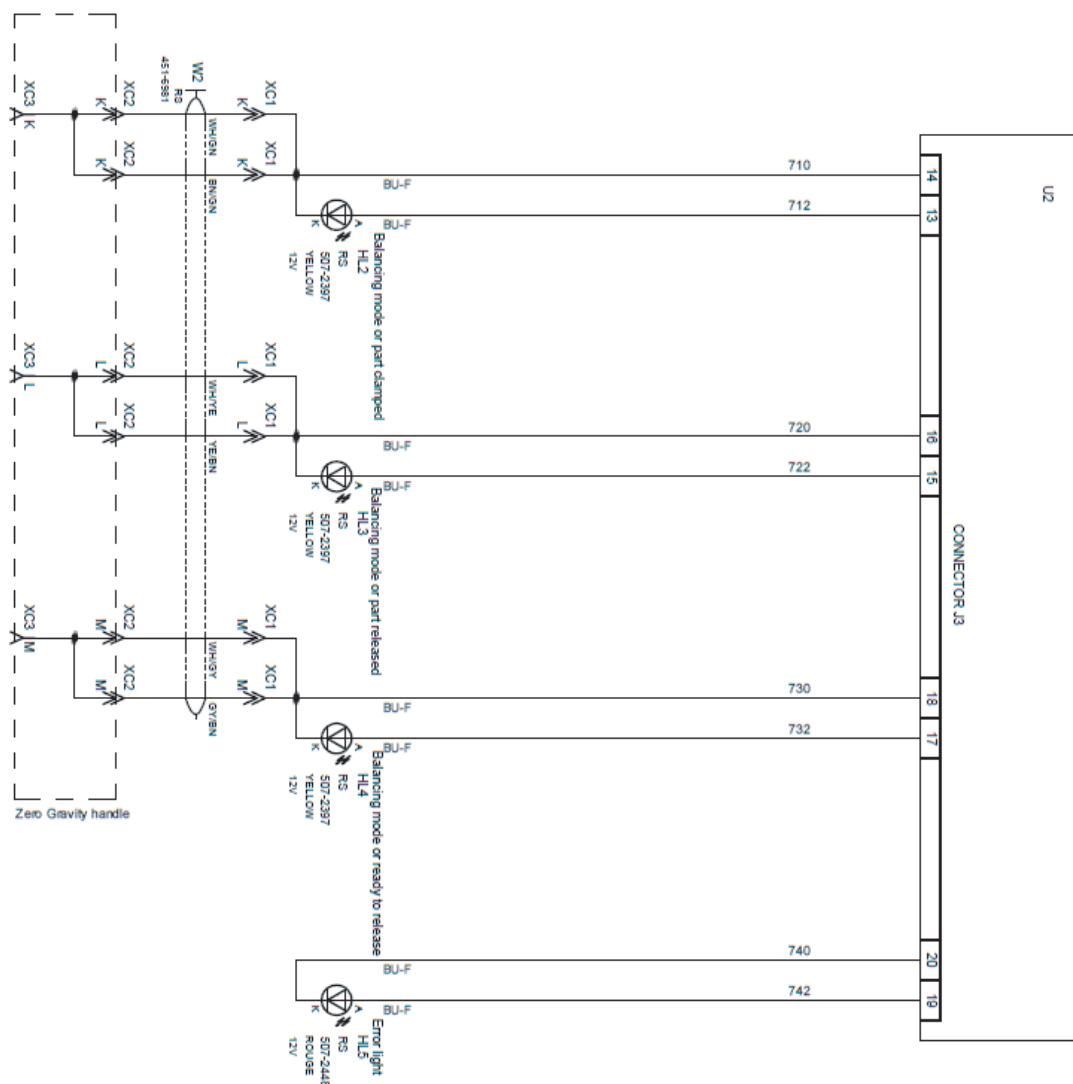










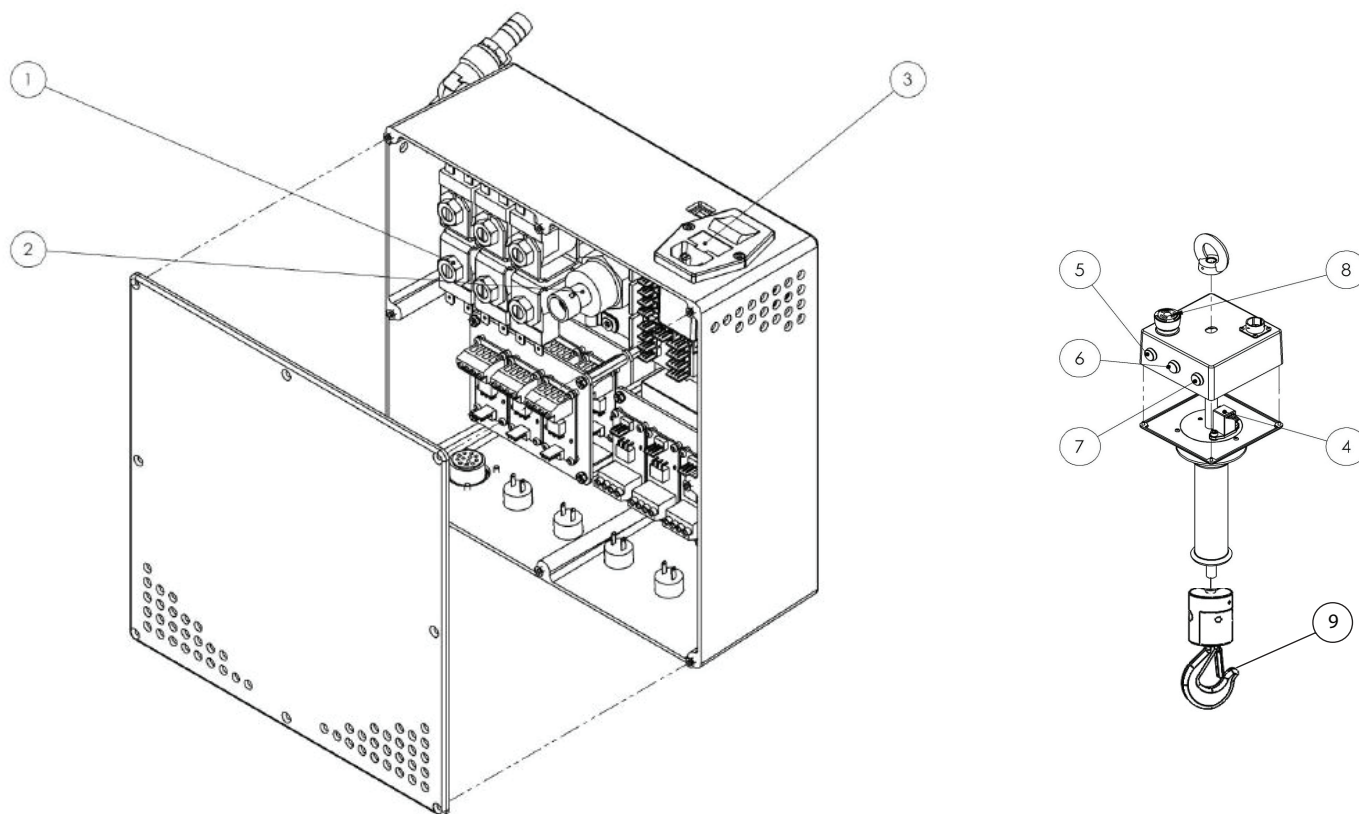


## Zero Gravity Controller - Parts List

Model Driver	Suspension Kit	Balancer	Manifold Kit	Balancer Brackets	Control Box	Command Handle	Spiral Wire
ZGW01508000	ZGS00	BW015080	ZGB-MANIFOLD	ZGE06	ZGB015	ZGP00B	ZGC2
ZGW015080A1	ZGSA1-150	BW015080					
ZGW015080A2	ZGSA2-150	BW015080					
ZGW015080AT	ZGSAT-150	BW015080					
ZGW015080HM	ZGSHM-150	BW015080					
ZGW015080S2	ZGSS2-150	BW015080					
ZGW02012000	ZGS00	BW020120		ZGE10	ZGB020		
ZGW020120A1	ZGSA1	BW020120					
ZGW020120A2	ZGSA2	BW020120					
ZGW020120AT	ZGSAT	BW020120					
ZGW020120HM	ZGSHM	BW020120					
ZGW020120S2	ZGSS2	BW020120					
ZGW03508000	ZGS00	BW035080			ZGB035		
ZGW035080A1	ZGSA1	BW035080					
ZGW035080A2	ZGSA2	BW035080					
ZGW035080AT	ZGSAT	BW035080					
ZGW035080HM	ZGSHM	BW035080					
ZGW035080S2	ZGSS2	BW035080					
ZGW05008000	ZGS00	BW050080			ZGB050		
ZGW050080A1	ZGSA1	BW050080					
ZGW050080A2	ZGSA2	BW050080					
ZGW050080AT	ZGSAT	BW050080					
ZGW050080HM	ZGSHM	BW050080					
ZGW050080S2	ZGSS2	BW050080					

## Spare Parts

Fig. Q



Command box				
Item	Part number	Description	Supplier	Quantity
1	KIT/INGER/150LB 47563675001	Set of Valve for FSB015	IR	1
	KIT/INGER/020LB 47563676001	Set of Valve for FSB020	IR	1
	KIT/INGER/035LB 47563677001	Set of Valve for FSB035	IR	1
	KIT/INGER/050LB 47563678001	Set of Valve for FSB050	IR	1
2	ZHSEA0080 04709614	Pressure Sensor	IR	1
3	610-9989 47738840001	Fuses	IR	2
4	RS317-780 47563682001	Force Sensor	IR	1
5	RS248-8913 47563683001	Power Button	IR	1
6	RS321-278 47563684001	Input 1 Button	IR	1
7	RS408-038 47563685001	Input 2 Button	IR	1
8	RS477-4890 47563686001	Emergency Stop	IR	1
9	CE120-KBB377 03504545	Bullard Hook Assembly	IR	1
*	47728057001	Power Cord	IR	As Required
*	47738841001	Hose and Fittings Kit ZGB	IR	As Required
*	47739078001	Muffler	IR	As Required

\* Indicates not illustrated.

**Notes:** \_\_\_\_\_

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