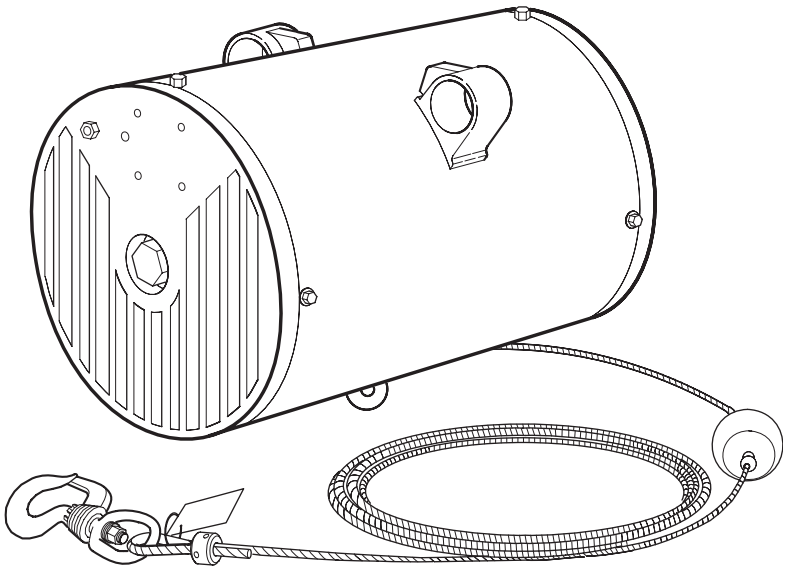
PARTS, INSTALLATION AND MAINTENANCE MANUAL
for
SERIES ZA, EA AND BA AIR BALANCERS



(Dwg. MHP2176)

READ THIS MANUAL BEFORE USING THESE PRODUCTS. This manual contains important safety, installation, and maintenance information. Make this manual available to all persons responsible for the installation, operation and maintenance of these products.

⚠ WARNING

This equipment is intended for industrial use only and should not be used for lifting, supporting, or transporting people or lifting or supporting loads over people.

Always operate, inspect and maintain this balancer in accordance with applicable safety codes and regulations.

Form MHD56151
Edition 4
April 2004
54072541

Ingersoll-Rand®

TABLE OF CONTENT

This Maintenance Manual describes the correct service, disassembly, assembly and repair procedures for Balancers. Use of replacement parts other than genuine **Ingersoll-Rand** original parts could result in damage to the balancer and void the warranty. Refer on page 51 for warranty information. Be sure you read all instructions before starting work on the balancer.

SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read this manual before operating the balancer.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in an injury. The following signal words are used to identify the level of potential hazard.

⚠ DANGER — Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING — Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION — Indicates an potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

NOTICE — Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

Safety Summary

⚠ WARNING

• Do not use this balancer or attached equipment for lifting, supporting, or transporting people or lifting or supporting loads over people.
• The supporting structures and load-attaching devices used in conjunction with these balancers must provide a safety factor of at least three times the rated capacity of the balancer. This is the customer's responsibility. If in doubt, consult a registered structural engineer.

NOTICE

• Lifting equipment is subject to different regulations in each country. These regulations may not be specified in this manual.

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: Employees who work near suspended loads or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under a raised load and keep out of the line of force of any load.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the owner/employer, not the manufacturer. Many OSHA requirements are not concerned or connected with the manufactured product but are, rather, associated with the final installation. It is the owner's and user's responsibility to determine the suitability of a product for any particular use. It is recommended that all applicable industry, trade association, federal, state, and local regulations be checked. Read all operating instructions and warnings before operation.

Rigging: It is the responsibility of the operator to exercise caution, use common sense and be familiar with proper rigging techniques. Refer to ASME B30.9 for rigging information, American Society of Mechanical Engineers, Three Park Ave, New York, NY 10016.

This manual has been produced by **Ingersoll-Rand** to provide dealers, mechanics, operators and company personnel with the information required to install, operate, maintain and repair the products described herein. It is extremely important that mechanics and operators be familiar with the servicing procedures of these products, or like or similar products, and are physically capable of conducting the procedures. These personnel shall have a general working knowledge that includes:

1. Proper and safe use and application of mechanics common hands tools as well as special **Ingersoll-Rand** or recommended tools.
2. Safety procedures, precautions and work habits established by accepted industry standards.

Ingersoll-Rand cannot know of, or provide all the procedures by which product operations or repairs may be conducted and the hazards and/or results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation or maintenance procedure or step, personnel should place the product in a safe condition and contact supervisors and/or the factory for technical assistance.

⚠ WARNING

• Balancers with capacities of 150 lbs or (68 kg) greater are equipped with the Z-Brake, a centrifugal brake that is designed to stop the uncontrolled upward travel of the wire rope in the event of a sudden release or loss of load, and limit the excessive upward acceleration of the empty hook for the safety of the operators. The brake must not be used as a travel limiting stop or up stop. Failure to follow these instructions will result in damage to the brake and the balancer. Continuous use of the Z-Brake will cause internal damage to the balancer and could result in damaging the balancer beyond repair.

Correct installation and operation of the balancer depends on you reading all instructions before starting work on the balancer.

⚠ CAUTION

Clean, dry air must be used at all times when operating balancers.

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions have been adapted in part from American National (Safety) Standards and are intended to avoid unsafe operating practices which might lead to injury or property damage.

Ingersoll-Rand recognizes that most companies who are using these balancers have a safety program in force at their facility. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

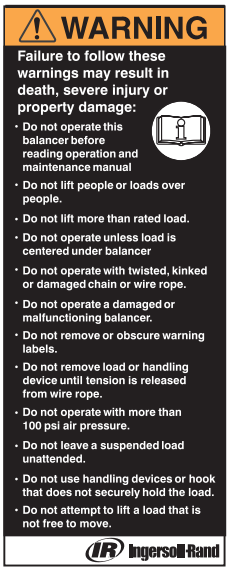
Safe Operating Instructions are provided to make an operator aware of dangerous practices to avoid and are not necessarily limited to the following list. Refer to specific sections in the manual for additional safety information.

1. Only allow personnel trained in safety and operation of this balancer to operate this product.
2. Only operate the balancer if you are physically fit to do so.
3. When a **"DO NOT OPERATE"** sign is placed on the balancer, or controls, do not operate the balancer until the sign has been removed by designated personnel.
4. Do not use the balancer if hook gate is sprung or broken.
5. Check that the hook gate is closed before using.
6. Before each shift, check the balancer for wear and damage. Never use a balancer that inspection indicates is worn or damaged.
7. Never lift a load greater than the rated capacity of the balancer. Refer to nameplate and capacity labels attached to the balancer.
8. Do not use more than one hook on a single load.
9. Never place your hand inside the throat area of a hook.
10. Never use the wire rope as a sling.
11. Only operate the balancer when the wire rope is centered over the load. Do not "side pull" or "yard".
12. Never operate the balancer with twisted, kinked or damaged wire rope.
13. Do not force hook into place.
14. Be certain the load is properly seated in the saddle of the hook.
15. Do not support the load on the tip of the hook.
16. Never run the wire rope over a sharp edge.
17. Pay attention to the load at all times when operating the balancer.
18. Make sure everyone is clear of the load path. Do not lift a load over people.
19. Never use the balancer for lifting or lowering people, and never allow anyone to stand on a suspended load.
20. Do not swing a suspended load.
21. Do not leave load suspended when the balancer is not in use.
22. Never leave a suspended load unattended.
23. Never weld or cut a load suspended by the balancer.
24. Ensure safety wire rope is installed (where required).
25. Do not operate the balancer if wire rope is jumping, excessive noise, jamming, overloading, or binding occurs.
26. Shut off air supply before performing any maintenance.
27. Avoid collision or bumping of the balancers.
28. Do not continuously rotate balancer in one direction. Air line damage will occur from continuous rotation potentially allowing the load to lower. Reverse direction with each cycle of the balancer to prevent twisting and damage to air lines.

WARNING TAG AND LABEL

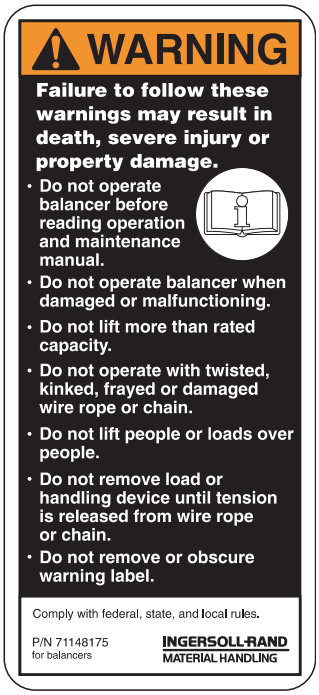
Each balancer is shipped from the factory with the warning tag and label shown. If the tag or label is not attached to the balancer, order a new tag or label, and install it. Tag and label are shown smaller than actual size.

Pendant Control Tag



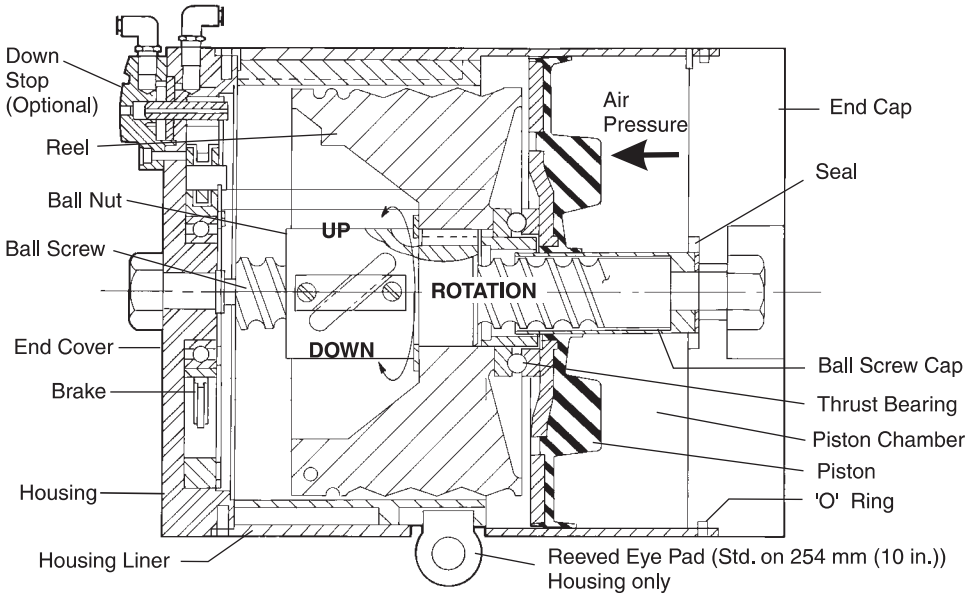
(Part No. 10445)

Balancer Label



(Part No. 71148175)

TYPICAL BALANCER CROSS SECTION



(Dwg. MHP1350)

SPECIFICATIONS

Principles of Operation

Balancers contain a stationary ball screw. The ball screw is held in position by two hex head bolts (through the end cap and end cover). Two pins in the end cover engage notches on the end of the ball screw to prevent it from rotating. The reel assembly, consisting of reel, ball nut and thrust bearing, rides on the ball screw. The piston contacts the thrust bearing and travels back and forth with the reel assembly. The piston does not rotate.

Compressed air powers the balancer. It is controlled by an external control package. Air enters or leaves the piston chamber through a single hole in the end cap. This compressed air causes the piston to move laterally. The piston pushes against the thrust bearing causing the reel to move laterally along the ball screw and winds up the wire rope. The load or hook travels down when the air is exhausted from the piston chamber through the control package to atmosphere.

The Balancer achieves maximum capacity at 100 psi, as the line pressure reduces so will the operating capacity of the Balancer. For every one psi reduction in air pressure there is a 1% reduction in overall capacity.

If the balancer has no load attached, it may be necessary to pull down on the load hook to lower.
The 500 lb (227 kg) balancer is designed to hang at a 3 degree angle with the controls end lower than the end cover.

MODEL CODE
Example: BA - W - 020 - 120 - S - HM

- BA - Type of Control Kit
- W - Wire
- 020 - Capacity
- 120 - Inches of Travel
- S - Z-Stop
- HM - Type of Suspension Kit

Type of Control Kit	Wire or Chain	Capacity in Pounds at 100 psi (6.9 bar)	Inches of Travel	Options	Type of Suspension Kit
B = Basic Unit no controls **BA = Single Balance Control** EA = Hi, Low, no load control ZA = Pendant Control	**W = Wire Rope** C = Chain (not covered in this manual)	005 = 50 lbs (22 kg) 015 = 150 lbs (68 kg) **020 = 200 lbs (91 kg)** 032 = 325 lbs (147 kg) *Z-Stop only* 035 = 350 lbs (158 kg) 040 = 400 lbs (181 kg) 050 = 500 lbs (227 kg) 065 = 650 lbs (294 kg) 070 = 700 lbs (317 kg) 080 = 800 lbs (362 kg) 100 = 1000 lbs (453 kg) 130 = 1300 lbs (589 kg) 140 = 1400 lbs (620 kg) 200 = 2000 lbs (907 kg)	040 = 40 in (102 cm) 060 = 60 in (152 cm) 080 = 80 in (203 cm) **120 = 120 in (305 cm)**	**S = Z-Stop**	00 = No suspension A1 = ZRA1 Rail A2 = ZRA2 Rail S2 = ZRS2 Rail S3 = ZRS3 Rail **HM= Top Hook Mount** TR = T-Rail/I-Beam AT = ZRAT Rail V2 = Valu-Trak K1 = KBKI Rail K2 = KBKII Rail E4 = ETA-4 Rail E8 = ETA-8 Rail

INSTALLATION

Prior to installing the balancer, carefully inspect it for possible shipping damage. Balancers are supplied fully lubricated from the factory.

CAUTION

• Owners and users are advised to examine specific, local or other regulations, including American National Standards Institute and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting the balancer to use.
• A falling load can cause injury or death. Before installing, read "SAFETY INFORMATION".

Balancer

Make certain the balancer is properly installed. A little extra time and effort in so doing can contribute a lot toward preventing accidents and helping you get the best service possible.

Always make certain the supporting member from which the balancer is suspended is strong enough to support the weight of the balancer plus the weight of a maximum rated load plus a generous factor of at least 300% of the combined weights.

Hook Mounted Balancer Installation

The supporting member must rest completely within the saddle of the hook and be centered directly above the hook shank on balancers suspended by a top hook. Do not use a supporting member that tilts the balancer to one side or the other.

Place hook over mounting structure. Make sure hook gate is engaged.

Trolley Mounted Balancer Installation

When installing the balancer and trolley, make certain the balancer is centered under the rail or beam. After installation, operate the trolley over the entire length of the rail or beam with a capacity load. Ensure rail or beam stops are installed before operating the balancer. Use Grade 5 or better bolts when attaching balancer to trolley assembly. Refer to Trolley Suspension Kit in this manual.

CAUTION

• To avoid an unbalanced load which may damage the trolley, the balancer must be centered under the trolley.

Rail Mounted Balancer Installation

For proper installation of the balancer on a rail system refer to Installation and Maintenance Manual for that rail system.

Air System

The supply air must be clean and free from water or moisture. A minimum of 100 psi (6.9 bar/690 kPa) at the balancer is required to provide rated capacity. Do not exceed 100 psi (6.9 bar).

WARNING

• Do not exceed 100 psi (6.9 bar) inlet pressure. Do not use a lubricator of any kind. Oil will damage internal components.

Air Lines

The inside diameter of the balancer air supply lines must not be smaller than 3/8 in. (10 mm) based on a maximum of 100 ft. (30 m) between the air supply and the balancer. Contact the factory for recommended air line sizes for distances greater than 100 ft. (30 m). Before making final connections, all air supply lines should be purged before connecting to balancer inlet. Supply lines should be as short and straight as installation conditions will permit. Long transmission lines and excessive use of fittings, elbows, tees, globe valves, etc. cause a reduction in pressure due to restrictions and surface friction in the lines. If quick-disconnect fittings are used at the inlet of the balancer, they must have at least a 3/8 in. (10 mm) air passage. Use of smaller fittings will reduce performance.

Air Line Filter

It is recommended that an air line strainer/filter be installed as close as practical to the balancer air inlet port. The strainer/filter should provide 10 micron filtration and include a moisture trap. Clean the strainer/filter monthly to maintain its operating efficiency.

To maintain dry air, the frequency for draining the filter should also be based on the condition of the air supply. We suggest the filter be drained weekly at first. Depending on air supply condition, a proper filter drain schedule should be established.

Moisture in Air Lines

Moisture that reaches the balancer through the supply lines is the chief factor in determining the length of time between service overhauls. Moisture traps can help to eliminate moisture. Other methods, such as an air receiver which collects moisture before it reaches the balancer controls or an aftercooler at the compressor that cools the air prior to distribution through the supply lines, are also helpful.

General Operating Instructions

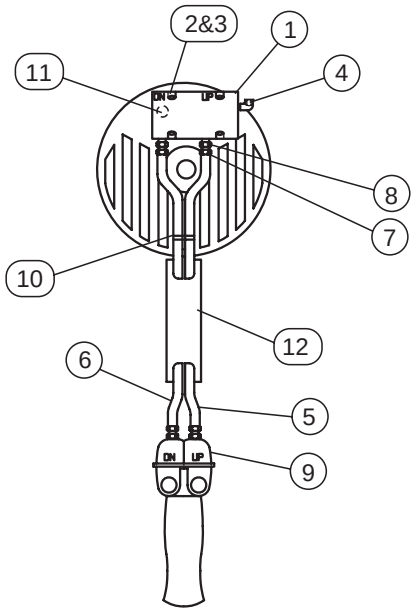
CAUTION

• Do not continuously rotate balancer in one direction. Air line damage will occur from continuous rotation potentially allowing the load to lower. Reverse direction with each cycle of the balancer to prevent twisting and damage to air lines.

Series ZA Basic Balancer

Manifold Installation

Refer to Dwg. MHP1899 on page 7.
Place balancer on a clean, sturdy work surface with end cap upright. Remove ZA control kit from its package and make certain 'O' Ring (11) is in place on back of manifold. Install manifold (1) with mounting screws and lockwashers (2 and 3).



(Dwg. MHP1899)

Item No.	Description of Part	Qty. Total	Part Number
1	Manifold	1	ZHS15071
2	Lockwasher	4	15785
3	Mounting Screw	4	15779
4	Fitting, Elbow	1	10354
5	Hose (bulk)	As Req'd	10555-B
6	Hose (bulk)	As Req'd	10555-G
7	Fitting, Hose End	4	10560
8	Fitting, Adapter	4	10565
9	Ergonomic Control Handle	1	18600
10	Clamp	4	10548
11	'O' Ring	1	15751
12	Warning Tag (do not remove)	1	10445

Control Kits

Part Number	Description of Part
15300-10	Control Kit 10 ft (includes items 1 to 12)
15300-12	Control Kit 12 ft (includes items 1 to 12)
15300-14	Control Kit 14 ft (includes items 1 to 12)
15300-17	Control Kit 17 ft (includes items 1 to 12)

Control Hose Installation

The control hose is pre-assembled to the control handle, but it must be attached to the manifold.

Control hose assemblies may either be gray and black straight hose, or yellow and black coiled tubing. The gray hose or yellow tube (6) must be connected to the down-side of the manifold. The black hose (5) must be connected to the up-side of the manifold.

Operational Adjustments

WARNING

• Prior to performing operational adjustments or servicing make sure air supply is off. Press down lever until wire rope is slack.

1. Install manifold to end cap.
2. Connect black UP hose to UP port on manifold.
3. Connect gray/yellow hose (handling device applications) to DN port on manifold.

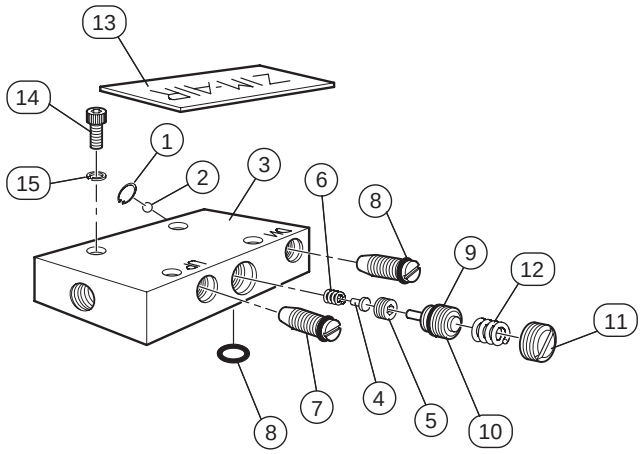
NOTICE

• When wire rope is winding, air is entering the balancer through both the up and down flow controls. Therefore, down flow control also affects the up speed when it is set for a minimal down speed.

4. Connect main air supply to right side port of manifold.
5. Turn on main air supply. Adjust regulator to required air pressure.
6. Rotate hook balance screw clockwise **slowly** until wire rope begins to raise, move to the full up position, ensure Z-brake does not engage.
7. Install load hook and handling device to wire rope in required position. Refer to "Lash up" instructions on page 25.

8. Rotate UP flow control clockwise until snug.
9. If wire rope is slack, ensure the Z-brake does not engage.
10. Feather UP lever until tension is applied to wire rope, then fully depress UP lever until load is in the full up position.
11. Depress DN lever and check speed.
12. Adjust DN flow control on manifold counterclockwise to increase speed, clockwise to decrease speed, until desired speed is achieved.
13. Lower to bottom of normal travel with tension on wire rope.
14. Adjust UP flow control on manifold counterclockwise to increase speed, clockwise to decrease speed, until desired speed is achieved.

Series ZA Manifold



(Dwg. MHP1904)

Item No.	Description of Part	Qty. Total	Part Number
• 1	Retainer Ring – ZA Manifold	1	ZHS15047
• 2	Ball, Check – ZA Manifold	1	ZHS15049
3	Body – ZA Manifold	1	15077
• 4	Valve Assembly	1	15802
• 5	Valve Seat	1	15803
• 6	Valve Spring	1	15804
7	Screw, Adjusting ZA Manifold	2	15080
• 8	'O' Ring	3	15751
9	Piston – ZA Manifold	1	ZHS15083
• 10	U-cup – ZA Manifold	1	15086
11	Screw, Adjusting ZA Manifold	1	15081
12	Spring – ZA Manifold	1	15084
13	Nameplate, Series ZA Manifold	1	10297
14	Mounting Screw	4	15779
15	Lockwasher	4	15785
•	Recommended Spare Available in Kit 15099 – ZA Manifold Repair Kit		

Removal From Balancer

1. Lower suspended load to floor. Turn off air supply to balancer.
2. Press down lever until wire rope is slack and all air is exhausted from balancer.
3. Remove air supply (4) and hoses (5 and 6) from manifold (1).
4. Remove the four screws holding manifold to end cap (2 and 3).

Disassembly

Refer to Dwg. MHP1904 on page 8.

CAUTION

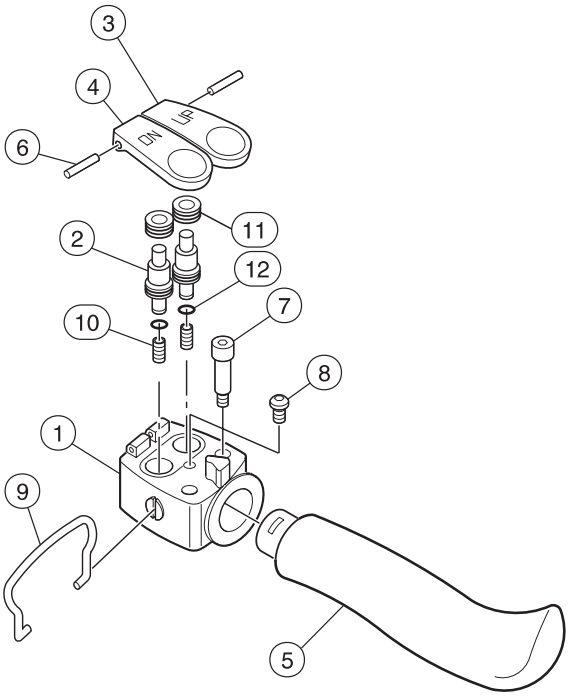
• Use of replacement parts other than genuine Ingersoll-Rand original parts could result in damage to the balancer and void the warranty.

1. Remove the two adjustment screws (7). Pull out when threads have disengaged.
2. Remove hook balance adjustment screw (11) and spring (12).
3. Remove piston (9) by grasping raised center with needle nose pliers and pulling straight out.
4. Remove seat (5), valve (4) and spring (6). Use a No. 2 Phillips screwdriver to unscrew seat (5).
5. To take out ball check (2), remove down side hose fitting and retainer ring (1).

Assembly

1. Thoroughly clean manifold body and all internal parts before reassembly. Replace all worn parts.
2. Apply a light coat of lubricant (Lubriplate) to 'O' Rings (8), U-cup (10), and threaded adjustments before reassembly.
3. Assemble manifold in reverse order of disassembly.
4. Use U-cup insertion tool, part number 54041777, to install seal to prevent damage from threaded hole.

Series ZA Control Handle



(Dwg. MHP1906)

Item No.	Description of Part	Qty. Total	Part Number
---	Ergonomic Control Handle Assembly	1	18600

Item No.	Description of Part	Qty. Total	Part Number
1	Valve Body	1	18601
• 2	Cartridge Valve	2	18602
• 3	Up Lever	1	18609
	Up Lever Stainless Steel	1	18609S
• 4	Down Lever	1	18607
	Down Lever Stainless Steel	1	18607S
5	ZA Ergonomic Handle	1	18604
• 6	Pin	1	10550200
7	Pin	1	Y178-64
• 8	Button Head Screw	1	70422
9	Guard	1	18622
10*	Spring	2	18613
11*	'O' Ring	1	18633
12*	Quad Ring	1	18632
•	Recommended Spare		

Recommended spare parts are available in kit
18575 - Ergo Control Handle Repair Kit
18575S - Ergo Control Handle with Steel Lever Repair/Upgrade Kit
*18570 - Cartridge Valve Repair Kit

Removal From Balancer

Refer to Dwg. MHP1899 on page 7.
1. Lower suspended load to floor. Turn off air supply to balancer.
2. Press down lever until wire rope is slack and all air is exhausted from balancer.
3. Disconnect twin hose (5 and 6) at handle (9).

Disassembly

Refer to Dwg. MHP1906 on page 8.

⚠ CAUTION

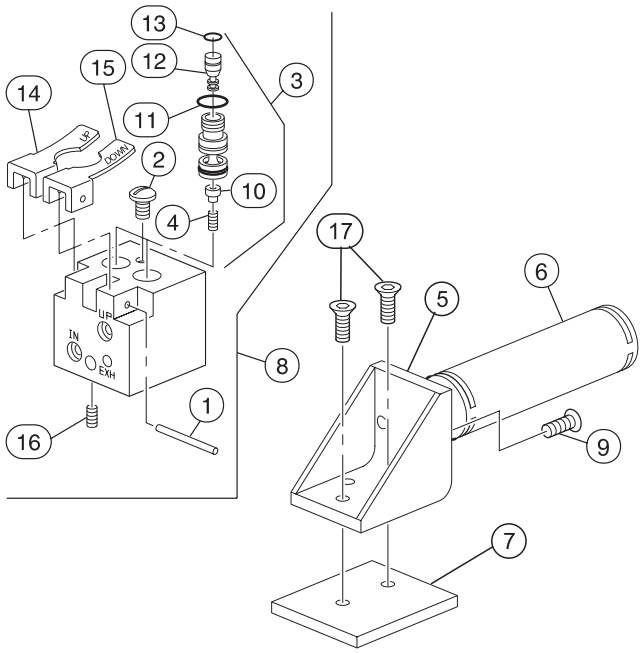
• Use of replacement parts other than genuine Ingersoll-Rand original parts could result in damage to the balancer and void the warranty.

1. Remove pins (6) and UP and DOWN levers.
2. Remove screw (8).
3. Remove the two insert valve cartridges (2) by grasping with needle nose pliers and pulling straight out.
4. Remove two springs (10). Check valve springs for breakage or loss of tension. Replace springs, if necessary. Examine the rubber seat on the end of the valve stem. Examine 'O' Rings for signs of wear or deterioration. Clean valve body (1).
5. Replace all worn parts.

Reassembly

1. Control handle is assembled in the reverse order of disassembly.
2. Apply a light coat of lubricant (10886) to 'O' rings and threaded connections before reassembly.

Series ZA Control Handle (Ergonomic)



(Dwg. MHP1907)

Item No.	Description of Part	Qty. Total	Part Number
• 1	Pin	1	18421
• 2	Screw	1	18422
• 3	Insert Valve Assemblies	2	18412
• 4*	Spring	2	18418
5	ZA Handle Bracket	1	18446
6	ZA Handle Grip	1	18447
7	Mounting Block	1	1826
8	Control Valve Assembly	1	ZHS18410
9	Button Head Screw	2	18451
• 10*	Seal	1	18417
• 11*	'O' Ring	2	ZHS18415
• 12*	V-Seal	1	18423
• 13*	'O' Ring	1	15759
• 14	Lever (Up)	1	18419
• 15	Lever (Down)	1	ZHS18420
16	Setscrew	1	16093
17	Screw	2	ZHS70427
•	Recommended Spare		

Suggested spare parts available in kit
18475 - ZA Control Handle Repair Kit
*18470 - Insert Valve Repair Kit

Removal From Balancer

Refer to Dwg. MHP1899 on page 7.
1. Lower suspended load to floor. Turn off air supply to balancer.
2. Press down lever until wire rope is slack and all air is exhausted from balancer.

3. Disconnect twin hose (5 and 6) at handle (9).

Disassembly

Refer to Dwg. MHP1907 on page 9.

CAUTION

• Use of replacement parts other than genuine Ingersoll-Rand original parts could result in damage to the balancer and void the warranty.

1. Remove pin (1) from UP and DOWN levers.
2. Remove screw (2).
3. Remove two insert valve assemblies (3) by pulling them straight out.
4. Remove two springs (4). Clean valve body. Check valve springs for breakage or loss of tension. Replace springs, if necessary. Examine rubber seat on end of valve stem. Examine 'O' Rings for signs of wear or deterioration.
5. Replace all worn parts.

Reassembly

1. Control handle is assembled in reverse order of disassembly.
2. Apply a light coat of lubricant (10886) to 'O' Rings and threaded connections before reassembly.

Series ZA Troubleshooting Guide

CAUTION

• Before doing any disassembly, lower load until wire rope is slack. Prior to performing operational adjustments or servicing make sure air supply is off.

Basic Balancer - Refer to Applicable Breakdown for Parts

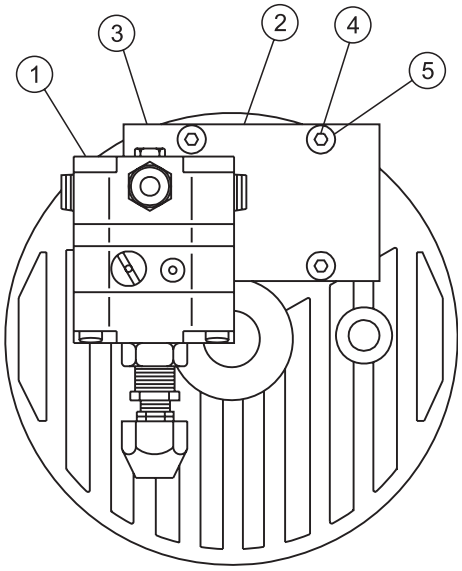
SYMPTOM	POSSIBLE CAUSE	SOLUTION
Balancer will not lift or hold load. Air leaking from inside housing.	End cap 'O' Ring leaking.	Replace 'O' Ring.
	Ball screw cap, seal leaking air.	Tighten hex head bolt in center of end cap. Remove if leak continues and replace seal.
	Air leak around piston.	Replace piston.
	Cap (ball screw) may be damaged.	Replace cap (ball screw).
Balancer will not lift load. No air leaking from the balancer.	Z-Brake engaged.	Lower load, refer to "Z-BRAKE ADJUSTMENT AND RESETTING" section on page 41.
Balancer lifts but will not lower.	Control hoses installed backwards.	Reverse hoses. Refer to Dwg. MHP1899 on page 7.

ZA Basic Control

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Balancer will lift, but will not hold load.	Air leak between manifold and balancer end cap.	Replace 'O' Ring (15751).
	Air leak around up/down adjustment screws on manifold.	Replace 'O' Ring (15751).
	Air leak around hook balance adjustment screw on manifold.	Replace U-cup (15086) or replace ball (ZHS15049).
	Worn or cut control air lines.	Replace control air line.
	Improper assembly of hose fittings (leakage).	Check and tighten fittings. Apply pipe sealant if necessary.
	Air leaks around or through "down" valve assembly in control handle.	Clean and inspect assembly. Replace worn parts.
Balancer lifts load without up lever being actuated.	Hook balance adjustment set too high.	Turn adjusting screw (15081) counterclockwise until screw head is flush with top of manifold. If problem continues rebuild manifold. Refer to Dwg. MHP1904 on page 8.
	Air leak around or through "up" valve assembly in control handle.	Clean and inspect assembly. Replace worn parts.

Series BA Balancer

150 lb (68 kg) Capacity



(Dwg. MHP1908)

Item No.	Description of Part	Qty. Total	Part Number
1	Regulator Assembly	1	13825
2	Tandem Manifold	1	15093
3	'O' Ring	1	15751
4	Mounting Screw	4	15779
5	Lockwasher	4	15785

Manifold Installation

Refer to Dwg. MHP1908 on page 11.
Place balancer on a clean, sturdy work surface with end cap upright. Remove BA control kit from its package. Check to be sure 'O' Ring (3) is in place on the back side of the manifold (2). Install manifold to end cap by using the 4 mounting screws and lockwashers (4 and 5) provided. Regulator is supplied with a hex nipple and a check valve. The hex nipple should be threaded into the hole on the manifold as shown in Dwg. MHP1259 on page 12. Connect air supply to check valve.

NOTICE

• Arrow on check valve must be pointing toward balancer. If installed backwards balancer will not function.

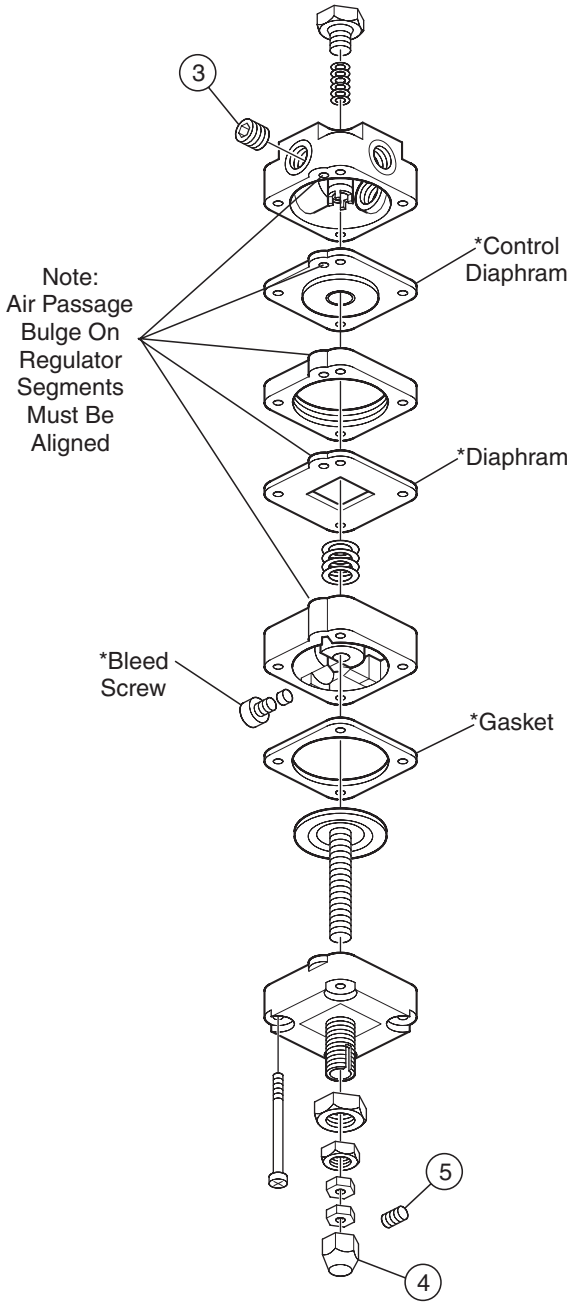
Operational Adjustments

⚠ WARNING

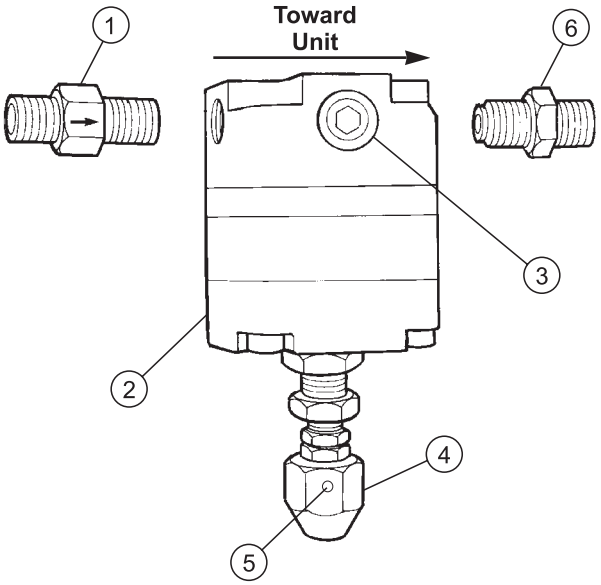
• Prior to performing operational adjustments or servicing make sure air supply is off and wire rope is slack.

1. Connect regulator to balancer.
2. Rotate regulator adjustment knob counterclockwise until it stops.
3. Turn on main air supply. Adjust regulator to required air pressure.
4. Rotate adjustment knob clockwise **slowly** until wire rope begins to raise, move to the full up position. (Ensure the Z-brake does not engage - 150 lb (68 kg) units only).
5. Install load hook and tooling or fixture to wire rope in the required position. Refer to "Lash up" instructions on page 25.
6. Rotate adjustment knob clockwise until load is suspended.
7. The correct setting will require equal effort to lift and lower the load.
8. If unit is required to raise the load out of the way, turn adjustment knob clockwise until desired speed is achieved.
9. Tighten jam nut just above adjustment knob to maintain proper setting.

Series BA Regulator



(Dwg. MHP1258)



(Dwg. MHP1259)

Item No.	Description of Part	Qty. Total	Part Number
---	Regulator Assembly	1	13825
1	Check Valve	1	13270
2	Regulator	1	13830
3	Plug	2	10764
4	Control knob	1	13832
5	Setscrew	1	13833
6	Fitting, Nipple	1	13840

Series BA Troubleshooting Guide

CAUTION

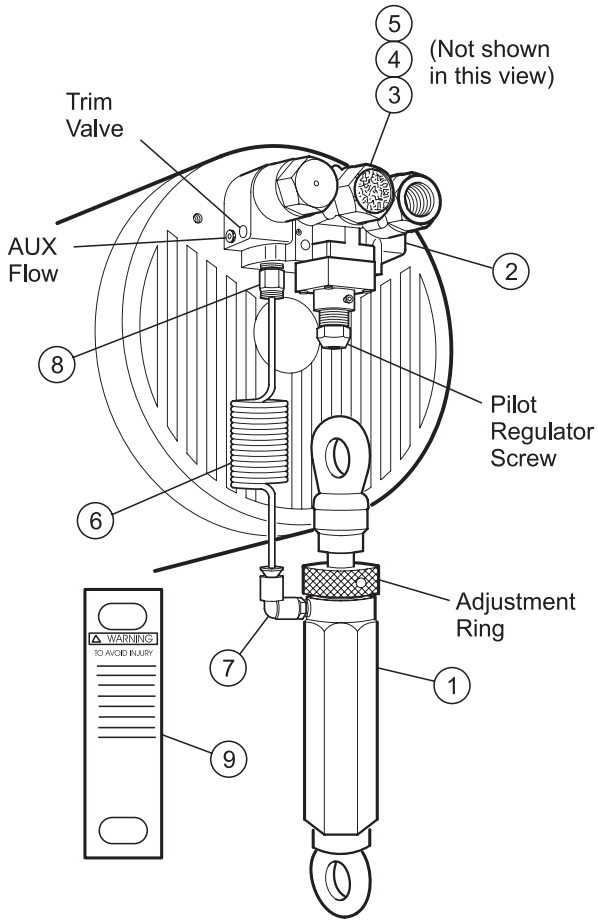
• Before doing any disassembly, lower load and turn control knob (counterclockwise) until wire rope is slack. Prior to performing additional adjustments or servicing make sure air supply is off

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Balancer will not lift load. *Make sure load does not exceed capacity of balancer.*	Check valve installed backwards.	Install check valve properly, arrow toward regulator.
	Regulator adjustment set low.	Turn adjustment clockwise until load rises.
	Insufficient air pressure.	Increase pressure to 100 psi (6.9 bar).
	Excessive leakage around piston, 'O' Ring or seal on end cap.	Check for damaged piston, seal or 'O' Ring. Replace worn parts.
	Binding of ball screw assembly, or thrust bearing.	Clean and lubricate ball screw assembly and thrust bearing, or replace if excessively worn.
Load rises but is hard to pull down.	Regulator adjustment set too high.	Back off adjustment (counterclockwise) until load is balanced.
	Exhaust hole in regulator bleed screw plugged.	Clean exhaust hole using fine wire, or replace bleed screw.
Air constantly blowing out of exhaust ports on regulator.	Ruptured diaphragm in regulator.	Replace diaphragm.
Erratic, jerky operation.	Fluctuating air supply pressure.	Clean parts thoroughly.
	Dirt or oil clogging inlet valve or bleed screw orifice.	Clean thoroughly and lubricate.
	Ball screw and thrust bearing dirty.	Install line regulator set at highest maintainable pressure. Do not exceed 100 psi (6.9 bar).

Series BA Z-Servo Control

200, 350 and 500 lb (90, 158 and 227 kg) Capacity

S Control Kit
254 mm (10 in.) Balancer



(Dwg. MHP1909)

Item No.	Description of Part	Qty. Total	Part Number
1	Z-Servo Control	1	10602
2	Integral Regulator Series EA	1	15601
3	Screw	2	15781
4	Screw	2	15782
5	Lockwasher	4	15785
6	Coiled Poly Black Tube	1	93948
7	Fitting, Elbow	1	ZHS93969
8	Connector	1	ZHS93963
9	Warning Tag (do not remove)	1	10445

Z-Servo Installation

Mount balancer on overhead suspension, with wire rope fully extended. Determine proper wire rope location for Z-Servo, refer to the “Load Hook Lash Up” section on page 23. Attach Z-Servo valve to wire rope as shown on page 14, Dwg. MHP1354.

Regulator Installation

Place balancer on a clean, sturdy work surface with end cap upright. Pull out wire rope until reel bottoms out. Remove BA control kit from package, check to ensure that ‘O’ Ring is in correct position on back of EA regulator (2). Install regulator on end cap with four mounting screws and lockwashers (3, 4 and 5).

Control kit is supplied with a coil hose assembly (6). Connect coil hose to “A” port of regulator.

Operational Adjustments

Refer to Dwg. MHP1909 on page 13.

⚠ WARNING

• Prior to performing operational adjustment or servicing make sure air supply is off and wire rope is slack.

NOTICE

• A minimum of 70 psi (4.8 bar) is required to operate the regulator.

1. Install regulator to balancer.
2. Install Z-Servo as close to but below the ball stop. Refer to Z-Servo Installation instructions on page 13.
3. Rotate regulator adjustment knob counterclockwise until 1/2 inch (13 mm) of thread is visible.
4. Rotate trim valve clockwise until snug, then counterclockwise 2 full turns.
5. Rotate auxiliary flow valve clockwise until snug.
6. Turn on main air supply. Adjust regulator to required air pressure.
7. Rotate adjustment knob clockwise **slowly** until wire rope begins to raise, move to the full up position, ensure Z-brake does not engage.

⚠ CAUTION

• Auxiliary flow valve is fully open when 1/8 in. (3.2 mm) of screw head protrudes from regulator body. Do not open beyond this point.

NOTICE

• Up and down speed should be the same for ease of adjustment.

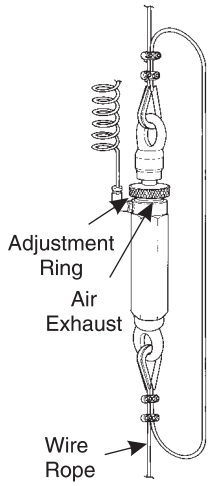
8. Install load hook and tooling or fixture to wire rope in the required position. Refer to “Lash-up” instructions on page 25.
9. Rotate regular adjustment knob clockwise until load raises to the full up position. The speed should be relatively slow. Pull down and release the load and check the speed.
10. Connect black tube to the “A” port on the regulator.
11. Rotate auxiliary flow valve counterclockwise until lowering speed is the same as the lifting speed. “Pinching” off the black tube will pressurize regulator to raise the load.
12. Raise and lower load two or three times to verify speeds are the same. If speed in one direction is much faster than the opposite direction the load will be difficult to move and may provide erratic operation.
13. Pinch off black tube and connect free end to the Z-Servo fitting.

14. Turn knurled nut at the top of the servo until load is balanced. Rotating nut clockwise will increase balance setting or raise the load. Counterclockwise rotation of the nut will reduce balance setting and lower the load.
15. Lift and lower the load several times. Equal effort should be required to raise and lower the load. If load is hard to pull down turn trim valve clockwise 1/2 turn and check. If load is hard to raise turn trim valve counterclockwise 1/2 turn and check.

NOTICE

• A small volume of air will exhaust at the Z-Servo while in operation.

Z-Servo Wire Rope Installation



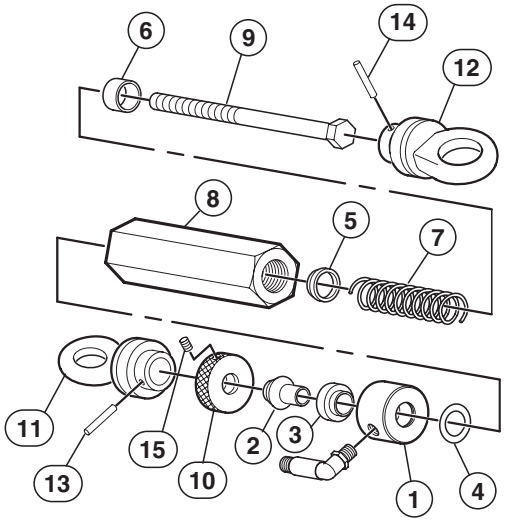
(Dwg. MHP1354)

1. Mount balancer on overhead suspension.
2. Position Z-Servo below travel range of wire rope.
3. Insert wire rope through top hole in Z-Servo. Install two clamps on wire rope 1-1/2 in. (38 mm) above top of Z-Servo and 1-1/2 in. (38 mm) apart. Leave 16 in. (40.64 cm) of wire rope free for Z-Servo to operate properly.
4. Insert wire rope through bottom hole in the Z-Servo. Install 2 clamps on wire rope 1-1/2 in. (38 mm) apart.
5. Install load hook.

NOTICE

• You must leave enough slack in the wire rope to allow proper operation of the Z-Servo balancer.

Z-Servo Control



(Dwg. MHP1910)

Item No.	Description of Part	Qty. Total	Part Number
---	Z-Servo Control (includes items 1-15)	1	1602
1	Valve	1	10626
2	Valve Stem	1	10631
• 3	Seal	1	ZHS10632
• 4	'O' Ring	1	10635
5	Guide Washer	1	10613
6	Load Washer	1	ZHS10614
7	Spring	1	ZHS10642
8	Housing	1	10645
9	Plunger	1	10651
10	Adjusting Nut	1	10620
11	Cap	1	ZHS10628
12	Nut	1	10662
• 13	Spring Pin	1	10616
• 14	Spring Pin	1	10617
• 15	Setscrew	1	10619
•	Recommended Spare		

Recommended Spare Parts Available In Kit 10600 - Z-Servo Repair Kit.

The regulator is the primary control for the BA system. The Z-Servo bleeds off air. Therefore it works like an amplifier. If the pilot regulator must be readjusted for any reason, the auxiliary flow, trim valve and Z-Servo must be readjusted.

Removal From Balancer

1. Place suitable stand or platform under the suspended load. The stand or platform should be high enough for the load to rest on when the balancer is at the bottom of its travel.
2. Slowly turn pilot regulator screw counterclockwise until wire rope is slack. Remove the load, and load hook from wire rope.

3. Turn off air supply.
4. Disconnect control hose from Z-Servo control. Remove wire rope clamps at top and bottom of Z-Servo control to complete removal of control. Refer to page 22 to repair EA regulator.

Disassembly

Refer to Dwg. MHP1910 on page 14.

CAUTION

• Use of replacement parts other than genuine Ingersoll-Rand original parts could result in damage to the balancer and void the warranty.

1. Remove spring pin (13).
2. Remove cap (11).
3. Loosen setscrew (15) and remove knurled adjusting nut (10).
4. Slide valve (2) and body (1) from bolt. Remove valve from body and check seal (3) and 'O' Ring (4) for deforming or wear.
5. Remove pin (14) and nut (12). This permits removal of plunger (9) and spring (7).

Assembly

1. Slide washer (6) (flat side up) onto plunger (9). Slide spring (7) and washer (5) onto plunger (9). Insert this assembly into housing (8).
2. Apply a light coat of lubricant (10886) to 'O' Ring (4) and insert in valve groove (1).
3. Install seal (3) on valve stem (2), with flat side of seal against shoulder of stem. Insert it into valve (1). Slide this assembly onto plunger (9).
4. Thread adjusting nut (10) onto plunger (9), grooved side first. Tighten to allow cap (11) to be started. Install pin (13).
5. Tighten nut (12). Align hole in nut with hole in housing.
6. Insert roll pin (14).
7. Tighten adjusting nut (10). Control is now ready for installation to balancer. Refer to 'Z-Servo Installation' section on page 13.

Series BA Z-Servo Troubleshooting Guide

CAUTION

• Before doing any disassembly, lower load, turn control knob (counterclockwise) until wire rope is slack. Prior to performing additional adjustments or servicing make sure air supply is off.

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Balancer will not balance or lift load - no air bleeding from Z-Servo control.	No air supply to balancer.	Turn on air. Set line regulator between 70 psi (4.8 bar) minimum and maximum 100 psi (6.9 bar).
	Air supply check valve holding.	Low air pressure (should be 70 psi (4.8 bar) minimum).
	Pilot regulator pressure set low.	Adjust until load rises or is in balance.
	Load over capacity of balancer.	Check weight of load. 100 psi (6.9 bar) is required to operate balancer at maximum capacity.
	Trim valve closed.	Adjust to manual specification. Refer to 'BA Z-Servo Operational Adjustments' section on page 13.
	Filter assembly plugged.	Remove and clean or replace.
	Pilot regulator contaminated with oil, water or dirt.	Remove, replace or clean. Check all parts for wear.
	Air blowing from inside of balancer.	Piston leaking - install new piston. Clean and lubricate cylinder bore.
	Leakage in control line.	Replace hose, fittings as require.
	Air leaking around end bolt.	Replace seal (10061) and tighten end bolt to 100 ft. lb. (13.83 kg/m).
	Air leaking around O.D. of end cap.	Replace 'O' Ring (15020).
	Thrust bearing, worn or tight. Will not rotate.	Remove ball screw and reel assembly. Replace or free up bearing as required. Lubricate with #10886.
	Reel and nut assembly do not turn.	Check for rust, dirt, wear, or the lack of lubrication. Clean and lubricate as required.

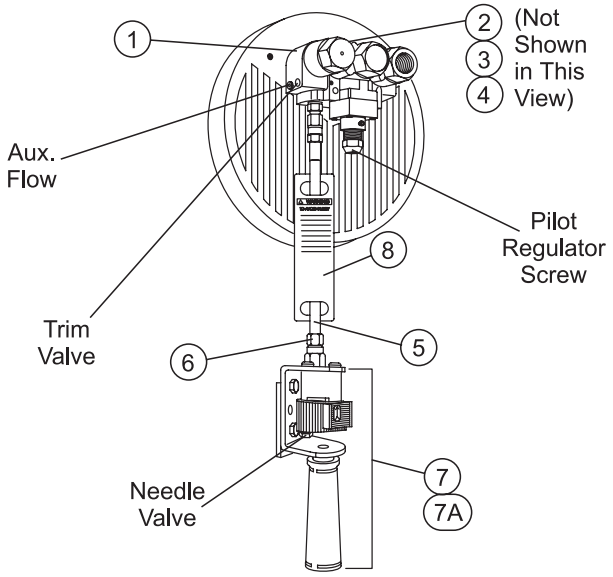
Series BA Z-Servo Troubleshooting Guide Continued

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Balancer will not balance or lower the load.	Air supply check valve holding.	Low air pressure - adjust to 70 psi (4.8 bar), minimum and 100 psi (6.9 bar) maximum.
	Excessive air flow through trim valve.	Close trim valve (clockwise) slowly until load floats down.
	Air does not bleed from control line fitting at port “A” of regulator.	Auxiliary flow control valve closed.
	Foreign matter in fittings at regulator or Z-Servo.	Remove and check for blockage.
	Control line pinched or has air flow restriction.	Make sure control line is unobstructed so air can flow.
Erratic operation.	Z-Servo not adjusted properly at adjustment ring.	Adjust - tighten adjusting nut (10620).
	Worn seal on Z-Servo.	Replace seal.
	Worn ‘O’ Ring on Z-Servo.	Replace ‘O’ Ring.
	Damaged regulator.	Replace regulator - return to shop for repair.
	Fluctuating air supply pressure.	Install pressure regulator in supply line. Set at 70 psi (4.8 bar) minimum. Do not exceed 100 psi (6.9 bar).
	Air contaminated with water, oil, dirt, etc.	Install 5 micron self-straining type filter.
	Trim valve not open enough.	Rotate trim valve counterclockwise in 1/4 turn increments until operation is smooth.
	Damaged regulator.	Replace regulator repair as necessary. Refer to EA Regulator disassembly.
Load hard to pull down.	Z-Servo adjustment ring too tight.	Loosen ring until air flow is evident.
	Trim valve open too much.	Rotate trim valve clockwise in 1/4 turn increments until load is easy to pull down.
	Wire rope does not have enough slack - holding Z-Servo closed.	Perform Z-Servo removal. Loosen bottom wire rope clamp and pull wire rope up. Retighten clamp.
	Auxiliary flow control valve closed too much.	Rotate auxiliary flow control counterclockwise in 1/4 turn increment until load is easy to pull down.

Series EA Balancer

CAUTION

• The auxiliary flow valve is fully open when 1/8 in. (3.2 mm) of screw head protrudes from regulator body. Do not open beyond this point.



(Dwg. MHP1911)

Item No.	Description of Part	Qty. Total	Part Number
1	Integral Regulator Series EA	1	15601
2	Mounting Screw	2	15781
3	Mounting Screw	2	15782
4	Lockwasher	4	15785
5	Control Hose, Black	10	10249
6	Fitting, Swivel	2	10261
7	Safety EA Control Handle Assembly	1	ZHS01810
7A	Optional EA Control Handle Assembly	2	ZHS01800
8	Warning Tag (do not remove)	1	10445

Series EA Regulator Installation

Refer to Dwg. MHP1911 on page 17.
Place balancer on a clean, sturdy work surface with end cap upright. Pull out load wire rope until reel bottoms out. Remove EA control kit from package. Check to ensure that 'O' Ring is in port on back of regulator (1). Install regulator on end cap with four mounting screws and lockwashers (2, 3 and 4). Connect control hose to port A on regulator and port on control handle.

Operational Adjustments

WARNING

• Prior to performing operational adjustments or servicing make sure air supply is off.
• Balancer may not support weight of empty handling device, or may raise device at a potentially hazardous rate. Extreme care must be used until control adjustments are complete.

NOTICE

• A minimum of 70 psi (4.8 bar) is required to operate the regulator. Do not use an air line lubricator.

EA Basic

1. Install regulator to balancer.

CAUTION

• Auxiliary flow valve is fully open when 1/8 in. (3.2 mm) of screw head protrudes from regulator body. Do not open beyond this point.

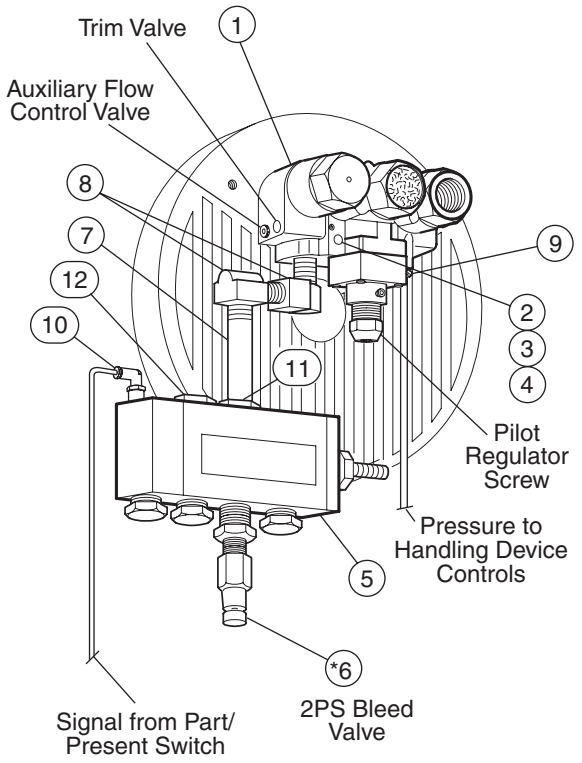
2. Install EA pendant to "A" port of regulator.
3. Rotate control handle to HI-LOAD position.
4. Rotate regulator adjustment knob counterclockwise until 1/2 inch (13 mm) of thread is visible.
5. Rotate trim valve clockwise until snug, then counterclockwise 2 full turns.
6. Rotate auxiliary flow valve clockwise until snug.
7. Turn on main air supply. Adjust regulator to required air pressure.
8. Rotate adjustment knob clockwise **slowly** until the wire rope begins to raise, move to the full up position, ensure Z-brake does not engage.
9. Install load hook and tooling or handling device to wire rope in the required position. Refer to "Lash-up" instructions on page 25.
10. Rotate both LO-LOAD and UN-LOAD flow controls clockwise until snug.
11. Apply the heaviest load to the tooling or handling device.
12. Rotate auxiliary flow valve clockwise until snug, then counterclockwise until 1/8 inch (3.2 mm) of screw head protrudes from side of regulator body.
13. Rotate regulator adjustment knob clockwise until load is balanced.
14. Lift and lower load several times. Equal effort should be required to raise and lower load. If load is hard to pull down turn trim valve clockwise 1/2 turn and check. If load is hard to raise turn trim valve counterclockwise 1/2 turn and check.
15. Rotate pendant to LO-LOAD position.
16. Slowly rotate LO-LOAD flow control counterclockwise until load drifts to the floor or full down position. The wire rope should go slack.
17. Remove heaviest load from tooling or handling device.
18. Apply medium weight load to tooling or handling device.
19. Rotate LO-LOAD flow control clockwise until load is balanced.
20. Tighten jam nut to maintain proper setting.
21. Lift load to full up position.
22. Rotate pendant to UN-LOAD position.

23. Slowly rotate UN-LOAD flow control counterclockwise until load drifts to the floor or full down position. Allow wire rope to go slack.
24. Remove medium weight load from tooling or handling device.
25. Rotate UN-LOAD flow control clockwise until tooling or handling device is balanced.
26. Maneuver tooling or handling device to heaviest load and engage load.
27. Rotate pendant to HI-LOAD position.
28. The load should be in balance.
29. Set down the heaviest load and rotate pendant to UN-LOAD position.
30. Maneuver tooling or handling device to medium weight load and engage load.
31. Rotate pendant to LO-LOAD position.
32. The load should be in balance.
33. Set down medium load and rotate pendant to UN-LOAD position.

NOTICE

• If, for any reason, the pilot regulator must be readjusted, the needle valves will have to be adjusted also.

EA 2PS



(Dwg. MHP1915)

Item No.	Description of Part	Qty. Total	Part Number
1	Integral Regulator-Series EA	1	15601
2	Mounting Screw	2	15781
3	Mounting Screw	2	15782
4	Lock Washer	4	15785
5	Two Position Vacuum Sensor	1	99075
	Two Position Pressure Sensor		99080
* 6	Bleed Valve	1	13419
7	Fitting, Nipple	1	10730
8	Fitting, Elbow	2	01973
9	Fitting, Tube	1	93965
10	Fitting, Elbow	1	93969
11	Fitting, Reducer Bushing	1	13501
12	Pipe Plug	3	13835

* Included in Two Position Sensor

WARNING

• The balancer may not support the weight of the empty handling device, or may raise device at a potentially hazardous rate. Extreme care must be used until control adjustments are complete.

Refer to Dwg. MHP1915 on page 18.

1. Install regulator and 2PS valve to balancer.
2. Rotate regulator adjustment knob counterclockwise until 1/2 inch (13 mm) of thread is visible.
3. Rotate trim valve clockwise until snug, then counterclockwise 2 full turns.
4. Rotate auxiliary flow valve clockwise until snug, then counterclockwise until 1/8 inch (3.2 mm) of screw head protrudes from side of regulator body.
5. Rotate 2PS-flow control clockwise until snug, then counterclockwise 1 turn.
6. Ensure tube is connected at the 2PS valve and handling device.
7. Turn on main air supply. Adjust regulator to required air pressure.
8. Rotate adjustment knob clockwise **slowly** until wire rope begins to raise, move to the full up position, ensure the Z-brake does not engage.
9. Install load hook and tooling or handling device to wire rope in required position. Refer to “Lash- up” instructions on page 25.
10. Engage load with tooling or handling device.
11. Rotate regulator adjustment knob clockwise until load is balanced.
12. Lift and lower load several times. Equal effort should be required to raise and lower load. If load is hard to pull down turn trim valve clockwise 1/2 turn and check. If load is hard to raise turn trim valve counterclockwise 1/2 turn and check.
13. Lower part to set down position. Rotate 2PS-flow control counterclockwise one full turn. Tooling or handling device may raise or lower unexpectedly when part is released. Ensure you are clear of the vertical path at all times during adjustments.

14. Release part from tooling or handling device. Rotate 2PS-flow control counterclockwise if tooling or handling device raises or counterclockwise if it lowers until tooling or handling device is balanced.
15. Lift and lower load several times. Equal effort should be required to raise and lower load. If load is hard to pull down, turn 2PS-flow control counterclockwise 1/2 turn and check. If load is hard to raise turn trim valve clockwise 1/2 turn and check.
16. Engage and disengage the part checking the balance condition of both the loaded and unloaded tooling or handling device.

Removal From Balancer

Refer to Dwg. MHP1911 on page 17.

1. Place suitable stand or platform under suspended load. Stand or platform should be high enough for load to rest on when balancer is at bottom of its travel.
2. Slowly turn pilot regulator screw counterclockwise. This will release tension on wire rope for load removal.
3. Turn off air supply.
4. Disconnect control hose (5) from EA Handle. Refer to page 22 to repair EA regulator.

Disassembly

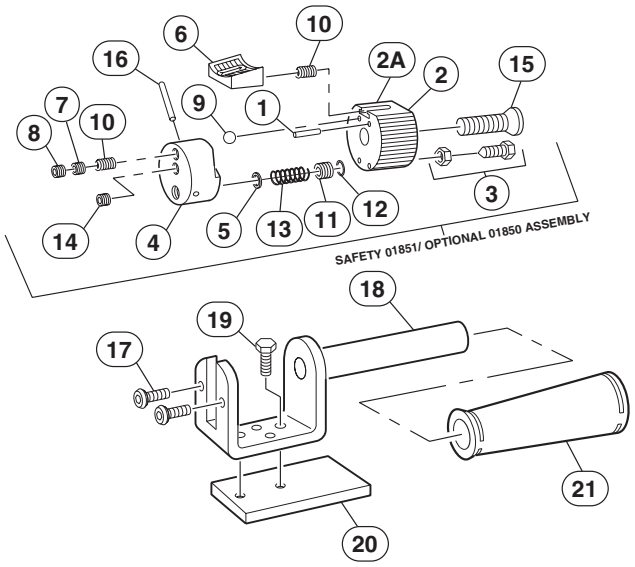
Refer to Dwg. MHP1912 on page 19.

CAUTION

• Use of replacement parts other than genuine Ingersoll-Rand original parts could result in damage to the balancer and void the warranty.

1. Remove two screws (17). Remove rotor control valve assembly (01851) or (01850) from bracket (18).
2. Drive out spring pin (16).
3. Remove screw (15), be cautious these are spring loaded parts.
4. Remove and replace any worn or broken parts in rotor valve (2) or (2A).
5. Remove floating seal assembly (11), spring (13), ball detent (9) and spring (10).
6. Inspect seal (11) and 'O' Ring (12) for wear. The face of the seal should be smooth. If it is not, polish seal on crocus cloth. 'O' Ring (12) must be free of nicks and cuts. Replace all worn parts.
7. Remove and inspect two needle valves (3) for damage to their tapered tips. Replace damaged valves.

Series EA Control Handle



(Dwg. MHP1912)

Item No.	Description of Part	Qty. Total	Part Number
---	Safety EA Control Handle Assembly	1	ZHS01810
---	Optional EA Control Handle Assembly (Incl's items 1 to 21)	1	ZHS01800
• 1	Spring Pin, Control Valve	1	1807
2	Valve Rotor, Optional EA	1	1862
2A	Valve Rotor, Safety EA	1	1863
• 3	Needle Valve Assembly	2	1838
4	Valve Body Option & Safety	1	1860
• 5	Brass Washer	1	1886
• 6	Thumb Well Locator	1	1804
7	Setscrew	1	1803
8	Setscrew	1	1834
• 9	Detent Ball	1	1805
• 10	Detent Spring	2	ZHS1806
• 11	Floating Seal	1	1880
• 12	'O' Ring	1	1882
• 13	Seal Spring	1	1884
14	Setscrew	1	1801
15	Flt. Hd. Screw	1	1817
• 16	Spring Pin	1	1814
17	Button Head Screw	2	10070
18	Handle Bracket	1	1840
19	Hex Head Screw	2	ZHS1833
20	Mounting Block	1	1826
21	Handle Grip	1	18447
•	Recommended Spare		

Recommended Spare Parts Available In Kit 01813 - EA Control Handle Repair Kit

Assembly

1. If pin (1) has been removed, reinstall it into 1/8 in. (3.2 mm) hole in the rotor (2) or (2A). Pin must protrude 3/32 in. (2.4 mm) above surface.
2. Install setscrew (7), spring (10) and ball detent (9) in small hole in valve body (4).
3. Insert washer (5), spring (13) and floating seal (11) with 'O' Ring (12) into large hole in valve body (4). Apply a small amount of lubricant to 'O' Ring (12).
4. For rotor (2A) only, insert spring (10) and locator (6) in slot in rotor valve. Locator should slide in and out freely. Apply small amount of light grease in slot if necessary.

NOTICE

• If new screw (15) is installed, it must be drilled to accept pin (16).

5. Insert screw (15) through rotor. Mate this assembly with valve body assembly. Tighten screw until hole in screw is aligned with hole in body.
6. Insert pin (16).
7. Thread two needle valves (3) into rotor body.
8. Adjust setscrew (7) to give proper detent feel to rotor.
9. Install and tighten setscrew (8).
10. Install and tighten setscrew (14).
11. Attach rotor control valve assembly (2) or (2A) to handle bracket (18).
12. Reinstall to control hose. Refer to EA Basic Installation on page 17.
13. Perform EA Basic Operational Adjustments.

Series EA Troubleshooting Guide

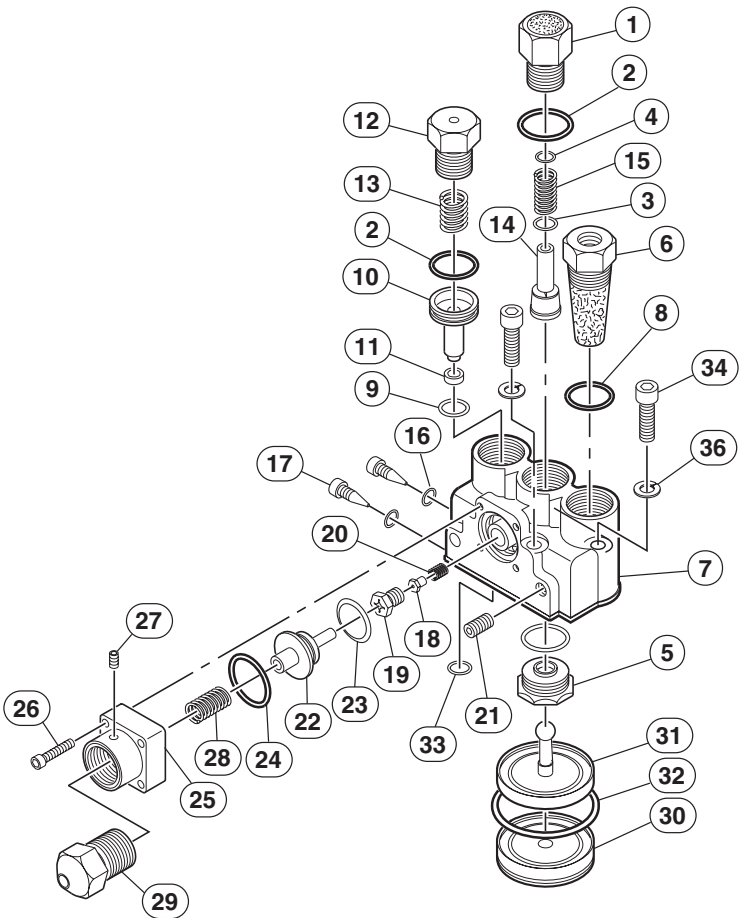
CAUTION

• Before doing any disassembly, lower load, turn control knob (counterclockwise) until wire rope is slack. Prior to performing additional adjustments or servicing make sure air supply is off.

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Balancer will not lift load. Control handle in hi-load position.	No air supply to balancer.	Turn on air. Set line regulator at maximum maintainable pressure not to exceed 100 psi (6.9 bar).
	Air supply check valve holding.	Low air pressure (should be 70 psi (4.8 bar) minimum).
	Pilot regulator pressure set low.	Adjust until load rises.
	Load over capacity of balancer.	Check weight of load including handling device. 100 psi (6.9 bar) is required to operate balancer at maximum capacity.
	Trim valve closed.	Adjust to manual specification. Refer to page 17.
	Filter assembly plugged.	Remove and clean or replace.
	Pilot regulator full of oil, water or dirt.	Remove, replace or clean. Check all parts for wear. Replace worn items.
	Air blowing from inside of balancer.	Piston leaking - install new piston. Clean and lubricate cylinder bore.
	Leakage in control line or handle.	Replace hose, fittings or handle parts as required.
	Air leaking around end cap bolt.	Replace seal (10061) and tighten end cap bolt to 100 ft. lb. (13.83 kg/m).
	Air leaking around outside diameter of end cap.	Replace 'O' Ring (15020) or (15520).
	Thrust bearing, worn or tight, will not rotate.	Remove ball screw and reel assembly. Replace or free up bearing as required. Lubricate with P/N 10886.
	Reel and ball nut assembly do not turn.	Check for rust, dirt, wear, or the lack of lubrication. Clean and lubricate as required.

Series EA Troubleshooting Guide Continued

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Balancer will not balance or lower the load. Control handle in lo-load position.	Lo-load needle valve closed.	Refer to EA Basic Operational Adjustments.
	Air supply check valve holding.	Low air pressure - should be 70 psi (4.8 bar), minimum.
	Excessive air flow through trim valve.	Close trim valve (clockwise) slowly.
	Air does not bleed from control line fitting at “A” port of EA regulator.	Refer to EA Basic Operational Adjustments, Trim Valve and Auxiliary Flow Valve Settings.
	Control line pinched or has air flow restriction.	Make sure control line is unobstructed so air can flow.
	Foreign matter in fittings at EA regulator, handle, or bleed parts in handle.	Make sure air passages are open for air flow.
Balancer will not un-load. Control handle in un-load position.	Air supply check valve holding.	Check for sufficient air supply pressure, 70 psi (4.8 bar) minimum.
	Un-load needle valve closed.	Open needle valve slowly.
	Excessive air flow through trim valve.	Close trim valve (clockwise) slowly until empty hook is balanced.
	Foreign matter in fittings at EA regulator, handle, or bleed parts in handle.	Make sure air passages are open for air flow.
Erratic Operation	Fluctuating air supply pressure.	Install pressure regulator in supply line. Set at low end of pressure fluctuation. Do not exceed 100 psi (6.9 bar).
	Air contaminated with water, oil, dirt, etc.	Install 5 micron self-draining type filters.
	Damaged EA regulator.	Replace regulator or repair as necessary. Refer to EA Regulator disassembly, on page 22.



(Dwg. MHP1914)

Item No.	Description of Part	Qty. Total	Part Number
1	Guide Assembly - EA Regulator	1	15692
• 2	'O' Ring	3	15750
• 3	'O' Ring	1	15754
• 4	'O' Ring	1	15755
5	Valve Seat - EA Regulator	1	ZHS15670
6	Intake Filter Assembly	1	13062
7	Body Assembly - EA Regulator	1	15605
• 8	'O' Ring	1	15758
• 9	'O' Ring	1	15759
10	Piston - EA Regulator	1	15730
• 11	Seal - Integral Check	1	15740
12	Plug - EA Regulator	1	15710
13	Spring - EA Regulator	1	15720
• 14	Valve Stem - EA Regulator	1	15680
15	Stem Spring - EA Regulator	1	15700
• 16	'O' Ring	2	15748
17	Needle Valve - EA Regulator	2	15760
• 18	Valve Assembly	1	15802
• 19	Valve Seat	1	15803

Item No.	Description of Part	Qty. Total	Part Number
• 20	Valve Spring	1	15804
21	Pipe Plug	1	ZHS13500
• 22	Pilot Piston Assembly	1	15800
• 23	U-Cup Seal	1	15801
• 24	'O' Ring	1	15757
25	Pilot Bonnet - EA Regulator	1	15821
26	Self Tap Screw	4	15777
27	Set Screw	1	10619
28	Pilot Spring	1	15810
29	Regulator Screw Assy. - EA Reg.	1	15841
30	Bonnet - EA Regulator	1	15620
• 31	Main Diaphragm Assy - EA Reg.	1	15630
• 32	'O' Ring	1	15752
• 33	'O' Ring	1	15751
34	Screw	2	15782
35	Screw	2	15781
36	Lockwasher	4	15785
•	Recommended Spare		

Recommended Spare Parts Available In Kit 15900 - EA Regulator Repair Kit

Removal From Balancer

1. Place suitable stand or platform under suspended load. Stand or platform should be high enough for load to rest on when balancer is at bottom of its travel.
2. Slowly turn pilot regulator screw counterclockwise until wire rope is slack. Remove load from hook.
3. Turn off air supply.
4. Disconnect all hose connections from EA regulator.
5. Remove mounting screws.

Disassembly

Refer to Dwg. MHP1914 on page 22.

CAUTION

• Use of replacement parts other than genuine Ingersoll-Rand original parts could result in damage to the balancer and void the warranty.

1. Remove filter assembly (6). Check for dirt or loose filter media.
2. Remove check valve assembly by removing plug (12) and pushing piston (10) out from opposite side with a blunt punch. Assembly consists of the hexagon plug (12), spring (13) and piston (10), 'O' Rings (2), (9) and seal (11). Inspect check valve 'O' Ring (2), seal (11), and piston 'O' Ring (9) for wear.
3. Remove guide assembly (1). This consists of three different size 'O' Rings (2), (3) and (4), a valve stem (14) and spring (15). Two 'O' Rings (2) are located inside guide assembly. Check 'O' Rings and valve stem for wear. Check inside valve for possible clogging of small pressure balance hole.
4. To remove bonnet (30) and diaphragm (31), push on brass ball, visible through hole in valve seat (5), with an instrument softer than brass.
5. Check rubber diaphragm for cracks or cuts. Replace it if necessary. Make sure brass ball pin is free to rotate.

NOTICE

• Brass ball pin must not have end play. If end play is found, adjust setscrew on opposite side of diaphragm. Apply a light coat of thread-locking compound to prevent screw from turning. End play in pin will cause slow exhaust or erratic operation.

6. Remove four screws (26) from pilot regulator bonnet (25).
7. Remove pilot piston assembly (22). Check U-cup (23) and 'O' Ring (24) for wear.
8. Check opening in brass tube of piston assembly (22) to make sure it is clear.
9. To inspect valve assembly (18), valve seat (19) and spring (20), remove seat with a #2 Phillips screwdriver or 3/8 in. (10 mm) socket wrench. Check rubber insert on valve (18) for wear. Replace if necessary.
10. Remove trim valve (17) and 'O' Ring (16). Check 'O' Ring for wear and trim valve tip for possible damage.
11. Remove auxiliary flow control valve (17) and 'O' Ring (16). Check 'O' Ring for wear and valve tip for possible damage.
12. Clean regulator body (7) and components thoroughly. Replace all worn parts.

NOTICE

• If more than 2 or 3 items require replacement, it is generally advisable to thoroughly clean regulator and install a P/N 15900 repair kit.

Assembly

1. Apply a very light coat of lubricant (10886) to all 'O' Rings during reassembly.
2. Install auxiliary flow control valve (17) and 'O' Ring (16). Turn until head of valve protrudes 1/16 in. to 1/8 in. (1.6 to 3.2 mm) from regulator body.
3. Install trim valve (17) and 'O' Ring (16). Turn clockwise until closed.
4. Install pilot regulator components. Insert spring (20) into hole. Position valve (18) in place. Make sure rubber insert of valve faces away from spring.
5. Insert valve seat (19) and carefully tighten.
6. Insert 'O' Rings (4) and (3) into guide. Apply a light coat of lubricant (10886) on outside diameter of valve stem (14). Slide spring (15) over small end of valve stem. Insert this assembly into guide assembly (1). Place completed guide and valve assembly into center hole of regulator body (7) and tighten.
7. Insert filter assembly (6) into hole above port B and tighten.
8. Insert stem of check valve assembly (10) seal end first into hole above port A. Insert spring (13) and hexagon plug (12).
9. Place 'O' Ring (24) into groove in regulator body between ports A and B. Insert spring (28) into regulator screw (29). Lubricate U-cup (23) with lubricant (10886). Insert it with piston assembly (22) into pilot regulator bonnet (25). Make sure brass stem goes through center of valve seat (19).
10. Insert and tighten four screws (26). This completes the pilot regulator assembly.
11. Connect air supply to regulator and turn on.
12. Check pilot regulator operation by turning regulator screw (29) clockwise until air pressure flows through small hole located on back of regulator body, at edge of bonnet (30) opening.

NOTICE

• After checking for air flow, turn adjustment knob counterclockwise until air flow stops. Disconnect air supply.

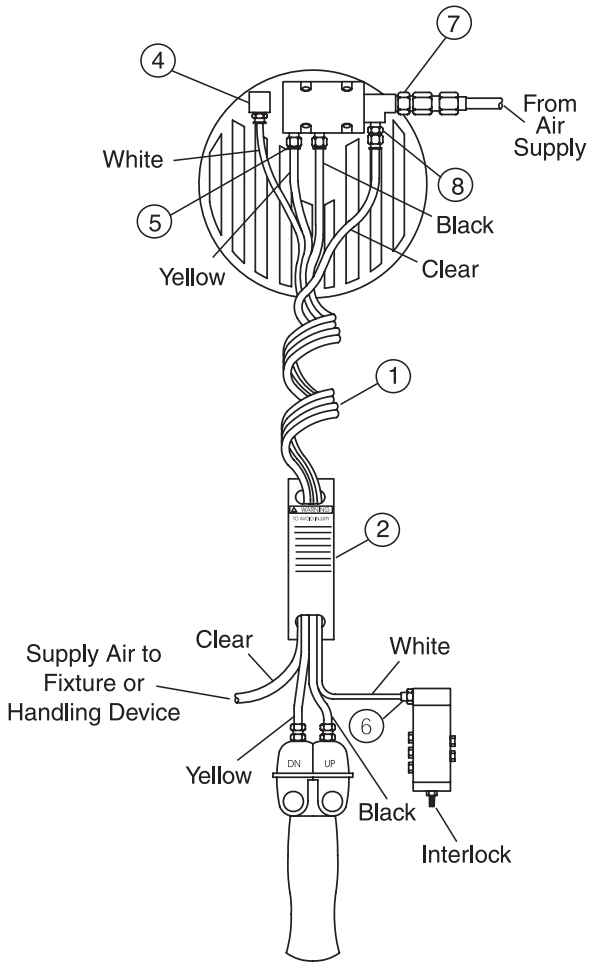
13. Insert diaphragm assembly (31), bonnet (30) and 'O' Ring (33).

(Dwg. MHP1920)

INTERLOCK ADJUSTMENTS

Refer to Dwg. MHP1920 on page 24.

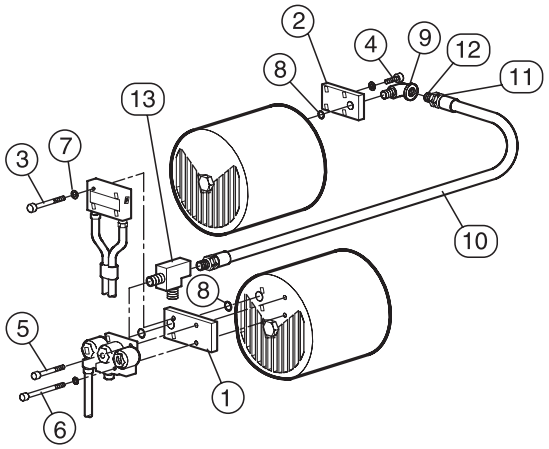
1. Raise handling device/fixture to a mid travel position, so balancer is supporting the entire weight. The Interlock screw threads into the aluminum housing that will rotate with the screw. Hold aluminum housing while turning the screw.
2. Turn screw counterclockwise until Interlock light illuminates (green light) or until 1-1/2 inch (38 mm) of thread is visible.
3. Depress and release (repeatedly) the clamp/vacuum release button while rotating Interlock screw clockwise until clamp opens or blow off air is heard at vacuum cups or Interlock indicator extinguishes.
4. Raise and lower handling device/fixture several times. Check for proper operation of clamp and vacuum controls.
5. Raise handling device/fixture to the full up position.
6. Depress and hold up lever of the "ZA" control for three seconds. This will simulate an additional load on the balancer.
7. Depress and release clamp/vacuum release button. Clamp should remain closed or not blow off air to vacuum cups.
8. Check that Interlock indicator has illuminated (green light).
9. Lower handling device/fixture and engage a part with the end effector.
10. Raise load 1 inch (26 mm) above pick up point.
11. Depress and release clamp/vacuum release button. Part should remain attached to end effector.
12. Lower handling device/fixture and release part at the pick up point.
13. Hold aluminum housing and tighten jam nut on Interlock screw to prevent setting from changing.



(Dwg. MHP1920)

Item No.	Description of Part	Qty. Total	Part Number
---	Quad-Coil Hose Assembly with Fittings	1	*10813
1	Quad Coil Hose	1	93949
2	Warning Tag (do not remove)	1	10445
3	Interlock	1	99064
4	Push on Elbow Fitting, 5/32 tube	1	93970
5	Push on Fitting, 3/8 tube	5	93947
6	Push on Fitting, 5/32 tube	1	93963
7	Street Tee, 3/8 NPT	1	10708
8	Reducer Bushing	1	13503

TANDEM CONTROL BALANCER



(Dwg. MHP1923)

Item No.	Description of Part	Qty. Total	Part Number
1	Master Tandem Manifold Assembly (includes item 8)	1	10549780
2	Slave Tandem Manifold Assembly (includes item 8)	1	10549814
3	Mounting Screw	4	15778
4	Mounting Screw	4	15779
5	Mounting Screw	2	15786
6	Mounting Screw	2	15787
7	Lockwasher	8	15785
8	'O' Ring	2	15751
9	Street Elbow 90°	3	10375
10	Black Control Hose	2.5 ft.	10555-B
11	Swivel-F Hose Fitting	2	10560
12	Male Adapter	2	10565
13	Street Tee Used with Zimmerman Interlock	1	1964

Tandem Control Installation

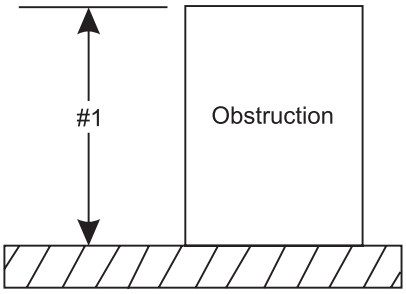
1. Install master manifold (1) behind EA, ZA or BA control kit. Refer to Dwg. MHP1923 on page 25.
2. Install slave manifold (2) to 2nd balancer.
3. Install tandem hose assembly (10) between master (1) and slave (2) manifolds as shown in Dwg. MHP1923 on page 25.

LOAD HOOKS, LASH-UP AND YARDING

Lash-Up

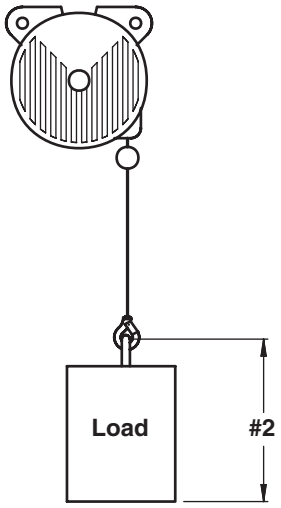
To properly install load hook to wire rope you must determine the following:

1. Highest point which load must clear from floor. Refer Dwg. MHP1358 on page 25.
2. Distance from hook throat to bottom of load. Refer Dwg. MHP1924 on page 25.
3. Add number 1 dimension to number 2 dimension, then add 3-1/2 in. (89 mm).
4. Measuring from the floor with the wire rope fully retracted, install hook using the dimension from number 3 to the floor.



(Dwg. MHP1358)

5. Verify coverage is correct. Use wire cutter part number 01942 to remove excess wire rope.



(Dwg. MHP1924)

CAUTION

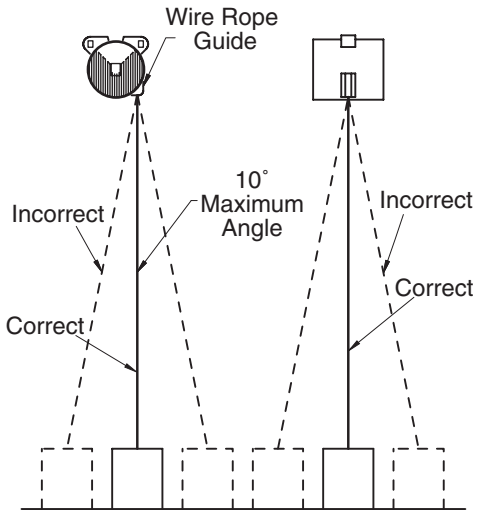
• Do not operate balancer if load is not centered under wire rope. Yarding of the wire rope will cause premature wire rope failure and undue wear of internal balancer parts and may void warranty.

• Do not continuously rotate balancer in one direction. Air line damage will occur from continuous rotation potentially allowing the load to lower. Reverse direction with each cycle of the balancer to prevent twisting and damage to air lines.

Yarding

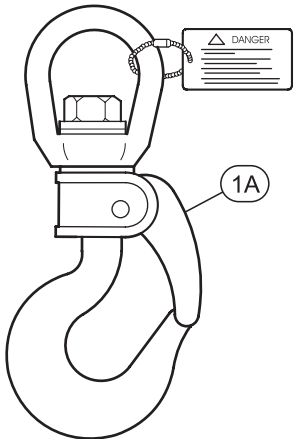
Wire rope should not be yarded more than 10 degrees from vertical center line of wire rope guide.
Excessive Yarding will cause increased wear on balancer and decrease working life of components.

Wire Rope Guide



(Dwg. MHP1925)

Hook Assembly



(Dwg. MHP1926)

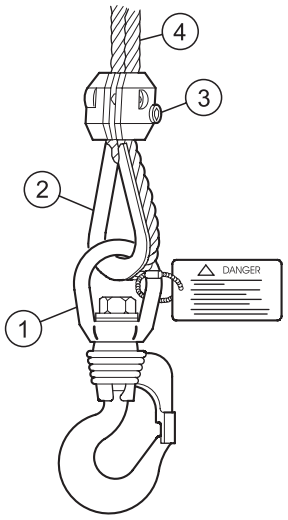
Item No.	Description of Part	Qty. Total	Part Number
1	Hook Assy., Spring Lock	1	10223
1A	Hook Assy., Pin Lock	1	10227
2	Thimble	1	10210
3	Clamp	1	10237
4	Wire Rope, 30 ft. length	1	10084-30

Spread and insert thimble (2) to clamp loop. Thread wire rope around thimble.

NOTICE

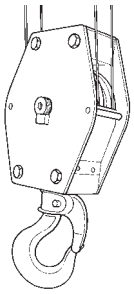
• Allow at least 1 in. (26 mm) of excess wire rope and cap end of wire rope. Join live wire rope strand to excess and install clamp as shown in Dwg. MHP1362 on page 26.

Wire Rope to Hook Assembly

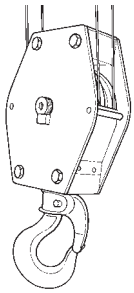


(Dwg. MHP1362)

LOAD BLOCKS



(Dwg. MHP1363)



(Dwg. MHP1364)

Load Block Installation

1. Thread wire rope through and around pulley(s) in Load Block.
2. Bring excess wire rope back up to bottom eye pad of balancer.
3. Install thimble on eye pad.
4. Loop wire rope around thimble.
5. Tighten wire rope and install clamps.

⚠ CAUTION

• Balancers using load blocks should not have ball stops on wire rope.

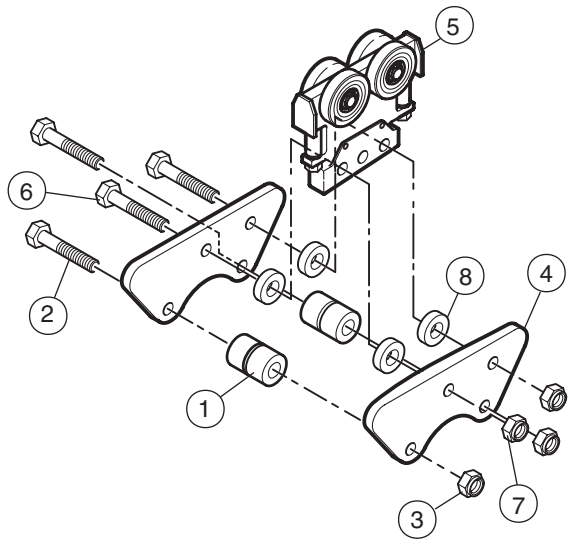
SUSPENSION KITS

⚠ WARNING

• Severe injury and/or property damage can occur if suspension kit is not installed correctly, or if installed on a rail flange other than specified. Rail stops must not contact balancer housing.

Part Number	Balancer Suspension Kit	Refer To Dwg:	Page No.
16300	ZRS2/3 Small Balancer	MHP1931	29
16305	ZRA1 Small Balancer	MHP1927	27
16307	ZRV2 Small Balancer		
16310	ZRA2 Small Balancer	MHP1931	29
16315	KBK II Small Balancer		
16320	T-Rail Small Balancer	MHP1928	28
16325	KBK I Small Balancer	MHP1932	30
16344	ETA4 Small Balancer	MHP1927	27
16345	ETA 8 Small Balancer	MHP1931	29
16355	ZRAT Small Balancer	MHP1927	27
16360	Hook Mount Small Balancer	MHP1930	28
16380	Opt. Small Balancer	MHP1931	29
16400	ZRS2/3 Large Balancer		
16405	ZRA1 Large Balancer	MHP1929	28
16407	ZRV2 Large Balancer		
16410	ZRA2 Large Balancer	MHP1931	29
16415	KBK II Large Balancer		
16420	T-Rail Large Balancer	MHP1928	28
16425	KBK I Large Balancer	MHP1932	30
16444	ETA4 Large Balancer	MHP1929	28
16445	ETA8 Large Balancer	MHP1931	29
16455	ZRAT Large Balancer	MHP1929	28
16460	Hook Mount Large Balancer	MHP1930	28
16480	Opt. Mount Large Balancer	MHP1931	29

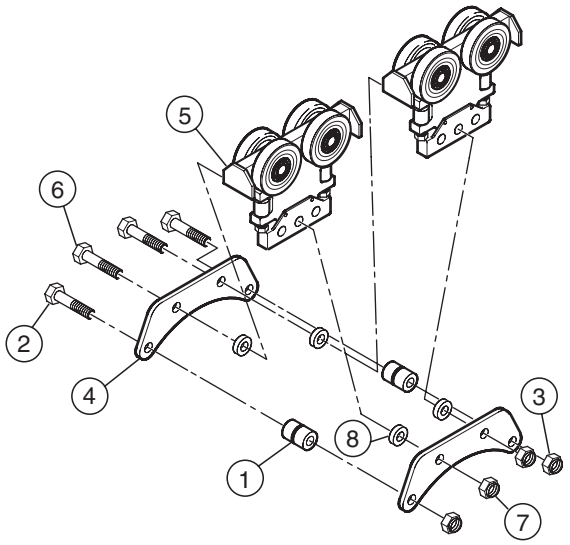
Small Balancer Suspension Kits



(Dwg. MHP1927)

Item No.	Description of Part	Qty. Total	Part Number			
			16305 ZRA1	16355 ZRAT	16344 ETA4	16307 ZRV2
1	Bushing	2	17025			
2	Screw	2	17047			
3	Nut	2	17060			
4	Trolley Bracket	2	17125			
5	Trolley	1	30279	31056	30743	31525
6	Screw	2	ZHS72005			
7	Nut	2	75563			
8	Spacer	4	30073-500			

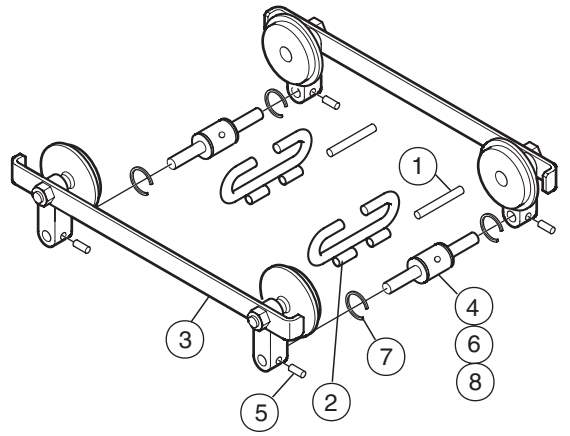
Large Balancer Suspension Kits



(Dwg. MHP1929)

Item No.	Description of Part	Qty. Total	Part Number			
			16405 ZRA1	16455 ZRAT	16444 ETA4	16407 ZRV2
1	Bushing	2	17025			
2	Screw	2	17047			
3	Nut	2	17060			
4	Trolley Bracket	2	17220			
5	Trolley	2	30279	31056	30743	31525
6	Screw	2	ZHS72005			
7	Nut	2	75563			
8	Spacer	4	30073-500			

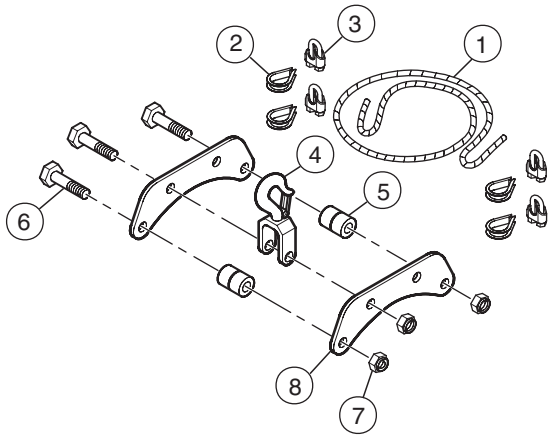
T-Rail Suspension Kits



(Dwg. MHP1928)

Item No.	Description of Part	Qty. Total	Part Number	Qty. Total	Part Number
			16320 T-Rail Small Balancer		16420 T-Rail Large Balancer
1	Spring Pin	1	01902	2	01902
2	Rail Safety	1	01925	2	01925
3	Trolley Half	2	16006	2	16013
4	Axle	2	16043	2	16043
5	Spring Pin	4	16060	4	16060
6	Bushing	2	17045	2	17045
7	Bushing Clip	4	ZHS17046	4	ZHS17046
8	Setscrew	2	ZHS70438	2	ZHS70438

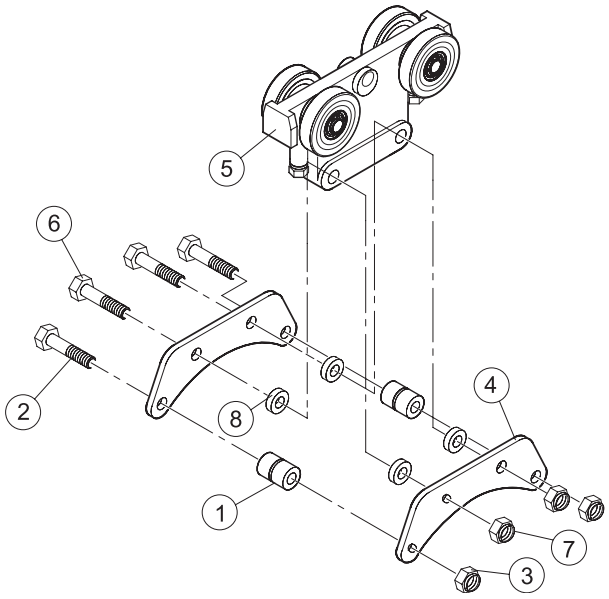
Hook Mount Suspension Kits



(Dwg. MHP1930)

Item No.	Description of Part	Qty. Total	Part Number	
			16360 Hook Mount Small Balancer	16460 Hook Mount Large Balancer
1	Safety Cable	3 ft.	10096-3	
2	Thimble	2	10210	
3	Clamp	4	10230	
4	Top Hook	1	17010	
5	Bushing	2	17025	
6	Screw	2	17047	
7	Nut	2	17060	
8	Bracket Top Hook	2	17505	17012

ZRS/ZRA2/KBKII and ETA8 Suspension Kits



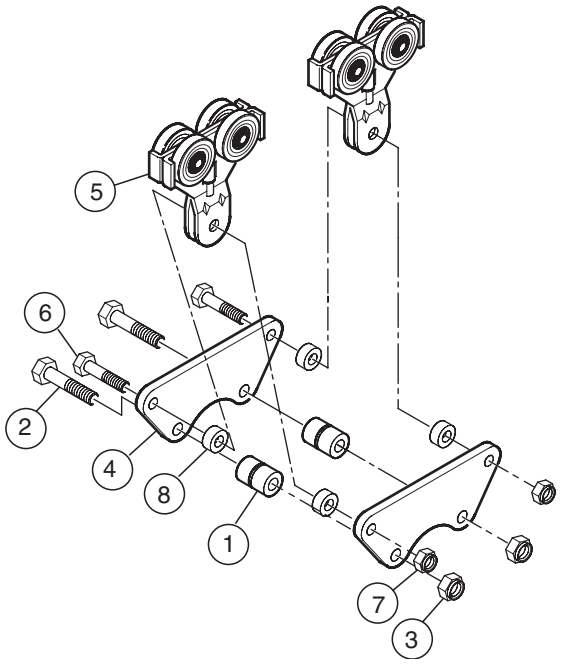
(Dwg. MHP2931)

Item No.	Description of Part	Qty. Total	Part Number			
			16300 ZRS2/3 Sm. Balancer	16310 ZRA2 Sm. Balancer	16315 KBKII Sm. Balancer	16345 ETA 8 Sm. Balancer
1	Bushing	2	17025			
2	Screw	2	17047			
3	Nut	2	17060			
4	Trolley Bracket	2	17110			
5	Trolley	1	ZHS30510	30015	30030	30929
6	Screw	2	72626			
7	Nut	2	75566			
8	Spacer	4	30073-312			

Item No.	Description of Part	Qty. Total	Part Number			
			16400 ZRS2/3 Lg. Balancer	16410 ZRA2 Lg. Balancer	16415 KBKII Lg. Balancer	16445 ETA 8 Lg. Balancer
1	Bushing	2	17025			
2	Screw	2	17047			
3	Nut	2	17060			
4	Trolley Bracket	2	17215			
5	Trolley	1	ZHS30510	30015	30030	30929
6	Screw	2	72626			
7	Nut	2	75566			
8	Spacer	4	30073-312			

Item No.	Description of Part	Qty. Total	Part Number	
			16380 - Opt. Sm. Balancer	16480 - Opt. Lg. Balancer
1	Bushing	2	17025	
2	Screw	2	17047	
3	Nut	2	17060	
4	Suspension Bracket	2	95488-S	95486-S

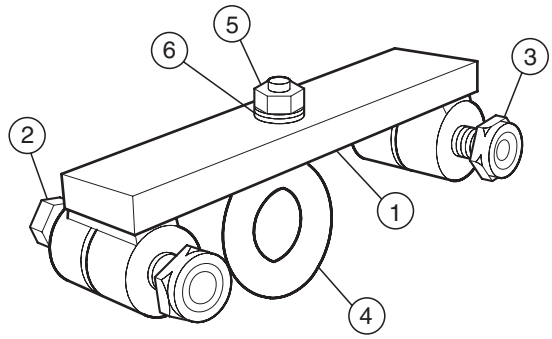
KBKI Suspension Kits

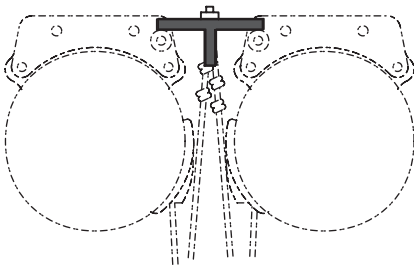


(Dwg. MHP2932)

Item No.	Description of Part	Qty. Total	Part Number	
			16325 - KBKI Small Balancer	16425 - KBKI Large Balancer
1	Bushing	2	17025	
2	Screw	2	17047	
3	Nut	2	17060	
4	Trolley Bracket	2	17120	17220
5	Trolley	2	ZHS30603	
6	Screw	2	ZHS72005	
7	Nut	2	75563	
8	Spacer	4	30073-594	

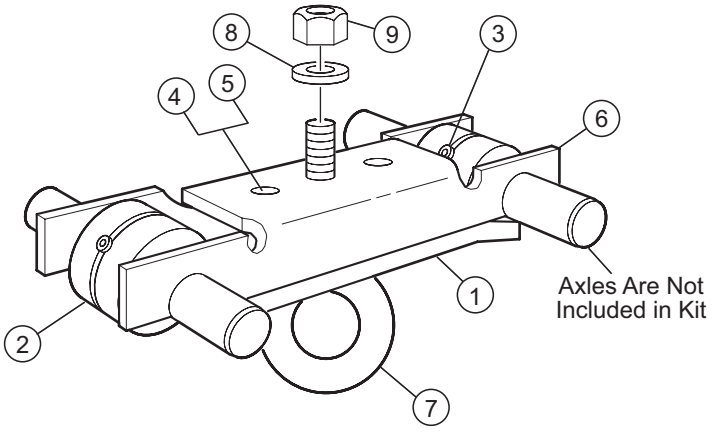
Tandem Tie Bar Kits

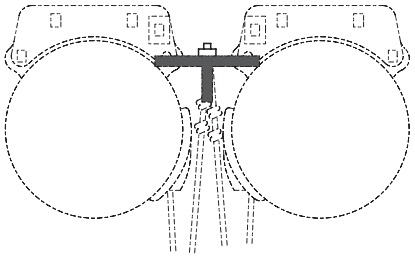




(Dwg. MHP1933)

Item No.	Description of Part	Qty. Total	Part Number
1	Tandem Tie-Bar	1	16200
2	Capscrew	2	17047
3	Locknut	2	17060
4	Tandem Reeve Eyebolt	1	16155
5	Nut	1	75512
6	Lockwasher	1	74513





(Dwg. MHP1934)

Item No.	Description of Part	Qty. Total	Part Number
1	Tie-Bar Clip	1	16047
2	Steel Axle Bushing	2	16052
3	Setscrew	2	16093
4	Socket Head Screw	2	16098
5	Lockwasher	2	16099
6	T-Rail Tie-Bar	1	16112
7	Tandem Reeve Eyebolt	1	16155
8	Lockwasher	1	74513
9	Nut	1	75512

CAUTION

• Clean, dry air must be used at all times when operating balancers.

Preventive Maintenance

Preventive maintenance recommendations are designed to prevent unexpected breakdowns and problems through periodic inspection and maintenance. Maintenance intervals should be based on frequency of usage and operating environment. Frequent usage, or dirty operating conditions require more frequent servicing. **A clean, dry air supply will help keep the equipment functioning properly.** Refer to "INSPECTION AND MAINTENANCE REPORT" on page 34. Using this report will aid in tracking component failures or faults. We recommend the use of this report as a preventive maintenance tool.

Wire Rope and Load Hooks

Wire rope, load hooks and clamps should be inspected on a daily basis. Time intervals should be based on the frequency of usage and in accordance with standard wire rope manufacturers specifications. Refer to "PREVENTIVE MAINTENANCE SCHEDULE" on page 33.

Wire Rope Inspection

1. Depress the down lever to lower the load to the bottom of balancer travel.
2. Use a gloved hand to carefully slide up the rope, if the glove snags on the wire rope refer to Preventive Maintenance Schedule.
3. Check entire length of rope up to the wire rope guide.
4. Replace wire rope if found faulty.

Load Hook Inspection

1. Top bail of hook swivels freely.
2. Tip of hook aligns with the self-closing gate.
3. No more than 10% wear is allowed at the base of the hook.
4. No more than 5% wear in all other areas.
5. Quic-Check® marks must align with a half-inch increment.

Balancer Lubrication

Basic Balancer: There are only 3 moving parts (ball nut, thrust bearing and piston) inside the balancer that require periodic cleaning and lubrication. Cleaning usually requires complete disassembly of the balancer and a thorough washing in a solution, such as mineral spirits.

NOTICE

• Special lubricants mentioned in the reassembly instructions are recommended for balancers and are available through Ingersoll-Rand.

Lubrication can be accomplished by partial disassembly of balancer while still on the overhead rail as follows:

1. On series EA and BA balancers, turn pilot regulator screw (counterclockwise) until wire rope is slack. On series ZA balancers, depress down lever until wire rope is slack.
2. Remove load from balancer.
3. Turn off air supply.
4. Remove wire rope guide, end cap and piston. Refer to Balancer Rebuild Disassembly steps 4 - 7 on page 35 for removal of end cap.
5. Using a paint brush (or a similar object) reach through the wire rope window in the housing and apply approximately a tablespoon of lubricant (10886) to ball screw.

NOTICE

• Lubricant (10885) must be used in 500 lb. (227 kg) Balancer.

6. Using a clean rag, wipe off piston, cylinder bore of housing and ball screw cap.
7. Apply lubricant (10885) to cylinder bore and outside diameter of ball screw cap. To reassemble refer to Balancer Rebuild Assembly steps 6 - 14 on page 40.
8. Attach control package to end cap. Turn on air.
9. Readjust balancer, per Control Operational Adjustments.

Air Supply

Be sure that air supply is free of rust, dirt, water and oil. Use of a good air filter and in line regulator is highly recommended. 100 psi (6.9 bar) is required to operate balancer at its maximum capacity. Lower pressure reduces balancer capacity accordingly. Do not use an air in-line oiler. Oil will damage balancer and controls.

Balancers Not in Regular Use

1. Balancers which have been idle for a period of one month or more, but less than one year, should be given an inspection conforming with the requirements of "Frequent Inspection" prior to being placed into service.
2. Balancers which have been idle for a period of more than one year should be given an inspection conforming with the requirements of "Periodic Inspection" prior to being placed into service.
3. Standby balancers should be inspected at least semiannually in accordance with the requirements of "Frequent Inspection." In abnormal operating conditions balancers should be inspected at shorter intervals.

PREVENTIVE MAINTENANCE SCHEDULE

Component	Inspection	Criteria for Operation	Daily (1st Operation of Shift)	Frequent (Less than 6 months/semiannual)	Periodic (More than 6 months/annual)
Wire Rope	Kinks	No visible kinks on entire length.	X	X	X
	Fraying	No visible fraying on entire length.	X	X	X
	Bird caging	No visible separations on entire length.	X	X	X
Clamps	Tightness	Clamps do not slide on wire rope. Clamps are tight.	X	X Torque check clamps at 7.5 ft. lbs (1.04 kg/m)	X Torque check clamps at 7.5 ft. lbs (1.04 kg/m)
	Cracks	No visible cracks.	X	X	X
Load Hook	Cracks	No visible cracks.	X		X
	Swivel	Smooth operation and free rotation.	X		X
	Hook Latch	Positive locking of latch	X		X
Reeve Block	Cracks	No visible cracks	X		X
	Swivel	Smooth operation and free rotation.	X		X
	Hook Latch	Positive locking of latch.	X		X
	Hardware	Center pulley bolt for full engagement.	X	X	X
	Pulley	Smooth operation when in motion.	X		X
Suspension Kit	Hardware	No loose or missing hardware.	X	X	X
	Trolley Body	Aluminum–no visible cracks. Steel–no visible broken welds.	X		X
	Trolley Wheels	Smooth operation with no binding.	X		X
	Hook Mount (Optional)	Positive locking of latch.	X		X
	Safety Cable (Optional)	No loose clamps. No damage or wear to wire rope.	X	X Torque check clamps at 4.3 ft. lbs (0.6 kg/m)	X Torque check clamps at 4.3 ft. lbs (0.6 kg/m)
Balancer	Smooth operation	No binding or resistance in motion.	X	X	X
	Lubrication	Piston and ball screw for grease.			X
	Wear	Internal parts for excessive wear. Refer to Balancer 'Cleaning and Inspection' section on page 37.			X
Controls	Fittings	No visible cracks, leaks or looseness	X		X
	Tubing	No visible bulges, cracks, kinks	X		X
	Handles	No visible cracks, leaks, looseness, or sticking of buttons	X		X
	Manifold/Regulator	No visible cracks, leaks or looseness of hardware	X		X
Z-Brake	Brake Rods	Secured and straight			X
	Bearing	Smooth rotation			X
	Brake Ring	No gouges-Burrs removed			X
	Brake Spring	Security. No deformation			X
Z-Stop	Engagement Pin	Fully engages plate-past notch in pin			X
	Engagement Plate	Secured to brake rods. Flat surface-no warping			X
	Housing	Secured to end cover. No air leakage			X
	Fittings	Secured. No air leakage			X

INSPECTION AND MAINTENANCE REPORT

Ingersoll-Rand Air Balancers

Model Number:					**Date:**
Serial Number:					**Inspected by:**
Reason for Inspection: (Check Applicable Box)					
	1. Scheduled Periodic Inspection (___ Monthly ___ Yearly)				**Operating Environment:** Normal ___ Heavy ___ Severe ___
	2. Discrepancy(s) noted during Frequent Inspection				
	3. Discrepancy(s) noted during maintenance				
	4. Other: _____				
Refer to the Parts, Operation and Maintenance Manual "INSPECTION" section for general inspection criteria. Also, refer to appropriate National Standards and Codes of practice. If in doubt about an existing condition contact the nearest **Ingersoll-Rand** Distributor or the factory for technical assistance.					
COMPONENT		**CONDITION**		**CORRECTIVE**		**NOTES**
		Pass	**Fail**	**Repair**	**Replace**	
Fasteners						
Shafts						
Bearings				- - -		
Spool						
Wire Rope Guide				- - -		
Cover						
Controls						
Hooks				- - -		
Top	Gate acts as gauge when visually inspecting for stretched, twisted or bent hooks.					
	Damage			- - -		
	Hook Crack Test Method Used: Dye Penetrant ____ Magnetic Particle ____ Other: _____					
Bottom	Gate acts as gauge when visually inspecting for stretched, twisted or bent hooks.					
	Damage			- - -		
	Hook Crack Test Method Used: Dye Penetrant ____ Magnetic Particle ____ Other: _____					
Hook Gate				- - -		
Wire Rope						
Working length(s) maximum stretch: _____ inches / _____ mm						
Support Structure						
Rail System						Refer to Rail System Manual
Labels and Tags				- - -		
Other Components (list in NOTES section)						

This page may be copied and used as an inspection / maintenance record.

Disassembly for 6.5 and 10 inch Balancers - All Series

WARNING

• Turn off air supply to balancer and be sure wire rope is slack before attempting any disassembly operations. Refer to (exploded view of balancers) Dwgs. MHP1962 - 1965 on pages 44 - 48 for your specific balancer.

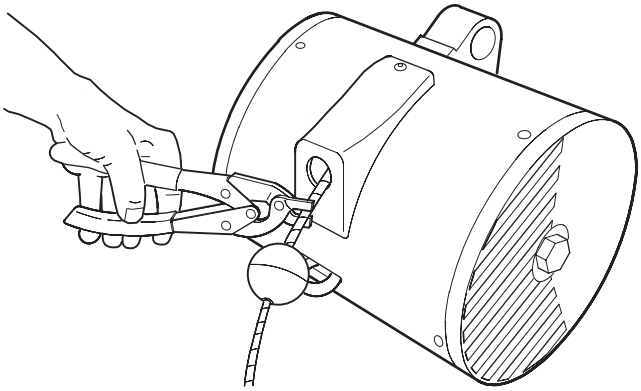
CAUTION

• Use of replacement parts other than genuine Ingersoll-Rand original parts could result in damage to the balancer and void the warranty.

NOTICE

• The balancer shown in the following instructions has 120 in. (305 cm) travel with all controls removed.

1. Place balancer on a bench or suitable clean work area.
2. Remove Z-Stop if installed. Refer to section "Z-STOP INSTALLATION AND TEST" on page 42.
3. Cut load wire rope above ball stop (if used). Refer to Dwg. MHP1935 on page 35.
4. Remove load hook and wire rope guide.
5. Loosen center bolt in end cap and end cover. Do not remove.



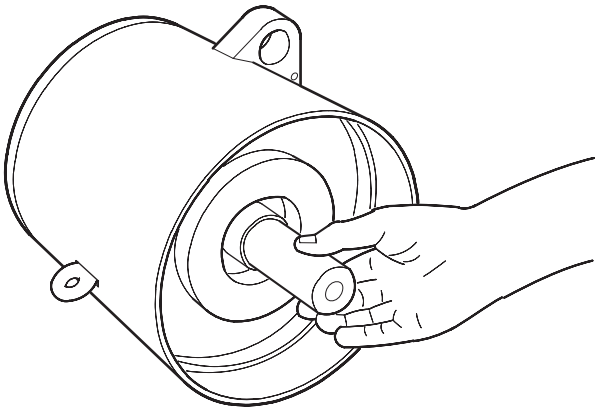
(Dwg. MHP1935)

6. Remove screws (if applicable) around outside diameter of end cap. Remove hex head bolt in center of end cap.
7. To remove end cap pull on wire rope. This will force piston against end cap and push end cap and piston out of housing.

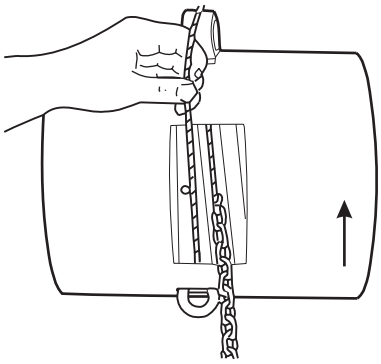
NOTICE

• DO NOT run reel off end of ball screw or ball bearings will drop out.
• Most balancers are equipped with thin metal shims inside the ball screw cap to assure an air tight fit of seal (10061). Do not lose shims.

8. Remove ball screw cap by slipping it off the ball screw. Refer to Dwg. MHP1936 on page 35.



(Dwg. MHP1936)

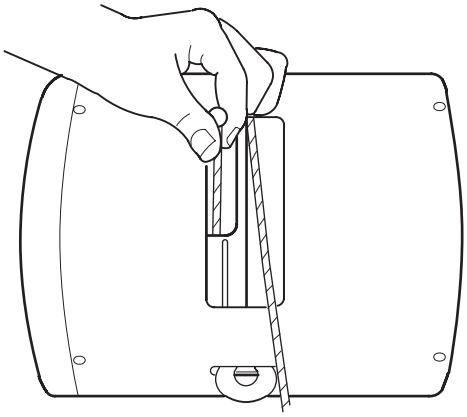


(Dwg. MHP1368)

NOTICE

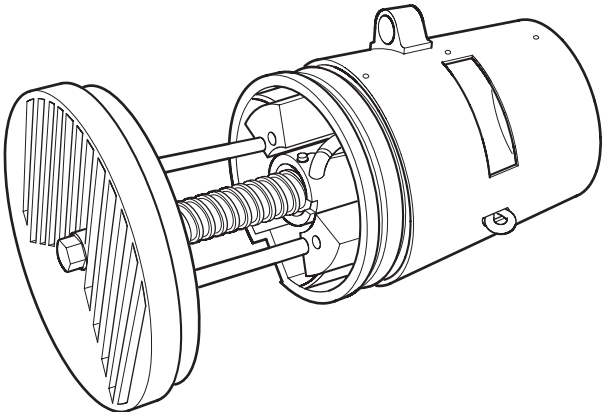
• Wire rope anchor hole in reel should be visible at this time. If not, rotate reel slightly, winding up wire rope, until hole is visible. Swaged fitting on the end of wire rope has a shank which fits into anchor hole. The fit should not be tight. If fit is tight, be careful not to damage reel assembly when removing wire rope. Refer to Dwg. MHP1368 on page 35 and Dwg. MHP1937 on page 36.

9. Push wire rope into balancer until swaged fitting is exposed. Pull on swaged fitting to remove wire rope. Refer to Dwg. MHP1938 on page 36.



(Dwg. MHP1937)

10. Remove all screws around outside diameter of end cover.
11. Remove end cover and ball screw-reel assembly by pushing on piston end of ball screw. Refer to Dwg. MHP1938 on page 36.

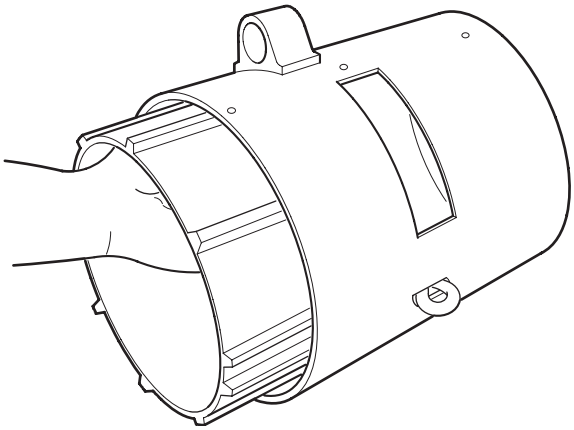


(Dwg. MHP1938)

NOTICE

• Use suitable marking pen to index ball screw notch with end cover spring pin to prevent misalignment of reel.

12. Remove end cover and brake from ball screw and reel assembly, by removing center bolt from end cover.



(Dwg. MHP1939)

13. If balancer has a housing liner, remove it at this time. Refer to Dwg. MHP1939 on page 36.

Disassembly of Ball Screw

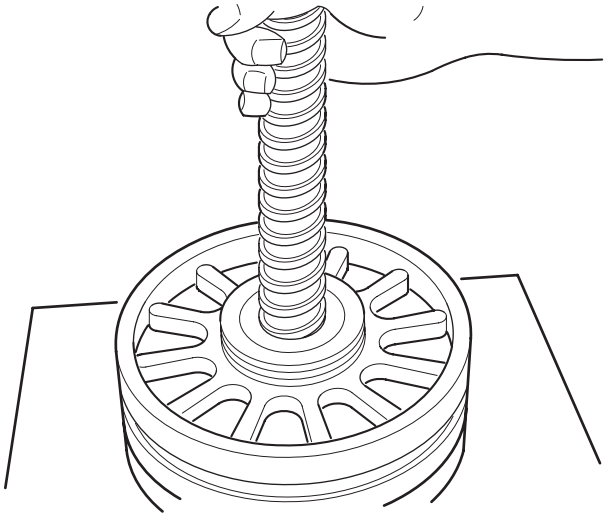
CAUTION

• Use of replacement parts other than genuine Ingersoll-Rand original parts could result in damage to the balancer and void the warranty.

NOTICE

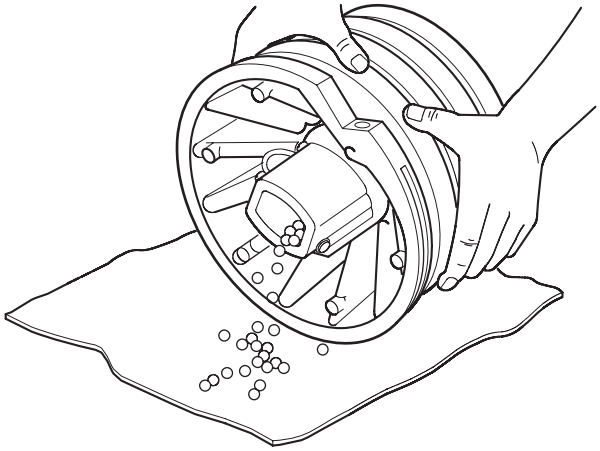
• If ball screw or ball nut do not show signs of excessive wear, disassembly of ball screw is not required.

1. Place ball screw and reel assembly on a shop towel, with thrust bearing facing upwards.



(Dwg. MHP1940)

2. Rotate ball screw counterclockwise, removing it from reel assembly. Refer to Dwg. MHP1940 on page 36.



(Dwg. MHP1941)

3. Grasp reel with both hands and gently lift up. Ball bearings will fall on shop towel. There are 64 ball bearings for models 150, 200 and 350. There are 84 ball bearings for model 500. Lightly tap reel to remove any remaining ball bearings. If all balls do not fall out, it may be necessary to insert a wire through the ball return tubes to push out any balls which may be lodged inside. Refer to Dwg. MHP1941 on page 36.

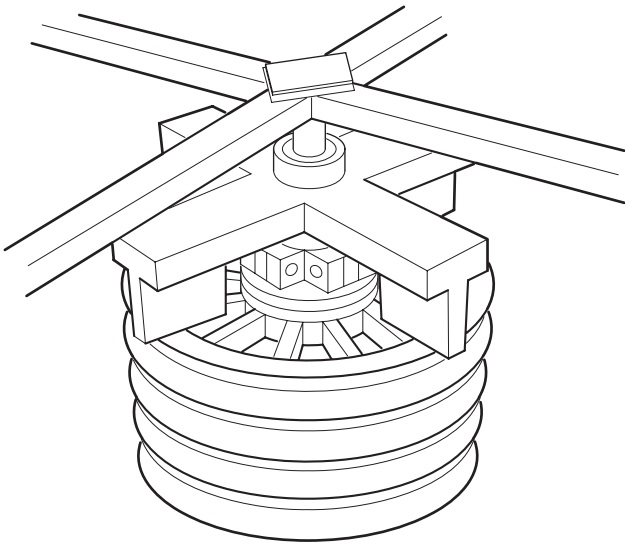
Cleaning and Inspection

Now that the basic balancer is completely disassembled, the components should be thoroughly cleaned and inspected.

1. Examine cylinder bore surface for excessive wear. Some small scuff marks may be removed with fine emery cloth. If wear is too excessive, housing must be replaced. If balancer has a liner, it should also be inspected for wear or possible cracking.
2. Check piston for cracks and wear of flexible sealing lips. Check steel backing plate for cracks and wear.
3. Inspect ball screw and thrust bearing for excessive wear, pitting, rusting and security in reel assembly.
4. Check wire rope guide for wear. Excessively worn or grooved wire rope guides should be replaced.
5. Inspect reel assembly for cracks and wear of "V" grooves, and anchor hole for deformation.

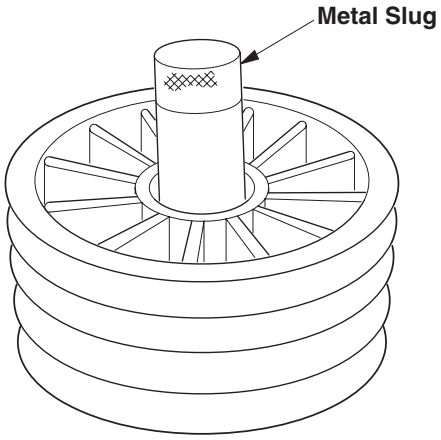
Ball Screw and Thrust Bearing Replacement

1. **Removing Thrust Bearing -** Thrust bearing is attached to reel with a retainer pressed into the hub of the reel approximately 1/4 in. (6.4 mm). To remove, use a bearing puller to engage under-cut at bottom of retainer inside diameter. Refer to Dwg. MHP1942 on page 37.



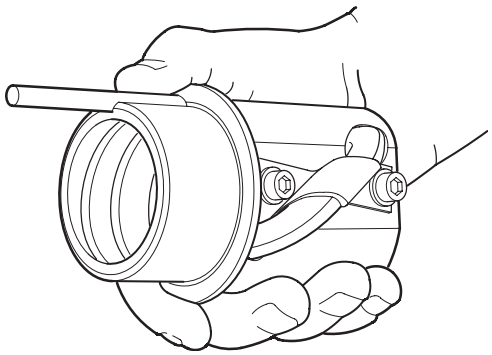
(Dwg. MHP1942)

2. **Removing Ball Screw Nut -** Ball screw nut can be pressed out of reel using a cylindrical metal slug 2 inches (50.8 mm) in diameter. Support reel along outer portion to allow ball nut to be removed. Press out ball screw nut, being careful not to damage reel. Refer to Dwg. MHP1943 on page 37.

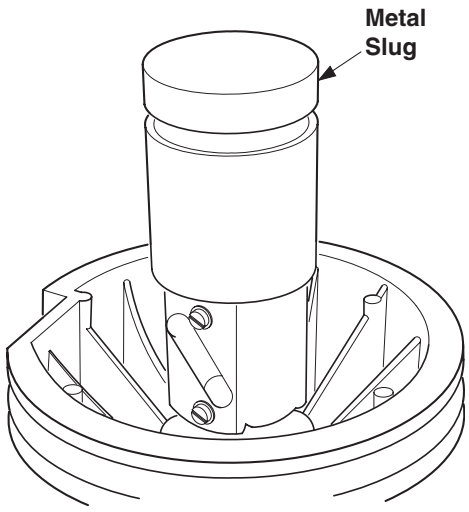


(Dwg. MHP1943)

3. **Installing New Ball Screw Nut -** To install ball screw nut, position washer over small diameter of nut. Place pin in position. Align pin with groove in reel and press in nut. Refer to Dwgs. MHP1944 and MHP1945 on page 37.

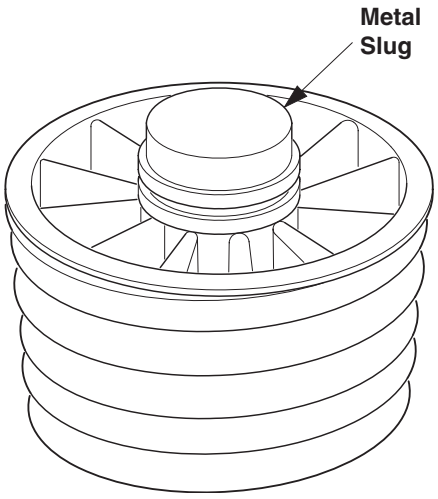


(Dwg. MHP1944)



(Dwg. MHP1945)

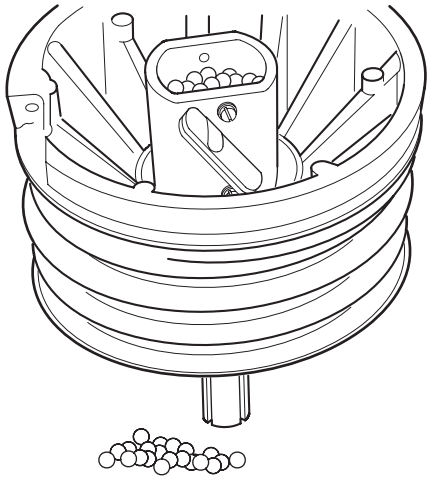
4. **Installing New Thrust Bearing -** To install thrust bearing, place ground inside diameter side of bearing race against reel, place retainer through thrust bearing and press it into reel. After retainer is pressed in, check outer bearing race to be sure it rotates freely. Thrust bearing retainer should be 0.008 to 0.012 in. (0.2 to 0.3 mm) below surface of outer bearing race. Refer to Dwg. MHP1946 on page 38.



(Dwg. MHP1946)

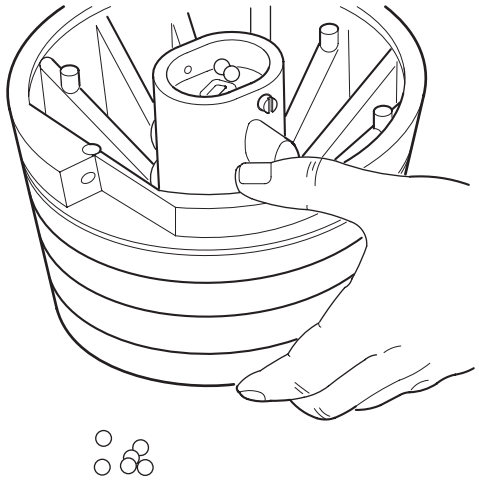
Ball Screw Reassembly

1. Plug hole on slotted end of ball screw with a small piece of paper towel, to prevent ball bearings from dropping into threaded hole.
2. Insert plugged end of ball screw into ball nut from thrust bearing side.
3. Turn ball screw clockwise to thread into ball nut. Thread ball screw to within 1-1/2 in. (38 mm) of ball nut end.
4. Stand assembly on ball screw and drop in approximately half of ball bearings. Refer to Dwg. MHP1947 on page 38.



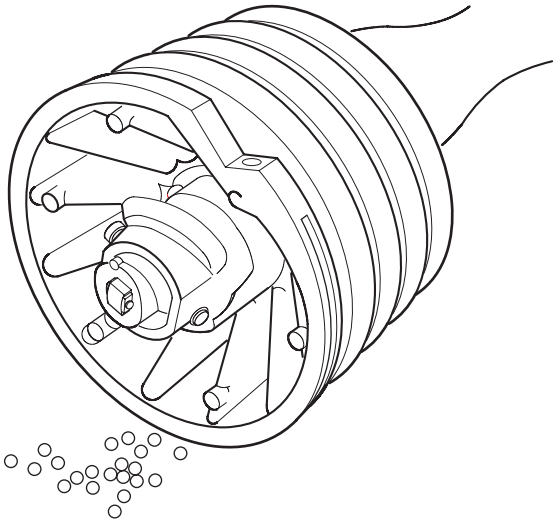
(Dwg. MHP1947)

5. With one hand holding ball screw, rotate reel down and up until all ball bearings have rolled into the tubes of the ball nut. Refer to Dwg. MHP1948 on page 38.
6. Lay reel down on its side with ball screw in a horizontal position. Rotate ball screw three or four times to seat ball bearings in proper location. Refer to Dwg. MHP1949 on page 38.



(Dwg. MHP1948)

7. Repeat steps 4, 5 and 6 until all ball bearings are reinstalled into ball nut.



(Dwg. MHP1949)

8. Remove paper plug from end of ball screw.

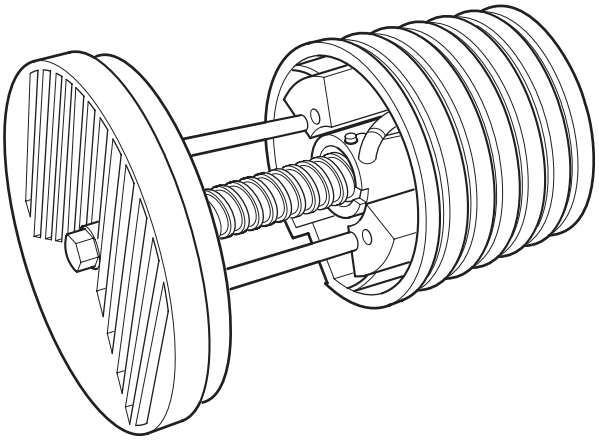
Z-Brake Inspection

1. Remove balancer from service.
2. Remove end cover of balancer.
3. Perform Z-Brake Preventive Maintenance. Refer to Preventive Maintenance Schedule on page 33.
4. Check engagement.
5. Grasp brake rods and rotate clockwise with a rapid motion. The brake shoe should engage the end cover and stop rotation. Refer to Z-Brake Adjustment if unable to engage brake.

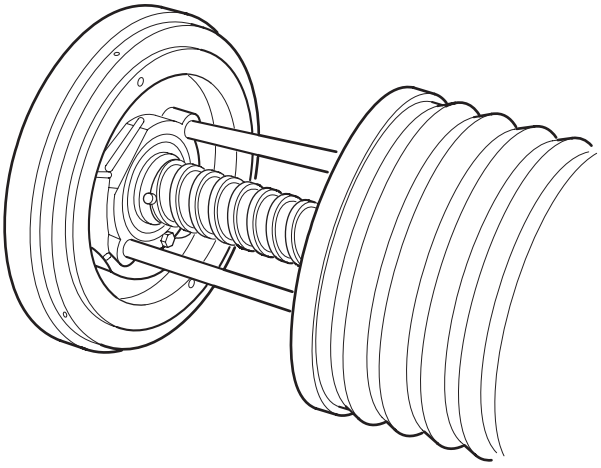
Reassembly

NOTICE

• Before reassembly, make sure all internal parts are clean, properly lubricated and all worn parts have been replaced.



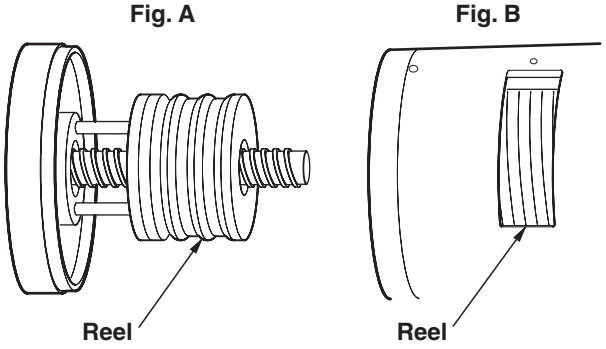
(Dwg. MHP1950)



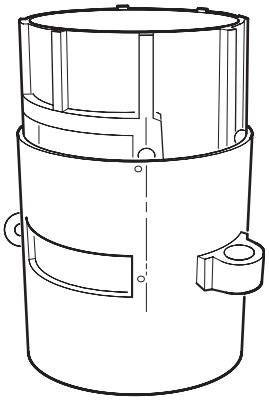
(Dwg. MHP1951)

1. Align and insert brake rods into holes in reel. Refer to Dwg. MHP1950 on page 39. Anti-rotation pins in end cover must line up with slots in ball screw (refer to Dwg. MHP1951 on page 39) and protrude 1/8 to 5/32 in. (3.2 to 4 mm) from inside surface of end cover. Insert shorter bolt through end cover and thread it into ball screw. Hand tighten bolt until ball screw is held firmly against end cover.
2. Lubricate ball screw and thrust bearing with lubricant (10886).

Dwg. MHP1952, Figure 'B' on page 39 illustrates reel and end cover assembly inserted into housing.

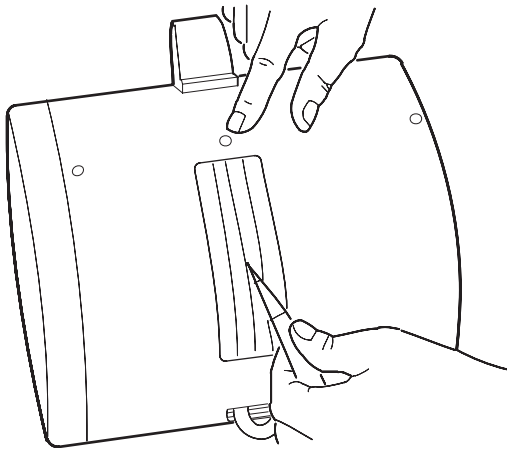


(Dwg. MHP1952)



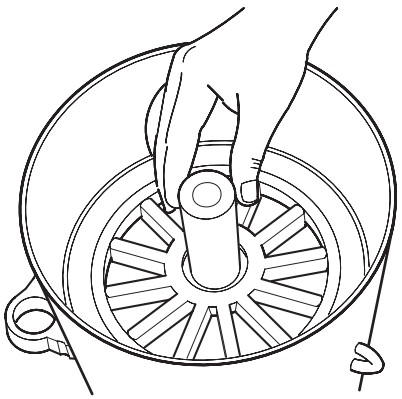
(Dwg. MHP1953)

3. Position housing as shown. Insert liner, if so equipped. Be sure to align round hole in liner at top of cut out with wire rope guide bolt hole in housing. Refer to Dwg. MHP1953 on page 39.



(Dwg. MHP1954)

4. Slide reel and end cover assembly into housing. Align screw holes in end cover with holes in housing. Check to see that bottom of reel 'V' groove is aligned with tapped hole or stud at top of wire rope guide opening. If it is not in line refer to Dwg. MHP1954 on page 39, rotate end cover in either direction until groove is aligned and bolt holes on outside diameter of end cover are in line with bolt holes in housing. Insert two screws on opposite sides of housing. Check reel alignment did not change when screws were inserted. If alignment is correct, insert remaining end cover screws.

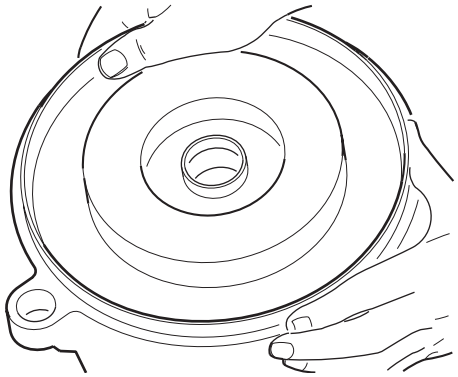


(Dwg. MHP1955)

NOTICE

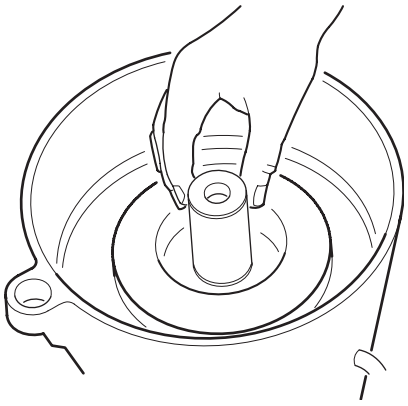
• Most balancers have metal shims inside the ball screw cap, between end of ball screw and ball screw cap, to obtain air tight fit. If balancer is so equipped, be sure shims are in place.

5. Stand balancer on end. Place shims on end of ball screw. Place ball screw cap over ball screw. Refer to Dwg. MHP1955 on page 39.
6. Apply a very light, even coat of Lubricant (10885) to housing cylinder bore and outside diameter of ball screw cap.



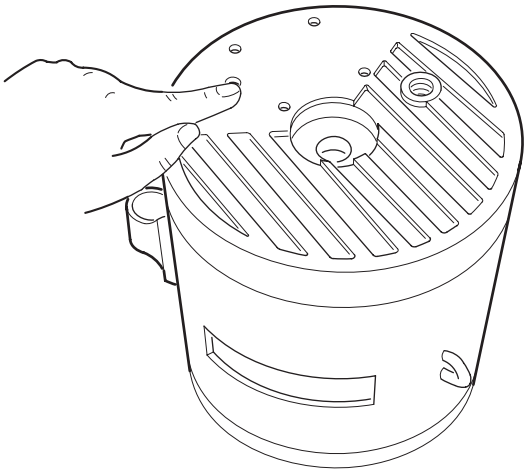
(Dwg. MHP1956)

7. Insert piston into housing, steel side first and push it down until it contacts thrust bearing. Refer to Dwg. MHP1956 on page 40.
8. Apply a light coat of Lubricant (10886) to end cap 'O' Ring and insert it in groove of end cap.



(Dwg. MHP1957)

9. Apply a coat of lubricant (10885) to one side of seal (10061). Press lubricated side onto end of ball screw cap. Refer to Dwg. MHP1957 on page 40. Lubrication helps hold seal in place while end cap is positioned.



(Dwg. MHP1958)

NOTICE

• Be careful not to damage 'O' ring during this operation.

10. Install end cap. Tapped holes for screws around outside diameter of end cap must be aligned with corresponding holes in housing. Make sure control kit mounting holes are at top of balancer. When end cap is properly aligned, use a soft hammer to tap it into housing. Refer to Dwg. MHP1958 on page 40.
11. Make sure seal (10061) has not moved during installation of end cap. Inside diameter of seal should not be visible through hole in center of end cap.
12. Insert bolt into center of end cap and hand tighten.
13. Insert screws around outside diameter of end cap.
14. Tighten end cap and cover center bolts to 90-100 ft./lbs (12.4-13.8 k/m).

Installing Wire Rope

⚠ CAUTION

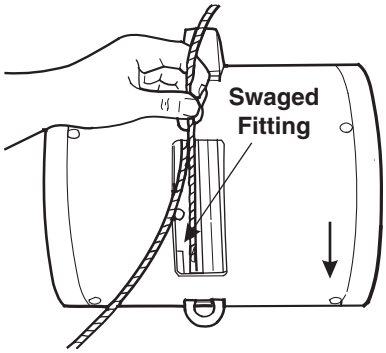
• Use of wire rope other than Ingersoll-Rand wire rope assembly should be avoided. Internal damage to the balancer may result.

1. Install new wire rope assembly, by first rotating reel down (direction of arrow in Dwg. MHP1366 on page 41) until anchor hole in reel is visible.

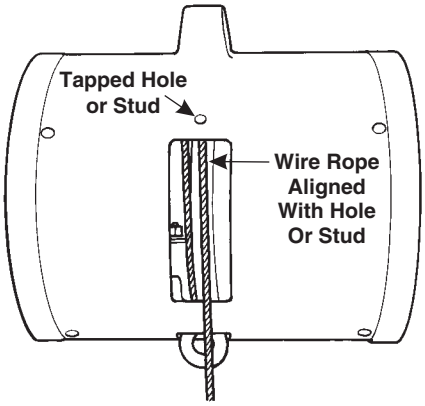
NOTICE

• Wire rope must be wrapped by hand twice around reel for proper operation.

2. End of wire rope is inserted down through anchor hole in reel and into groove. Continue pushing wire rope into groove until end appears at top of reel. Grasp this end and pull until swaged fitting on end of wire rope is pulled into anchor hole in reel. Refer to Dwg. MHP1366 on page 41.
3. Wrap wire rope around reel one more time, as described in step 2. Wire rope should be centered in opening of housing. Refer to Dwg. MHP1367 on page 41.



(Dwg. MHP1366)



(Dwg. MHP1367)

Installing Ball Stop

1. To install ball stop, the control package must be installed.
2. Turn on air to balancer and slowly wind as much wire rope as possible into balancer.
3. Slide ball stop (10165) and wire rope stop (10200) onto wire rope and up to balancer. Correct clearance between the wire rope guide and ball stop is 1/8 to 1/4 in. (3.2 to 6.4 mm).
4. Use swage tool, part number 01927 to secure stop in position.

Z-BRAKE ADJUSTMENTS AND RESETTING

⚠ WARNING

• Balancers with capacities of 150 lbs (68 kgs) or greater are equipped with the Z-Brake, a centrifugal brake that is designed to stop uncontrolled upward travel of wire rope in the event of a sudden release or loss of load, and limit excessive upward acceleration of empty hook. Brake MUST NOT be used as a travel limiting stop or up stop. Failure to follow these instructions will result in damage to brake and the balancer. Continuous use of brake will cause internal damage to balancer and could result in damaging balancer beyond repair.

Z-Brake Reset Procedure

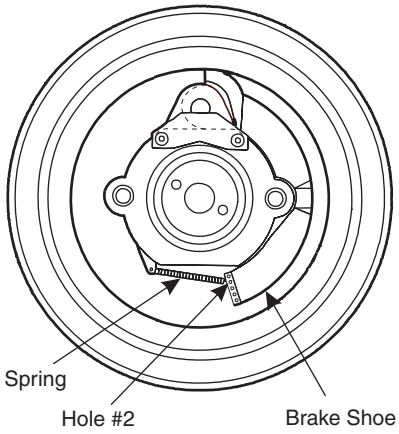
ZA Controls

1. Ensure vertical path of load is clear.
2. Press down lever and release air in balancer until load begins to lower.
3. Resume operation.
4. If brake engages when a load is attached or it interferes with standard operation, brake must be adjusted. Refer to Z-Brake ‘Adjustment Procedure’ section on page 42 for further instructions.

BA and EA Controls

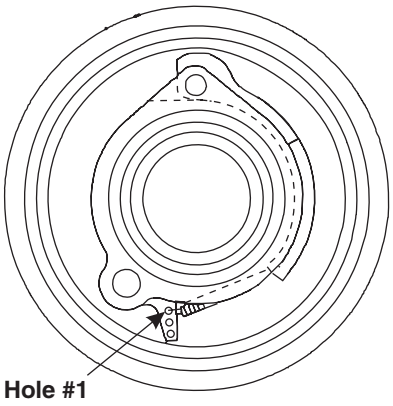
1. Ensure vertical path of load is clear.
2. Grasp load hook at lifting eye pad and pull down on wire rope. Carefully and slowly release load hook.
3. Attempt to resume operation.
4. If brake is still engaged rotate pilot regulator screw of regulator until load begins to lower. This will change settings on control.
5. Follow appropriate control adjustments to ensure proper operation of balancer.
6. Resume operation.
7. If brake engages when a load is attached or it interferes with standard operation brake must be adjusted. Refer to Z-Brake ‘Adjustment Procedure’ section on page 42 for further instructions.

91, 158, 227 kg (200, 300, 500 lb.) Balancer



(Dwg. MHP1369)

68 kg (150 lb.) Balancer



(Dwg. MHP1370)

WARNING

• Be sure air supply is off and wire rope has slack.

Adjustment Procedure

1. Remove balancer from overhead suspension.
2. Place balancer on a clean, dry work bench.
3. Remove control regulator from balancer.
4. Stand balancer on end cap (control end).
5. Loosen hex bolt in center of end cover.
6. Remove bolts around the diameter of housing.
7. Remove center bolt from end cover.
8. Remove end cover Z-Brake assembly.

NOTICE

• Note position of bearing retainer between end cover and ball screw. Bearing retainer not required for 200 lb. (90 kg) balancer.

9. Place end cover on work bench so that rods are pointing up.
10. With needle nose pliers remove end of spring on brake shoe and place in desired hole. The farther from the center of balancer spring is set, the less sensitive it will become.

Reassembly

1. Place balancer on its side so wire rope guide is facing you.
2. With your fingers rotate reel so it moves toward end cover. Wire rope will retract.
3. Hold end cover and align rods with holes in reel. The 150 lb. (68 kg) balancer has only one rod.

NOTICE

• Be sure bearing retainer is in place between ball screw and brake assembly.

4. Slide rod(s) and end cover assembly into hole(s) in reel until the 9/32 in. (7.14 mm) diameter holes in housing and anti-rotation notches on ball screw line up with pins in end cover.
5. Install bolts on end cover outside diameter.
6. Install end cover center bolt and torque to 90-100 ft/lb. (12.45-13.83 kg/m).
7. Install controls and perform operational adjustments as necessary.

Z-STOP INSTALLATION AND TEST

Refer to Dwg. MHP2178 on page 43.

1. Lower the load completely.
2. Disconnect/shut off air supply.

If installing as a retrofit kit:

   a. Remove end cover from balancer.
   b. Install new end cover. Ensure brake shafts align with corresponding holes in reel assembly.
   c. Align end cover with outer housing holes, and install four each bolts.
   d. Tighten the end cover center bolt to 100 ft. lbs. (14 kg/m) of torque.

3. Connect air supply to air fitting (4) on end cover using yellow 5/32 in. tubing.
4. Connect red 5/32 in. tubing to balancer interlock port to air fitting (4) on Z-Stop.
5. Connect/turn on air supply.
6. Check for leakage at all air fitting connections. Repair any leaks found.

Removal

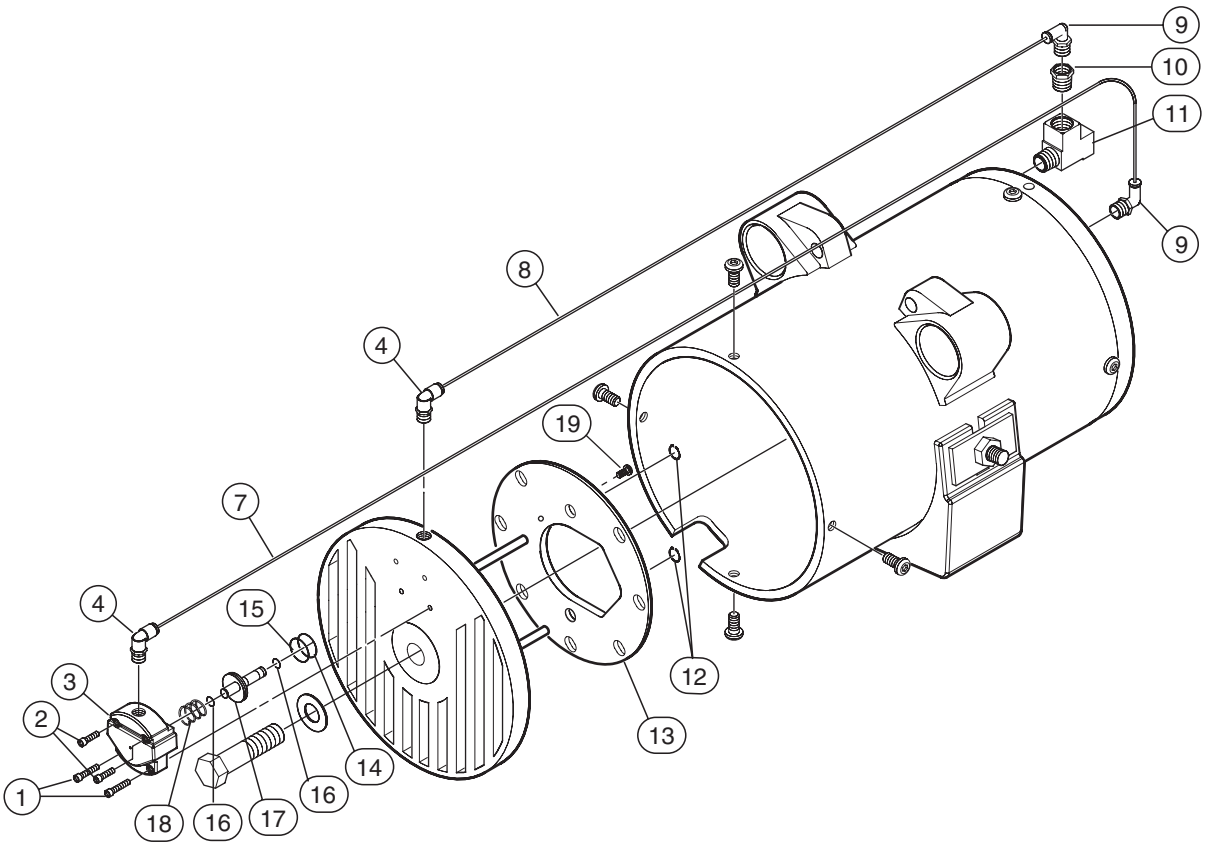
Refer to Dwg. MHP2178 on page 43.

1. Remove balancer from overhead suspension.
2. Place balancer on a clean, dry work bench.
3. Remove control regulator from balancer.
4. Stand balancer on end cap (control end).
5. Remove wire rope guide.
6. Disconnect red and yellow (7 and 8) tubes at fittings (4).
7. Remove screws (1 and 2) from Z-Stop housing (3).
8. Remove spring (18).
9. Grasp engagement pin (17) with needle nose pliers and pull straight out. If the pin is engaged in the plate, rotate the reel **SLOWLY** in either direction through the wire rope guide opening to release.
10. Install in reverse order.
11. Lubricate ‘O’ rings (14, 15 and 16) with part number 10885.

Testing

1. Run balancer through range of motion in work cell to ensure proper operation.
2. With handling device/fixture in mid-point of travel disconnect/shut off air supply to balancer.
3. Balancer should be locked out of operation, the handling device/fixture may drift down a small amount until Z-Stop locks out.
4. Attempt to raise or lower the handling device/fixture. No movement should be detected.
5. Connect/turn on air supply to balancer.
6. Slowly move handling device fixture up and down. The handling device/fixture should respond to inputs from controls.

Z-STOP ASSEMBLY - 200/325/500 LB. (91/147/227 KG) BALANCER



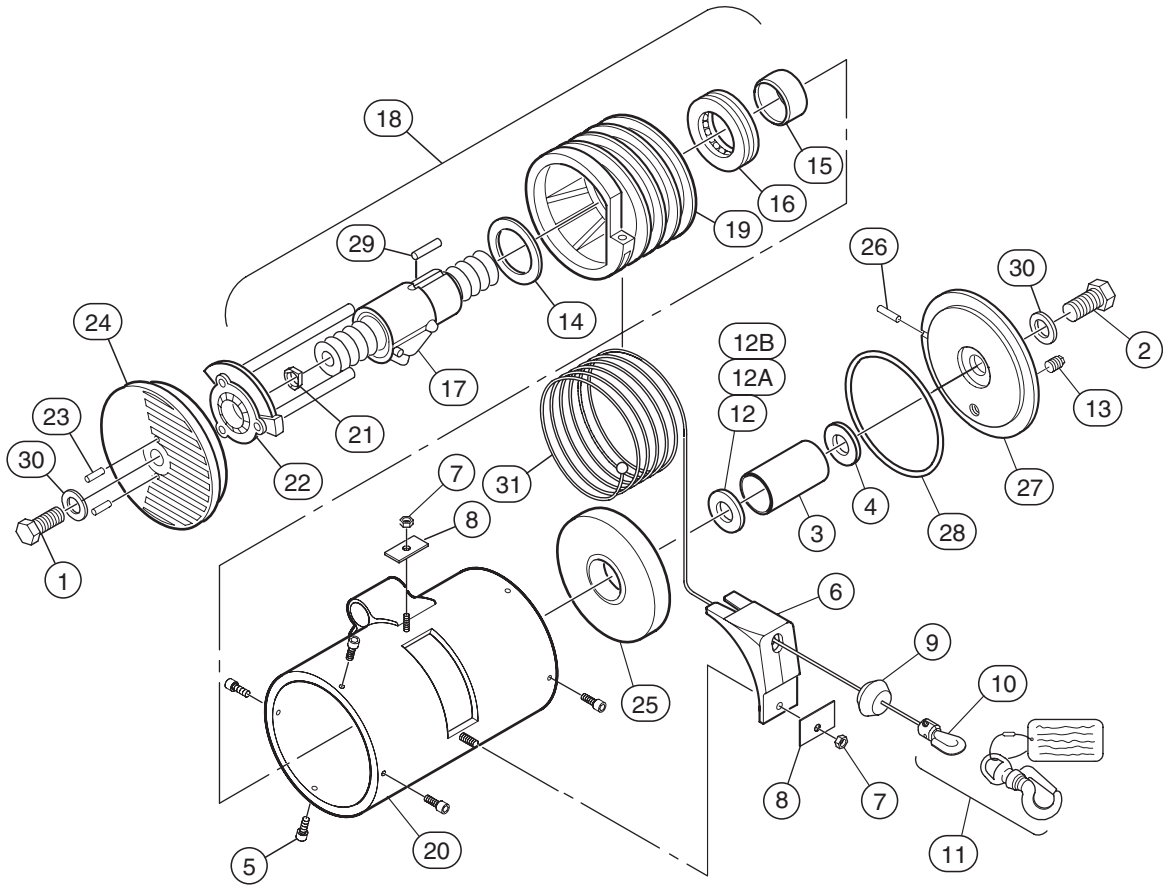
(Dwg. MHP2178)

Item No.	Description of Part	Qty. Total	Part Number	
			13301 – Z-Stop Assembly 200 lb. (91 kg) and 325 lb. (147 kg) Balancer	13321 – Z-Stop Assembly 500 lb. (227 kg) Balancer
1	Capscrew	2	ZHS70255	
2	Capscrew	2	ZHS70254	
3	'Z' Stop Housing	1	13335	
4	Fitting, Elbow	2	ZHS93969	
5	Tube, Bulk	As Req'd	Tri Coil Assembly 93953/Quad Coil Assembly 93949	
6	Interlock	1	99064	
7	Tube, 5/32 in. Red	2 ft.	93960-R	
8	Tube, 5/32 in. Yellow	2 ft.	93960-Y	
9	Fitting, Elbow	2	93970**	
10	Fitting, Reducer	1	13502	
11	Fitting, Tee	1	ZHS10708	
12	Retaining Ring	2	99126	99127
*13	Engagement Plate	1	ZHSEA0035	ZHSEA0036
*14	'O' Ring	1	13342	
*15	'O' Ring	1	13343	
*16	Quad Ring	2	13344	
*17	Engagement Pin	1	13338	
*18	Spring	1	ZHS76522	
19	Screw	2	ZHSEA0029	

* Refer to Dwg. MHP1960 on page 49 for breakdown.

** Use part number 93983 with handling device.

BASIC 150 LB. (68 KG) BALANCER



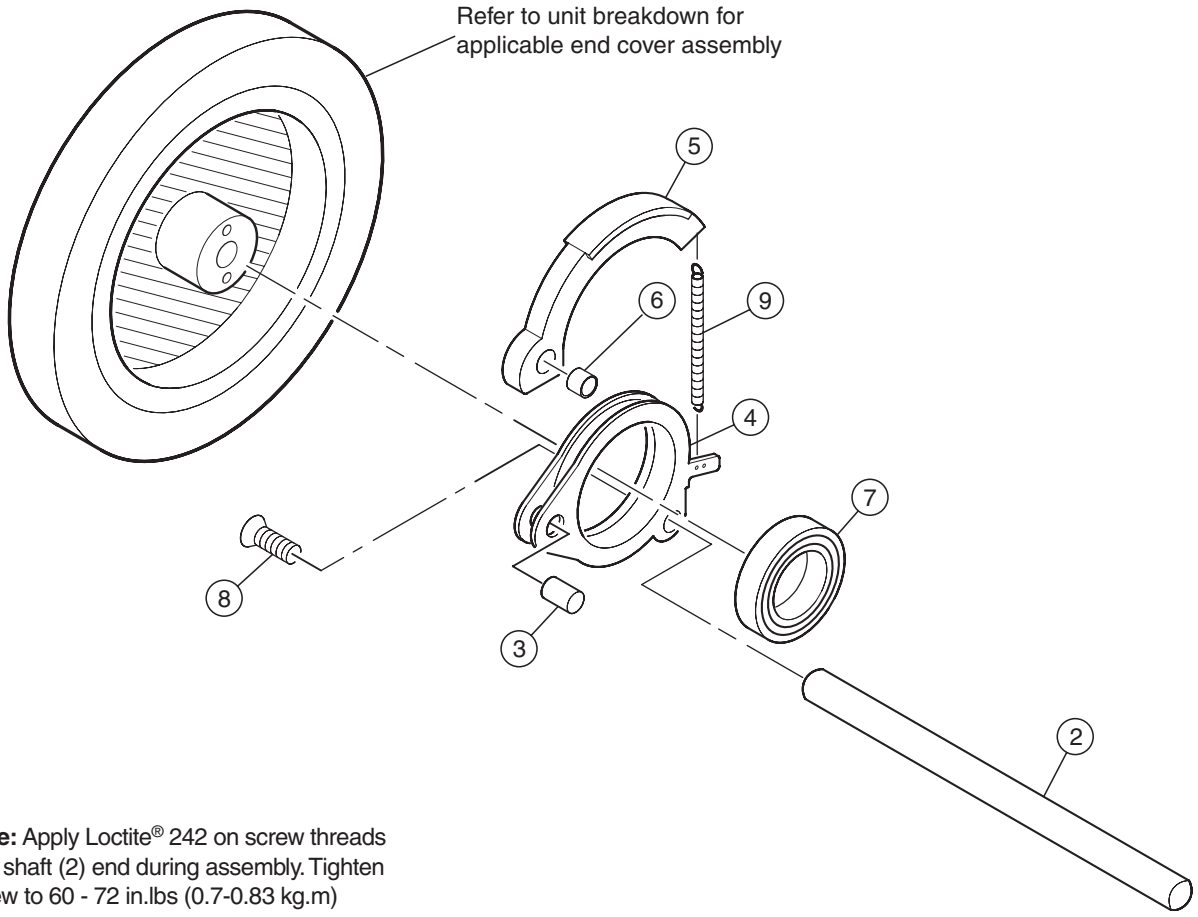
(Dwg. MHP1962)

Item No.	Description of Part	Qty. Total	Part Number
1	Ball Screw Bolt (End Cover)	1	ZHS10017
2	Ball Screw Bolt (End Cap)	1	ZHS10013
3	Ball Screw Cap	1	ZHS10046
• 4	Ball Screw Seal	1	10061
5	Screw	8	10071
6	Wire Rope Guide	1	ZHS10116
7	Nut	2	10124
8	Wire Rope Guide Plate	2	10125
9	Ball Stop Assy.	1	10165
• 10	Swaged Stop	1	10200
11	Accessory Kit	1	10208
12	0.005 in. (0.127 mm) Shim	As Req'd	10415
12A	0.010 in. (0.254 mm) Shim	As Req'd	10416
12B	0.025 in. (0.635 mm) Shim	As Req'd	10417
13	Pipe Plug 1/4 NPT	1	10764
14	Ball Nut Washer	1	HSPPS-2
15	Thrust Bearing Retainer	1	ZHS11081
16	Thrust Bearing	1	ZHS11091
17	Ball Screw Assy. ***	1	11112
18	Ball Screw and Reel Assy.	1	11514

Item No.	Description of Part	Qty. Total	Part Number
19	Real Assy.	1	11514
20	Housing Assy.	1	12911
21	Retainer (Z- Brake)	1	13039
22	Z-Brake Assy.*	1	ZHSEA0034
23	Anti-Rotation Pin	2	13440
24	End Cover Assy.	1	13805
25	Piston Assy.	1	14502
26	End Cap Spring Pin	1	ZHS15037
27	End Cap Assy.	1	15515
• 28	'O' Ring	1	15520
29	Ball Nut Dowel Pin	1	16058
30	Washer	2	74516
• 31	Wire Rope 20 ft. (6 m)	1	10084-20
41	Capacity Label **	1	10402
42	I-R Label **	1	ZHS54033030

•	Recommended Spare Parts Available in Kit 10590
*	Refer to Dwg. MHP1959 on page 45 for Z-Brake Assembly
**	Not Shown
***	Set of 64 Ball Bearings - Part Number 11012

Z-BRAKE ASSEMBLY - 150 LB. (68 KG) BALANCER

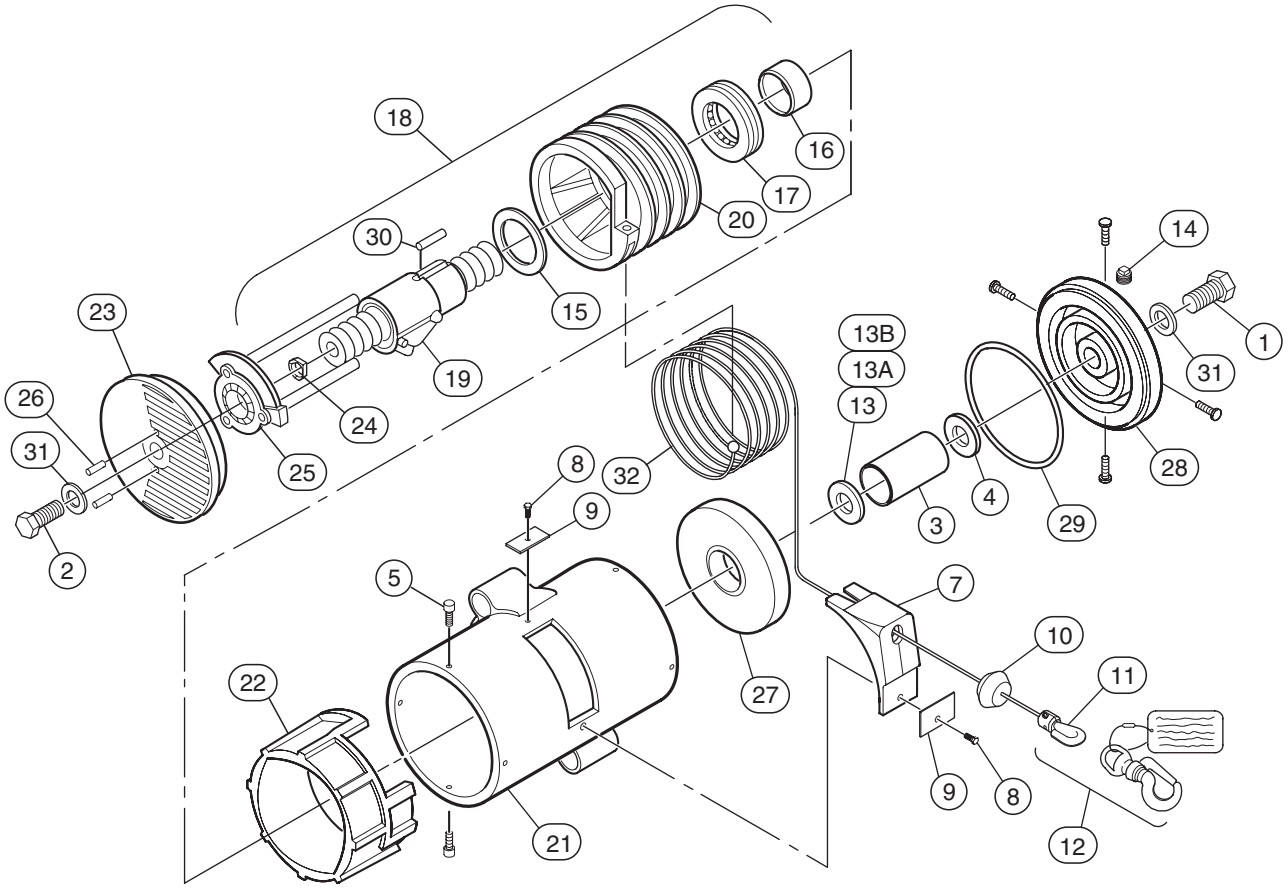


Note: Apply Loctite® 242 on screw threads and shaft (2) end during assembly. Tighten screw to 60 - 72 in.lbs (0.7-0.83 kg.m)

(Dwg. MHP1959)

Item No.	Description of Part	Qty. Total	Part Number
---	Brake Assembly - 150 lb. (68 kg) Balancer	1	ZHSEA0034
2	Shaft	1	13112
3	Pivot Shaft	1	13113
4	Brake Rotor	1	ZHSEA0033
5	Brake Shoe	1	13116
6	Bushing	1	65054
7	Radial Bearing	1	65074
8	Screw	1	ZHS70427
9	Heavy Spring	1	76517

BASIC 200 LB. (91 KG) BALANCER



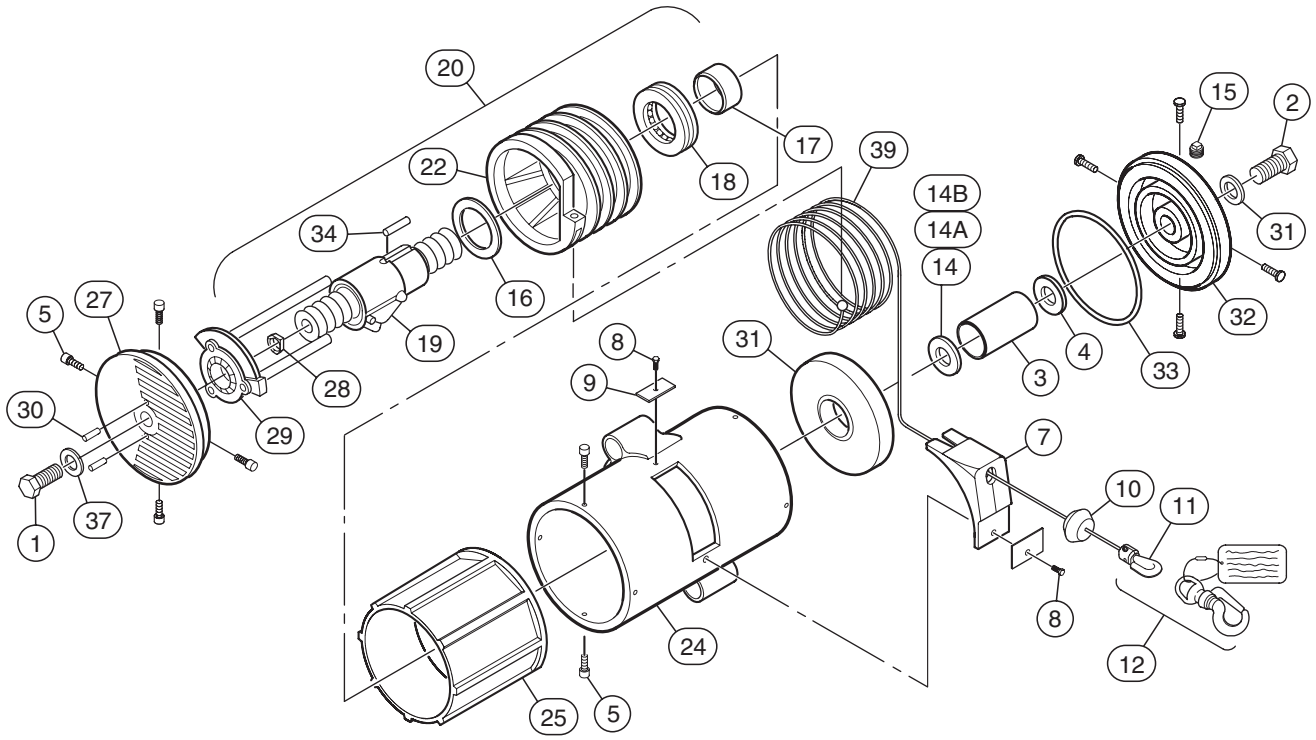
(Dwg. MHP1963)

Item No.	Description of Part	Qty. Total	Part Number
1	Ball Screw Bolt (End Cap)	1	ZHS10017
2	Ball Screw Bolt (End Cover)	1	ZHS10013
3	Ball Screw Cap	1	ZHS10044
• 4	Ball Screw Seal	1	10061
5	Screw	8	10072
7	Wire Rope Guide	1	ZHS10114
8	Screw	2	10120
9	Wire Rope Guide Plate	1	10125
10	Ball Stop Assy.	1	10165
• 11	Swaged Stop	1	10200
12	Accessory Kit	1	10208
13	0.005 in. (0.127 mm) Shim	As Req'd.	10415
13A	0.010 in. (0.254 mm) Shim	As Req'd.	10416
13B	0.025 in. (0.635 mm) Shim	As Req'd.	10417
14	Pipe Plug 1/4 NPT	1	HSPPS-2
15	Ball Nut Washer	1	11076
16	Thrust Bearing Retainer	1	ZHS11081
17	Thrust Bearing	1	ZHS11091
18	Ball Screw & Reel Assy.	1	11102
19	Ball Screw Assy. ***	1	11112

Item No.	Description of Part	Qty. Total	Part Number
20	Real Assy.	1	11125
21	Housing Assy.	1	ZHS12204
22	Housing Liner	1	12225
23	End Cover Assy.	1	13035
24	Retainer (Z-Brake)	1	13036
25	Z-Brake Assy.*	1	ZHSEA0032
26	Anti-Rotation Pin	2	13440
27	Piston Assy.	1	14005
28	End Cap	1	15016
• 29	'O' Ring	1	15020
30	Ball Nut Dowel Pin	1	16058
31	Washer	2	74516
• 32	Wire Rope 30 ft. (91.1m)	1	10084-30
41	Capacity Label **	1	10403
42	I-R Label **	1	ZHS54033030

•	Recommended Spare Parts Available in Kit 10591
*	Refer to Dwg. MHP1960 on page 49 for Z-Brake Assembly
**	Not Shown
***	Set of 64 Ball Bearings - Part Number 11012

BASIC 350 LB. (158 KG) BALANCER



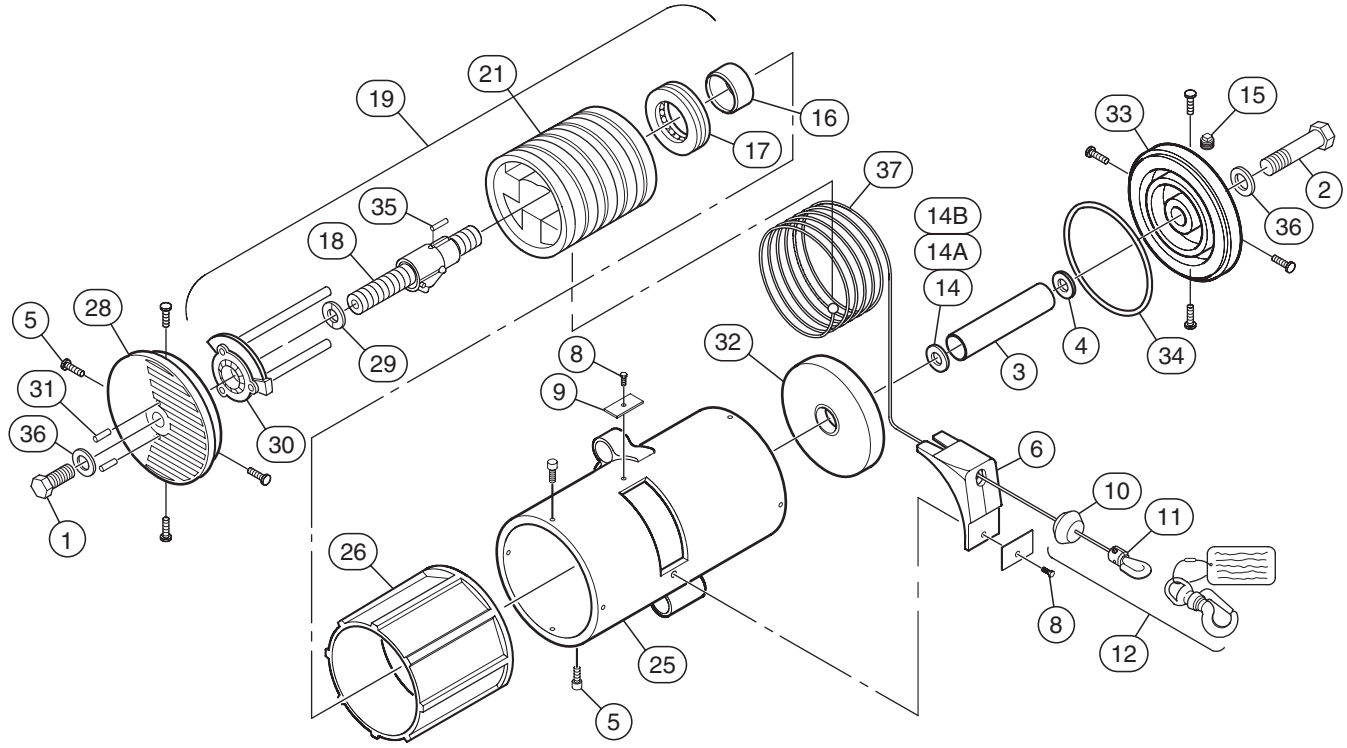
(Dwg. MHP1964)

Item No.	Description of Part	Qty. Total	Part Number
1	Ball Screw Bolt (End Cover)	1	ZHS10012
2	Ball Screw Bolt (End Cap)	1	ZHS10017
3	Ball Screw Cap	1	ZHS10048
• 4	Ball Screw Seal	1	10061
5	Screw	8	10072
7	Wire Rope Guide	1	10115
8	Screw	2	1012 0
9	Wire Rope Guide Plate	1	10125
10	Ball Stop Assy.	1	10165
• 11	Swaged Stop	1	10200
12	Accessory Kit	1	10208
14	0.005 in. (0.127 mm) Shim	As Req'd	10415
14A	0.010 in. (0.254 mm) Shim	As Req'd	10416
14B	0.025 in. (0.635 mm) Shim	As Req'd	10417
15	Pipe Plug 1/4 NPT	1	HSPPS-2
16	Ball Nut Washer	1	11076
17	Thrust Bearing Retainer	1	ZHS11081
18	Thrust Bearing	1	ZHS11091
19	Ball Screw Assy. ***	1	11112
20	Ball Screw & Reel Assy.	1	11514

Item No.	Description of Part	Qty. Total	Part Number
22	Reel Assy.	1	11544
24	Housing Assy.	1.	ZHS12204
25	Liner Assy.	1	12240
27	End Cover Assy.	1	13038
28	Retainer (Z-Brake)	1	13039
29	Z-Brake Assy. *	1	ZHSEA0032
30	Anti-Rotation Pin	2	13440
31	Piston Assy.	1	14005
32	End Cap	1	15016
• 33	'O' Ring	1	15020
34	Ball Nut Dowel Pin	1	16058
37	Washer	2	74516
• 39	Wire Rope 30 ft. (9.1 m)	1	10084-30
41	Capacity Label **	1	
42	**I-R** Label **	1	ZHS54033030

•	Recommended Spare Parts Available in Kit 10951
*	Refer to Dwg. MHP1960 on page 49 or Z-Brake Assembly
**	Not Shown
***	Set of 64 Ball Bearings - Part Number 11012

BASIC 500 LB. (227 KG) BALANCER



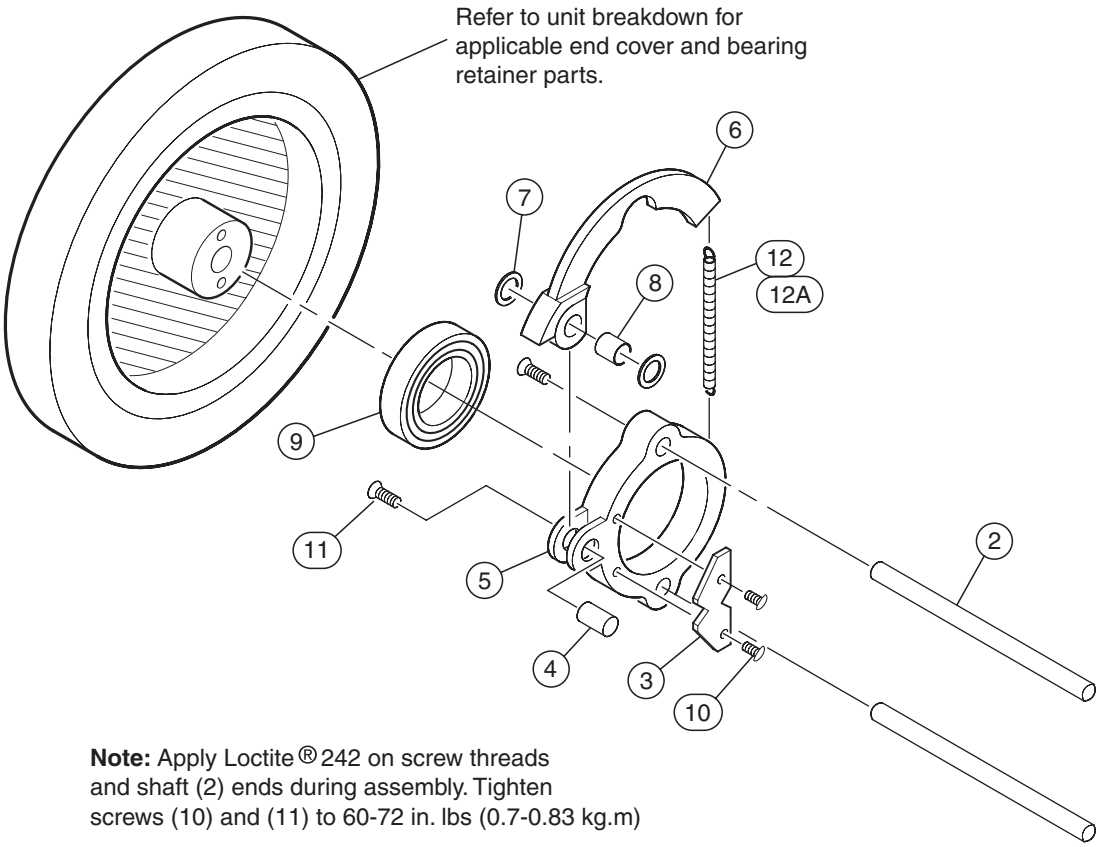
(Dwg. MHP1965)

Item No.	Description of Part	Qty. Total	Part Number
1	Ball Screw Bolt (End Cover)	1	ZHS10017
2	Ball Screw Bolt (End Cap)	1	ZHS10018
3	Ball Screw Cap	1	ZHS10047
4	Ball Screw Seal	1	10061
5	Screw	12	10072
6	Wire Rope Guide	1	ZHS10118
8	Screw	2	10120
9	Wire Rope Guide Plate	1	10125
10	Ball Stop Assy.	1	10165
• 11	Swaged Stop	1	10200
12	Accessory Kit	1	10208
14	0.005 in. (0.127 mm) Shim	As Req'd	10415
14A	0.010 in. (0.254 mm) Shim	As Req'd	10416
14B	0.025 in. (0.635 mm) Shim	As Req'd	10417
15	Pipe Plug 1/4 NPT	1	HSPPS-2
16	Thrust Bearing Retainer	1	ZHS11081
17	Thrust Bearing	1	ZHS11091
18	Ball Screw Assy. ***	1	11115
19	Ball Screw & Reel Assy.	1	11515

Item No.	Description of Part	Qty. Total	Part Number
21	Reel Assy.	1	11564
25	Housing Assy.	1	12208
26	Liner Assy.	1	12245
28	End Cover Assy.	1	13038
29	Bearing Retainer (Z-Brake)	1	13039
30	Z-Brake Assy. *	1	ZHSEA0038
31	Anti-Rotation Pin	2	ZHS13440
32	Piston Assy.	1	14005
33	End Cap	1	15016
• 34	'O' Ring	1	15020
35	Ball Nut Dowel Pin	1	16058
36	Washer	2	74516
• 37	Wire Rope 30 ft. (9.1)	1	10084-30
41	Capacity Label **	1	10398
42	**I-R** Label **	1	ZHS54033055

•	Recommended Spare Parts Available in Kit 10591
*	Refer to Dwg. MHP1960 on page 49 for Z-Brake Assembly
**	Not Shown
***	Set of 64 Ball Bearings - Part Number 11012 (2 sets required for 500 lb. (227 kg) model)

Z-BRAKE ASSEMBLY – 200/350/500 LB. (91/158/227 KG) BALANCER



Note: Apply Loctite® 242 on screw threads and shaft (2) ends during assembly. Tighten screws (10) and (11) to 60-72 in. lbs (0.7-0.83 kg.m)

(Dwg. MHP1960)

Item No.	Description of Part	Qty. Total	Part Number		
			ZHSEA0032 – Z-Brake Assembly 200 lb. (91 kg) Balancer	ZHSEA0032 – Z-Brake Assembly 350 lb. (158 kg) Balancer	ZHSEA0038 – Z-Brake Assembly 500 lb. (227 kg) Balancer
2	Shaft	2	13112		13142
3	Shaft Retainer	1	ZHS13122		
4	Pivot Shaft	1	ZHS13123		
5	Brake Rotor	1	ZHSEA0020		ZHSEA0037
6	Brake Shoe	1	13125		
7	Thrust Washer	2	65063		
8	Bushing	1	65073		
9	Radial Bearing	1	65074		
10	Screw	2	ZHS70257		
11	Screw	2	ZHS70515		
12	Spring	1	76517		
12A	Heavy Spring		76520*		

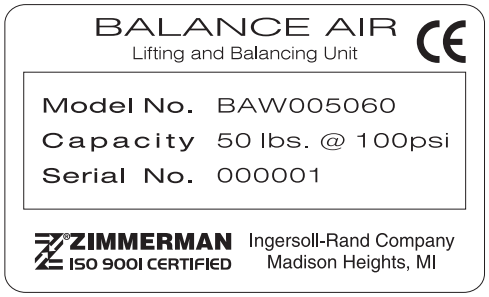
* Replaces 76517 Brake Spring

PARTS ORDERING INFORMATION

Balancers are designed and constructed to provide long, trouble-free service. In time it may become necessary to order and install new parts to replace those that have been subjected to wear.

The use of other than **Ingersoll-Rand** replacement parts may result in decreased performance, and may invalidate the warranty. For prompt service and genuine **Ingersoll-Rand** parts, provide your nearest Distributor with the following:

1. Complete model number and serial number as it appears on the nameplate.
2. Part number and part description as shown in this manual.
3. Quantity required.



The model and serial number label is located on the housing.

For your convenience and future reference it is recommended that the following information be recorded.

Model Number _____

Serial Number _____

Date Purchased _____

Return Goods Policy

If it becomes necessary to return the complete balancer or certain parts to the factory, contact the Distributor from whom you purchased the balancer, or the nearest **Ingersoll-Rand** Distributor in your locality, **Ingersoll-Rand** will not accept any returned goods for warranty or service work unless prior arrangements have been made and written authorization has been provided from the location where the goods were purchased.

NOTICE

• Continuing improvement and advancement of design may cause changes to this balancer which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.

Disposal

When the life of the balancer has expired, it is recommended that the balancer be disassembled, degreased and parts separated as to materials so that they may be recycled.

SERVICE AND MAINTENANCE

For additional information contact:
Ingersoll-Rand
U.S. and International Sales
1872 Enterprise Drive
Rochester Hills, MI 48309
Phone: (248) 293-5700
Fax: (248) 293-5800

For additional information on related products order publication by the referenced Part/Document Number listed:

Product	Part/Document Number	Product	Part/Document Number
Z Rail Manual	MHD56159	Valu-Trak Rail Manual	MHD56161
Manipulator Arm Manual	MHD56162	Jib Crane Manual	MHD56209
Balancer Electric Controls Manual	MHD56222		

LIMITED WARRANTY

Ingersoll-Rand Company (**I-R**) warrants to the original user its Products to be free of defects in material and workmanship for a period of one year from the date of purchase. **I-R** will repair, without cost, any Product found to be defective, including parts and labor charges, or at its option, will replace such Products or refund the purchase price less a reasonable allowance for depreciation, in exchange for the Product. Repairs or replacements are warranted for the remainder of the original warranty period.

If any Product proves defective within its original one year warranty period, it should be returned to any Authorized **I-R** Material Handling Service Distributor, transportation prepaid with proof of purchase or warranty card.

This warranty does not apply to Products which **I-R** has determined to have been misused or abused, improperly maintained by the user, or where the malfunction or defect can be attributed to the use of non-genuine **I-R** parts.

I-R makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above. I-R's maximum liability is limited to the purchase price of the Product and in no event shall I-R be liable for any consequential, indirect, incidental, or special damages of any nature rising from the sale or use of the Product, whether based on contract, tort, or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

IMPORTANT NOTICE

It is our policy to promote safe delivery of all orders.

This shipment has been thoroughly checked, packed and inspected before leaving our plant and receipt for it in good condition has been received from the carrier. Any loss or damage which occurs to this shipment while en route is not due to any action or conduct of the manufacturer.

Visible Loss or Damage
If any of the goods called for on the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

Concealed Loss or Damage
When a shipment has been delivered to you in apparent good condition, but upon opening the crate or container, loss or damage has taken place while in transit, notify the carrier's agent immediately.

Damage Claims
You must file claims for damage with the carrier. It is the transportation company's responsibility to reimburse you for repair or replacement of goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the **Ingersoll-Rand** invoice, nor should payment of **Ingersoll-Rand** invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery.

You may return products damaged in shipment to us for repair, which services will be for your account and form your basis for claim against the carrier.

United States Office Locations

Technical Support

Ingersoll-Rand
Zimmerman Handling Systems
1872 Enterprise Drive
Rochester Hills, MI
48309
Phone: (248) 293-5700
Fax: (248) 293-5800

For Order Entry, Order Status
Ingersoll-Rand
Global Logistics
P.O. Box 618
510 Hester Drive
White House, TN 37188
Phone: (615) 474-8665
Fax: (615) 672-0854

Web Site:
www.irco.com

Regional Sales Offices

Annandale, NJ
P.O. Box 970
1467 Route 31 South
Annandale, NJ 08801
Phone: (908) 238-7000
Fax: (908) 238-7048

International Office Locations

Offices and distributors in principal cities throughout the world. Contact the nearest **Ingersoll-Rand** office for the name and address of the distributor in your country or write/fax to:

Canada
National Sales Office
Regional Warehouse
Toronto, Ontario
51 Worcester Road
Rexdale, Ontario
M9W 4K2
Phone: (416) 213-4500
Fax: (416) 213-4510
Order Desk
Fax: (416) 213-4506

Europe, Middle East and Africa
Ingersoll-Rand
Douai Operations
111, Avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 3-27-93-08-08
Fax: (33) 3-27-93-08-00

Asia Pacific Operations
Ingersoll-Rand Ltd.
42 Benoi Road
Jurong, Singapore
629903
Phone: 65-861-1555
Fax: 65-861-0317

Russia
Ingersoll-Rand
Presnensky Val
19, Moscow, Russia 123557
Phone: (7) 095-933-03-24
Fax: (7) 095-737-01-48

Australia
Ingersoll-RandLtd.
Landmark Corporate Center
Level 2
454-472 Nepean Highway
Frankston, Vic 3199
Australia
Phone: 613 8781 1600
Fax: 613 8781 1611

Printed in USA