EZ-Clean®

Floor Scale

Installation and Service Manual

B14604400A
(8/99).00

METTLER TOLEDO

Publication Revision History

An overview of this manual's revision history is compiled below.

Publication Name: METTLER TOLEDO 2158 EZ-Clean Floor Scale Installation and Service Manual

Publication Part Number: A14604400A **Publication Date: 1995**

Part Number	Date	Revisions
B14604400A	8/99	Reformatted manual. Added information relating to design changes in the pneumatic cylinders and pneumatic control box.

INTRODUCTION

This publication is provided solely as a guide for individuals who have received Technical Training in servicing the METTLER TOLEDO product.

Information about METTLER TOLEDO Technical Training can be obtained by writing, calling, or faxing:

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240
Phone: (614) 438-4511
Fax: (614) 438-4958
www.mt.com

FCC Notice

This device complies with Part 15 of the FCC Rules and the Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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Declaration of conformity
Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
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Dichiarazione di conformitá

We/Wir/Nous/WIJ/Noi: **Mettler-Toledo, Inc.**
1150 Dearborn Drive
Worthington, Ohio 43085
USA

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Type: Analog Load Cells
Models: 744, 745 and 745A
(when used within the technical requirements listed in Mettler Toledo documentation and installed as a Load receptor as listed in Type approval certificate T2206, Table 4.)

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
auf das sich diese Erklärung bezieht, mitder/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.
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CE Conformity / CE-Konformität / Conformité CE
90/384/EU Nonautomatic Balances and Scales / Nichteselbsttätige Waagen / Balances à Functionnement non automatique
Article 1.2.a.
89/336/EU EMC Directive / EMU-Richtlinie / Directive concernant la CEM
EN55 022, B: 1987 Emissions / Funkstörungen
EN50 082-2: 1995 Immunity
73/23/EU Low Voltage / Niederspannung / basse tension
EN61010-1 el. Safety / el. Sicherheit / sécurité el.
94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres
EN 50 014 : 1977 + A1…A5, General requirements
EN 50 020 : 1977 + A1…A5, Intrinsic safety "i"

Other Directives and Standards / Andere Richtlinien und Normen / Autres documents
corresponding to local requirements / entsprechend lokalen Anforderungen / correspondant aux exigences locales
R60 OIML International Recommendation , Metrological regulation for load cells
EEx ib IIC T4 el. Safety / el. Sicherheit / sécurité el. (PTB Nr. Ex-95.D.2051, for models 744 and 745)
EEx ib IIC T4 el. Safety / el. Sicherheit / sécurité el. (KEMA No. Ex-98.D.0965, for model 745A)

Darrell Flocken, Manager - Weights & Measures
Office of Weights and Measures
Worthington, Ohio USA
~~**September, 1996**~~
Revised January 1999 **(Added: model 745A, conformity to 89/336/EU – 73/23/EU – 94/9/EC)**

According to EN45014

PRECAUTIONS

READ this manual BEFORE operating or servicing this equipment.

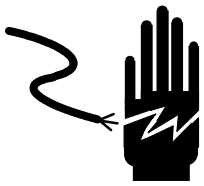
FOLLOW these instructions carefully.

SAVE this manual for future reference.

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

CALL METTLER TOLEDO for parts, information, and service.

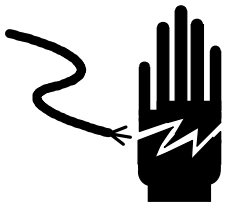


⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

⚠ CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.



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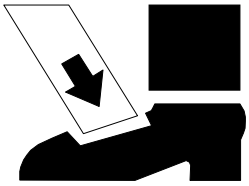

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KEEP HANDS, FEET, AND OTHER BODY PARTS CLEAR OF THE MOVING PLATFORM. DO NOT WORK INSIDE THE PIT UNLESS THE SAFETY SUPPORT CHANNELS ARE IN POSITION OVER THE CYLINDER COLLARS AND THE PNEUMATIC CONTROL BOX HAS BEEN LOCKED.

⚠ CAUTION

BEFORE CONNECTING OR DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM OR DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

CONTENTS

1 Introduction

The EZ-Clean® floor scale is installed in a pit and includes pneumatic air cylinders to lift the scale platform. The pneumatic lift system tilts the platform to approximately 40 degrees, permitting full access to the pit below for complete washdown and sanitation (see Figure 1-1).

The scale platform assembly rests on a subframe that is housed within a cast-in-place quick-pit frame. The quick-pit frame serves as a pit coping. The subframe is attached to the quick-pit frame by a hinged joint that allows the subframe and platform assembly to pivot. The pneumatic air cylinders are anchored to the pit floor and attached to the subframe.

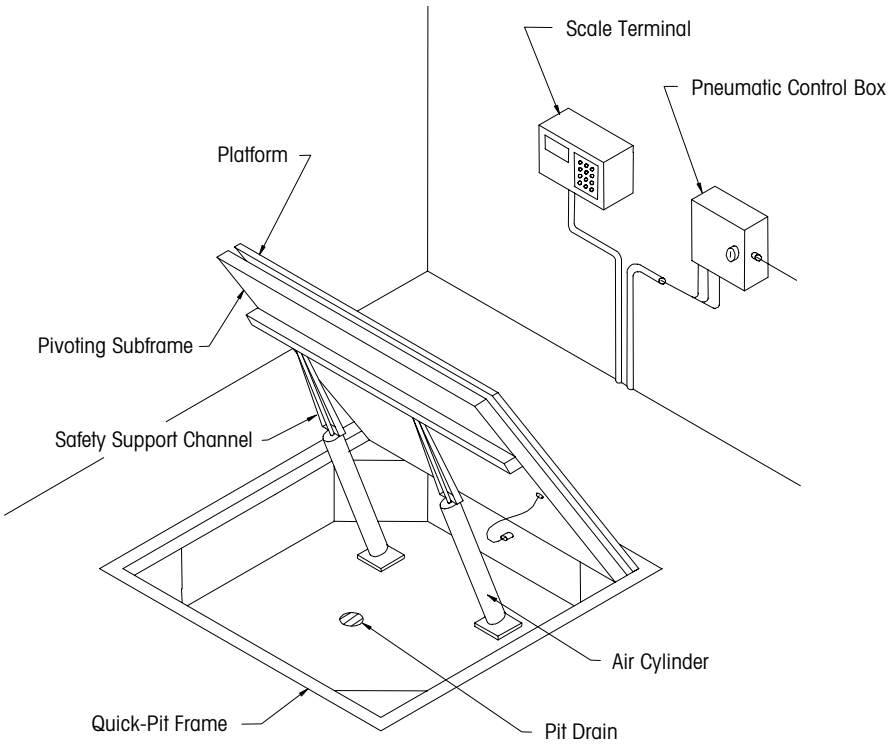


Figure 1-1: EZ-Clean Floor Scale

Model Numbers

Table 1-1 shows how standard model numbers are determined for EZ-Clean floor scales.

Model Number Configuration						
XXXX	E	X	X	X	X	X
Model	Type	Revision	Deck Material	Capacity	Size	Control Box
2158 = Analog 2160 = DigiTOL 2162 = IDNet	E = EZ-Clean	1 = Current Revision	0 = Carbon Steel Tread Plate 1 = Carbon Steel Smooth Plate 2 = Stainless Steel Tread Plate 3 = Stainless Steel Smooth Plate	0 = 500 lb 1 = 1,000 lb 2 = 2,500 lb 3 = 5,000 lb 4 = 10,000 lb 5 = 20,000 lb A = 600 kg B = 1,500 kg C = 3,000 kg D = 6,000 kg E = 10,000 kg	1 = 3 x 3 feet 2 = 4 x 4 feet 3 = 4 x 5 feet 4 = 5 x 5 feet 5 = 4 x 6 feet 6 = 5 x 7 feet	P = Panel Mount H = Harsh (Wall) Mount

Table 1-1: Model Number Configuration for EZ-Clean Scales

For example, 2158E1334H is a Model 2158 EZ-Clean floor scale (current revision), stainless steel smooth deck plate, 5 x 5 with a 5,000-lb capacity and a harsh mount pneumatic control box.

Specifications

Model 2158 EZ-Clean floor scales meet or exceed Class III, 5,000 division accuracy requirements in accordance with the National Institute of Standards and Technology (NIST) Handbook 44. A certificate of conformance (No. 91-097A2) was issued under the National Type Evaluation Program (NTEP) of the National Conference on Weights and Measures.

Load Cell Specifications

EZ-Clean floor scales include stainless steel, cantilever-beam load cells with integral four-conductor, shielded, color-coded cable. Scales 4 feet x 6 feet and smaller use cables that are 7.5 feet long. Scales larger than 4 feet x 6 feet use cables that are 15 feet long. Do not mix cables of different lengths within a platform. Load cells are powered by the scale terminal.

Load cell specifications are listed in Table 1-2:

Model Number	744 potted	745 hermetic
Capacities	500 lb	1,250 lb 2,500 lb 5,000 lb 10,000 lb
NTEP Certificate of Conformance Number	91-089	92-108
Maximum Excitation Voltage	15 VDC or VAC rms	
Recommended Excitation Voltage	15 VDC	
Full Scale Output	2 mV/V	
Input Terminal Resistance	385 ohms minimum	
Output Terminal Resistance	350 ohms ± 2 ohms	
Temperature Range Compensation	-10°C to +40°C (+14°F to +104°F)	
Service/Storage Temperature Range	-50°C to +85°C (-58°F to +185°F)	
Safe Side Load	100% of full load cell rating	
Safe Overload	150% of full load cell rating	

Table 1-2: Load Cell Specifications

Load cell capacities are listed in Table 1-3:

Scale Platform Capacity	Capacity of Each Load Cell	Minimum Approved Graduation Size
500 lb	250 lb	0.1 lb
1,000 lb	500 lb	0.2 lb
2,500 lb	1,250 lb	0.5 lb
5,000 lb	2,500 lb	1.0 lb
10,000 lb	5,000 lb	2.0 lb
20,000 lb	10,000 lb	5.0 lb

Table 1-3: Load Cell Capacities

Load cells are bolted to the platform assembly (see Figure 1-2). All load cells 2,500 lb and less have a built-in overload stop to prevent damage from accidental overload. The load cell suspension uses a rocker pin inserted between the cell and a fixed receiver that is part of the subframe.

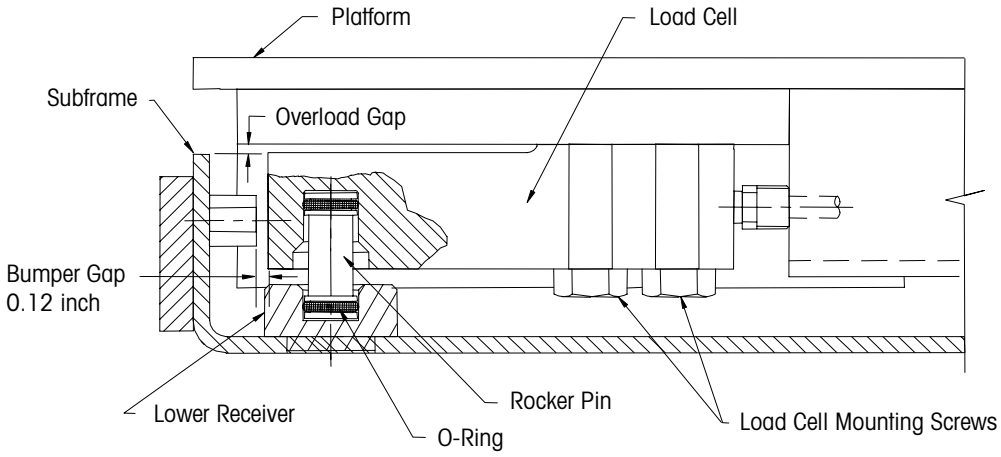


Figure 1-2: Load Cell / Suspension Detail

Pneumatic Air Cylinder Specifications

Main Lifting Cylinders

Type: Double acting, universal pivot mount. Only one port used, gravity lowered.

Material: Stainless steel body

Port Size: 3/8 NPT

Dimensions: 3-inch bore x 12-inch stroke for 3-foot wide scales, quantity (1)

3-inch bore x 16-inch stroke for 4-foot wide scales, quantity (2)

3-inch bore x 20-inch stroke for 5-foot wide scales, quantity (2)

3-inch bore x 24-inch stroke for 6-foot wide scales, quantity (2)

Safety Bar Disengagement Cylinders

Type: Double acting

Material: Stainless steel

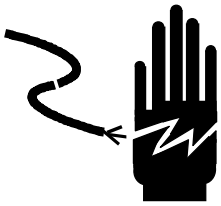
Port Size: #10-32 UNF

Dimensions: 5/8-inch bore x 2-inch stroke

Pneumatic Air Supply Requirements

The pneumatic lift system requires an air supply of up to 100 psi. The air supply is connected to a 1/4 NPT female connector at the inlet to the pneumatic control box. Quick connect/disconnect fittings and 1/4-inch nylon tubing are supplied with the scale for connecting the air cylinders to the pneumatic control box.

2 Installation



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Inspection

When the EZ-Clean scale is delivered, inspect it for any damage that might have occurred during shipping and handling. Inspect the following parts:

- Frame assembly (make sure it is not warped or bent)
- Load cell and suspension parts
- Load cell cables
- Load cell junction box
- Pneumatic control box
- Air cylinders and mounting hardware

If any parts are damaged or missing, contact your freight carrier immediately.

Site Selection

Many problems with floor scales are caused by site conditions. Make sure that the site where the scale will be installed meets the following guidelines:

- The floor should be level to within 1/4 inch from the highest to lowest corner.
- There should be provisions for proper drainage away from the scale area.
- There should be no strong vibrations or wind currents near the scale.
- The scale should not be subjected to excessive or unusual loading due to the location or type of equipment used.

Pit Construction

Before you begin constructing the pit, check with your METTLER TOLEDO representative to make sure that you have the correct foundation drawing for the EZ-Clean scale.

1. **Excavate a pit according to the foundation drawing for the specific scale being installed.**
2. Make provisions for a drain in the center of the pit floor, with the floor sloping to the drain.
3. Make provisions for two runs of conduit (3/4 inch EMT minimum) through the side wall of the pit. One conduit will go to the scale terminal and one to the pneumatic control box. Select a convenient location for the terminal and control box.
4. Attach the four shipping angle brackets to the quick-pit frame as shown on the foundation drawing. These brackets allow the frame to rest level with the surrounding floor while concrete is being poured.
5. Lower the quick-pit frame (with pivoting subframe attached) into the pit. Center the frame in the pit opening.
6. Using the frame as a guide, prepare forms for the following:
   - 8-inch side walls around the pit perimeter with 45-degree corners. The form should ensure that the underside of the triangular frame corner plates will be fully supported by concrete.
   - Carefully measure the dimension from the top of the quick-pit frame to where the bottom of the main air cylinder's mounting bracket meets the pit floor. This dimension is critical and must be held. The pit floor should slope from the side wall to the centrally located drain.
7. Use concrete that has a minimum strength of 3,000 psi at 28 days with 5 to 7% air entrainment. Pour the concrete so that it is level with the surrounding floor, making sure that the underside of the frame corner plates are completely supported by concrete.
8. Allow the concrete to cure fully before proceeding with installation.

Pneumatic Control Installation

A pneumatic control box is supplied with the EZ-Clean scale. The control box contains a pressure gauge, pressure regulator, and four-way valve to direct the airflow. A toggle switch inside the box controls the cylinders that raise and lower the scale platform.

1. Mount the pneumatic control box near the scale pit. It is available in a panel-mount design or wall-mount design. Both have mounting flanges with four 5/16-inch diameter bolt holes. Use four 1/4-inch mounting bolts or screws to secure the box to the mounting surface.
2. Attach the air supply to the 1/4 NPT female connection on the right side of the box (see Figure 2-1).
3. Attach 1/4-inch tubing to the 1/4-inch connections on the bottom of the box. This tubing will connect to the main cylinder(s) and safety cylinder(s) as shown in Figure 2-1.

When the platform is being raised, the UP supply line supplies air to extend the main cylinder(s) and retract the safety cylinder(s) so that the safety support channels will be engaged. When the platform is being lowered, the DOWN supply line supplies air to extend the safety cylinder(s), disengaging the safety support channels.

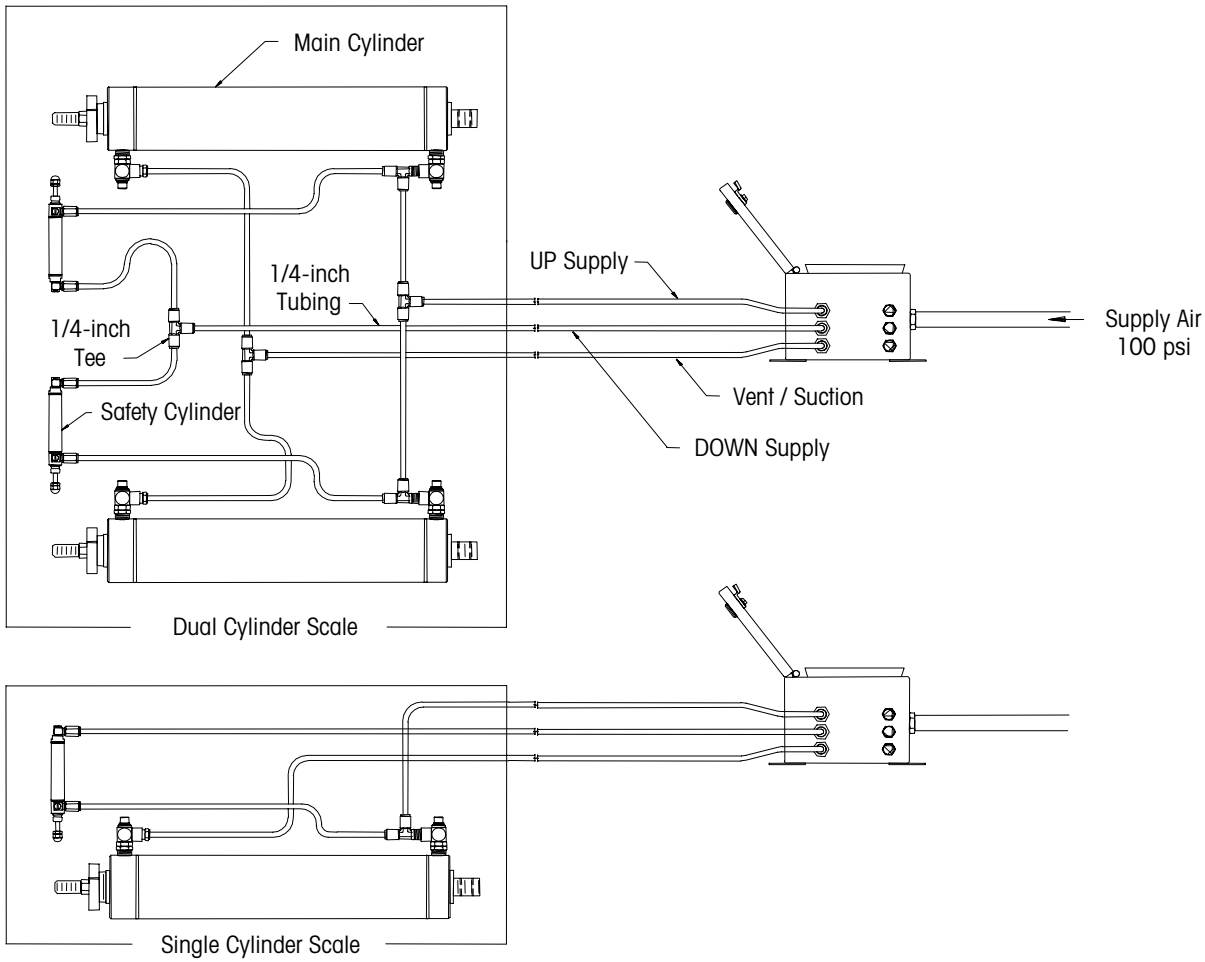
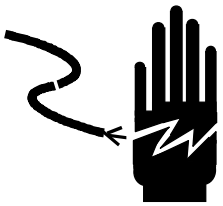


Figure 2-1: Pneumatic Cylinder Connections

Scale Installation



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Once the pneumatic control box has been mounted and the pit concrete has cured, complete the installation by installing the air cylinder assemblies and the scale platform.

1. Make sure that the pit has been poured to the dimensions shown in the pit drawing.
2. Remove the platform assembly from the pivoting subframe. To lift the assembly, insert eye bolts in the two threaded holes in the platform. Attach a chain and use a crane or forklift to move the platform assembly. Make sure that the pivoting subframe is seated against the quick-pit frame's corner plates.
3. Attach the rod end of each air cylinder to the subframe support tube (see Figure 2-2). Align the holes at the rod end of the cylinder with the hole on the support tube. Insert a pivot pin in the holes, and secure the pin with two hair-pin cotters.

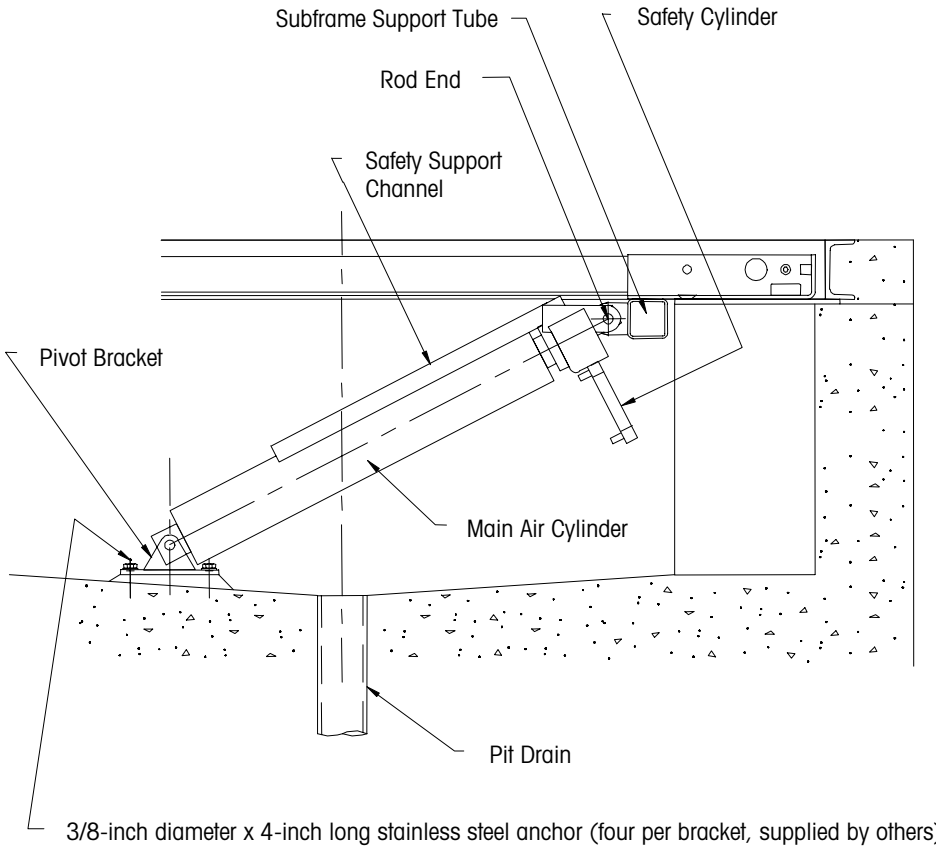


Figure 2-2: Air Cylinder Installation

4. Adjust each cylinder rod until it is approximately 1/4 inch from the bottomed position (fully retracted). Place the pivot brackets against the pit floor and use them as templates to mark the mounting hole locations. Make sure that the air cylinder assemblies are parallel to each other and square to the subframe support tube.
5. Drill mounting holes into the pit floor for 3/8-inch diameter x 4-inch long stainless steel WEJ-IT anchor bolts or equivalent. Anchor bolts are not provided with the scale. Follow the instructions supplied with the anchor bolts to ensure proper installation.
6. Bolt the cylinder pivot brackets to the pit floor.
7. Attach the 1/4-inch tubing from the pneumatic control box to the main cylinder(s) and safety cylinder(s) as shown in Figure 2-1. To connect the 1/4-inch Nylo-Flux tubing to the push-in tube fittings, simply push it in until it bottoms in the fitting.
8. Make an initial adjustment of the flow control valves on the main air cylinder(s) (see Chapter 3). Then apply air pressure to the cylinders to check for air leaks.
9. Run a six-conductor instrument cable through the conduit from the scale terminal to the pit side wall.
10. Replace the platform assembly on the pivoting subframe. Make sure the load pins are seated in the receivers.
11. Open the pneumatic control box and move the toggle switch to the UP position. This should pressurize the air cylinders and lift the platform to its full up position. Make final adjustments to the pressure regulator and flow control valves (see Chapter 3).
12. If the scale frame does not rest evenly on the front two corners, shim between the pivoting subframe and the quick-pit frame. Two 1/16-inch shims (part number TN202559) are shipped loose with each scale.
    - For 1,000-lb to 5,000-lb capacity scales, attach the shims to the bottom side of the pivoting frame using the 1/2-13 UNC flathead screws, nuts, and washers that are provided.
    - For 10,000-lb capacity scales, place shims between the pivoting subframe and the spacer plate using existing hardware.
13. Remove the access cover plate from the platform, and open the junction box.
14. Insert the instrument cable through one of the large drain holes located in the junction box channel next to the junction box assembly. Route the cable into the junction box enclosure and connect the wires according to the wiring code (see Table 2-2 and Figure 2-3).

Load Cell Wiring		Instrument Cable Wiring*	
Function	**Color**	**Function**	**Color**
+Excitation	Green	+Excitation	White
		+Sense	Yellow
+Signal	White	+Signal	Green
Shield	Yellow	Shield	Orange
-Signal	Red	-Signal	Black
		-Sense	Red
-Excitation	Black	-Excitation	Blue
		*Based on METTLER TOLEDO Cable Number 510624370	

Table 2-2: Wiring Codes

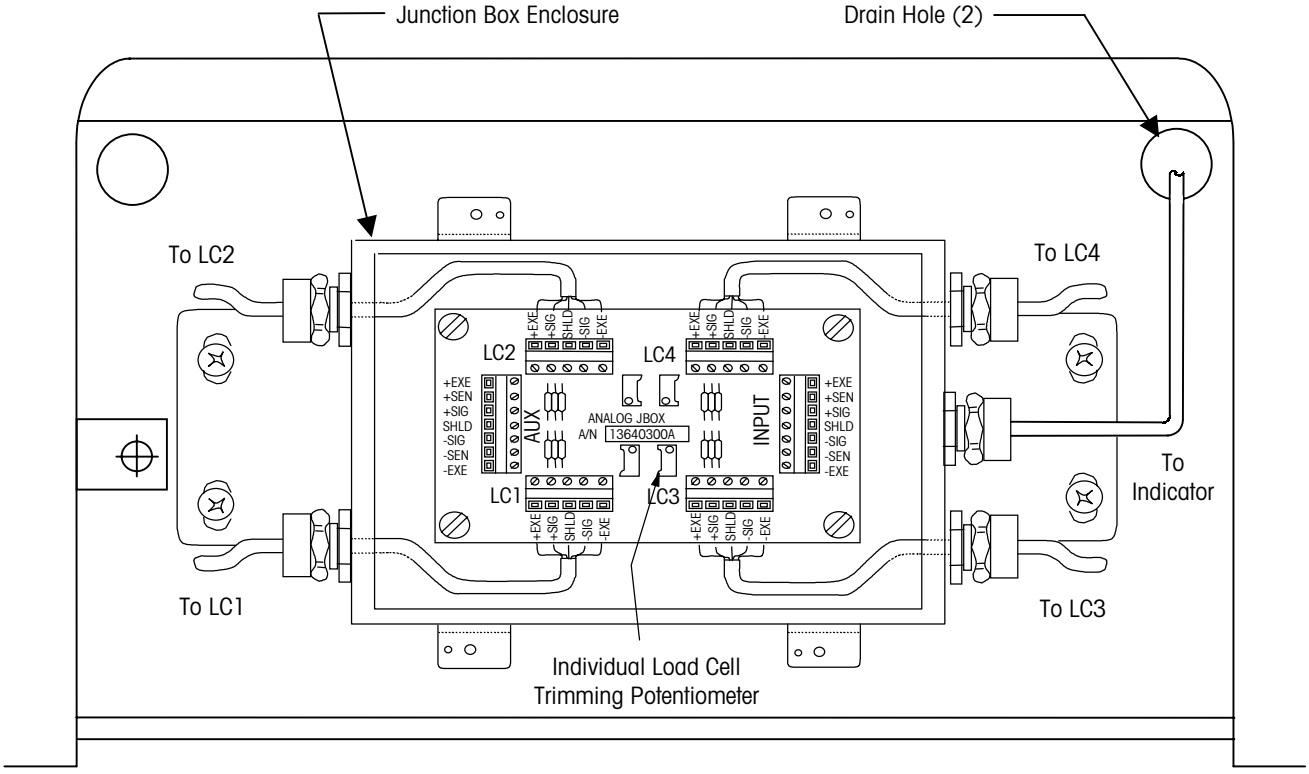
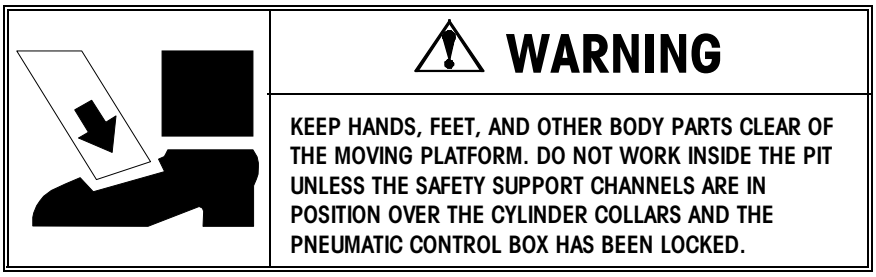


Figure 2-3: Junction Box Connections

15. Open the control box and move the toggle switch to the DOWN position to lower the scale platform. Then apply power to the scale terminal to confirm that the system is wired correctly. Leave the junction box cover off for the calibration procedure.



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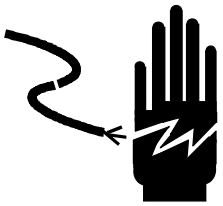
3 Operation and Adjustment

Operating the Pneumatic Lift



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Raising the Platform Assembly

1. Make sure that the scale platform is empty.
2. Unlock the front cover of the pneumatic control box, and move the toggle switch to the UP position. This will pressurize the main air cylinders, causing the platform assembly to pivot upwards.
3. As the main cylinders reach full extension (platform at approximately 40 degrees to the floor), the safety support channels will drop into position over the ends of the cylinder collar (see Figure 3-1). In this position, the safety support channels will prevent the platform assembly from lowering in case the system loses air pressure.

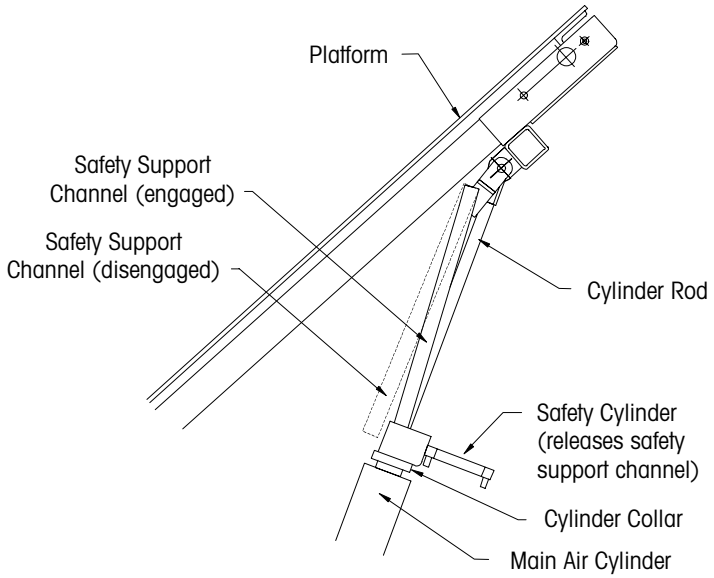
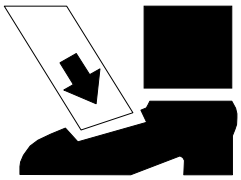


Figure 3-1: Side View of Raised Platform

4. Once the platform assembly is raised and the safety support channels are engaged, close the front cover of the pneumatic control box, lock it, and remove the key from the lock.



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Lowering the Platform Assembly

1. Make sure that there are no objects projecting into the pit area.
2. Unlock the front cover of the pneumatic control box, and move the toggle switch to the DOWN position. This will decrease the air pressure, retracting the main cylinders. It will also pressurize the safety cylinders, causing them to disengage the safety support channels so that the main air cylinders can be retracted.
3. Once the platform assembly is in the down position, close the front cover of the pneumatic control box, lock it, and remove the key from the lock. Place the key in a secure location so that only qualified individuals have access to it. Never leave the key in the control box lock while the scale is unattended.

Adjusting the Air Cylinders

System air pressure is controlled by the pressure regulator inside the pneumatic control box and measured by the pressure gauge attached to the regulator. When you install an EZ-Clean floor scale, you will need to adjust the pressure regulator and the flow control valves on the main air cylinders. A scale measuring 4 x 4 feet with a 5,000-lb capacity should operate properly with air pressure set to 40 to 60 psi. Larger scales with higher capacities can require as much as 100 psi to effectively raise the platform.

1. When you install the air cylinders, make an initial adjustment of the flow control valves on the cylinders (see Figure 3-2). Turn the flow control valves on each main air cylinder clockwise until they are fully closed. Then open the valves by turning them counterclockwise approximately 3 to 4 turns.

Note: For dual-cylinder systems, the flow control valve settings should be the same for both cylinders. Make sure that both cylinders are adjusted to the same lifting/lowering speeds.

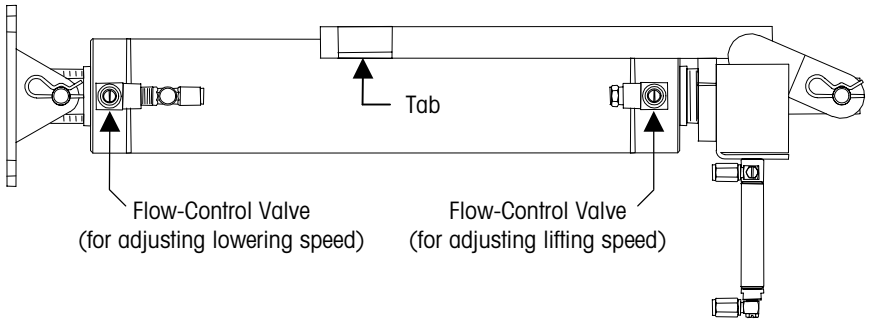


Figure 3-2: Air Cylinder Adjustments

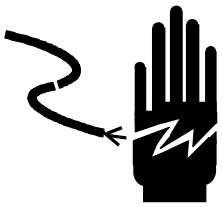
2. After installing the scale platform, move the toggle switch inside the pneumatic control box to the UP position. Then turn the pressure regulator to increase the air pressure until the platform raises up completely.

   IMPORTANT: Once the platform is up all the way, make sure that the small tabs on the safety support channels are positioned so that they will be in line with the safety cylinder shaft ends when the shafts are extended for lowering the platform.

3. Lower the platform by moving the toggle switch to the DOWN position. Note the time it takes to raise and lower the platform. Adjust the raising and lowering speeds so that each action takes about 15 seconds.

   - To increase the raising speed, adjust the pressure regulator to increase the air pressure or turn the top flow control valve counterclockwise.
   - To increase the lowering speed, turn the bottom flow control valve counterclockwise.

4 Calibration



⚠ WARNING

PERMIT ONLY QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS, AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

Shift Adjustment

When you shift adjust a scale, you are adjusting the output voltage (signal) of each load cell so that all load cells in the system produce a consistent signal. A correctly adjusted scale will give the same weight reading no matter where on the platform you place a test weight. Each EZ-Clean scale is shift adjusted at the factory. For a new installation, the only adjustment that should be needed is minor load cell trimming.

After the scale has been installed and shimmed, check all mechanical parts to make sure that they work properly. Then check the scale's repeatability by placing a test weight on the same location on the platform several times to make sure that you get the same weight reading each time. After checking for repeatability, adjust the load cell trimming potentiometers as needed.

Load Cell Trimming

Use the following procedure to trim the load cells:

1. Remove the access plate from the scale platform, and open the junction box.
2. Figure 4-1 shows test weight locations (A, B, C, and D) at the center of each quadrant of the scale platform. Place a test weight (equal to half the rated scale capacity) at location A and record the weight reading. Then move the test weight to location B and record the weight reading. Continue until you have taken a weight reading at each of the four locations.

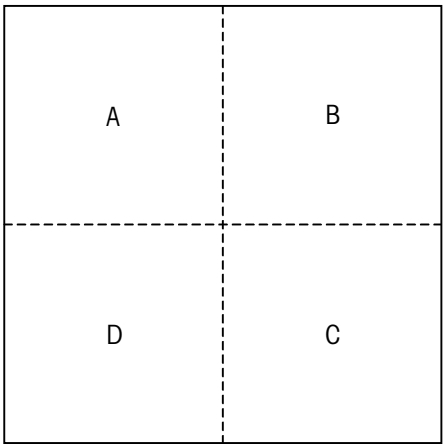


Figure 4-1: Test Weight Locations

3. Place the test weight at the location immediately clockwise from the location at which you got the lowest weight reading. Then adjust the trimming potentiometer for the load cell that corresponds to the corner of the scale where the test weight is positioned (see Figure 4-2). Make the adjustment by turning the potentiometer until the weight reading matches the lowest reading.

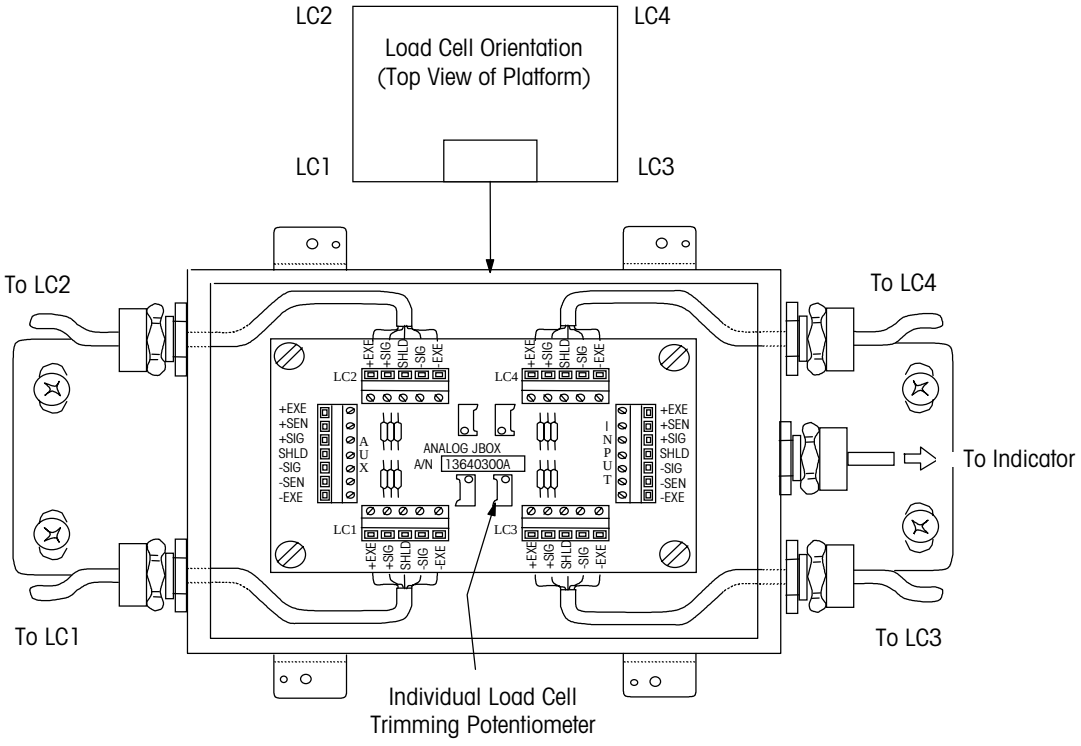


Figure 4-2: Load Cell Trimming Potentiometers

4. Proceeding clockwise, repeat the adjustment described in Step 2 for the next two test weight locations.

   NOTE: Because the trimming potentiometers interact with each other, any adjustment will affect the weight readings at all four corners of the scale.

5. Repeat Steps 1 to 3 until the weight readings at all corners of the platform are the same or are within the specified National Institute of Standards and Technology (NIST) Handbook 44 Scale Accuracy Requirements.

6. Replace the junction box lid and platform access plate.

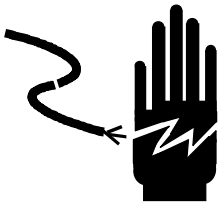
Scale Calibration

To calibrate the scale, we recommend using test weights equal to the scale capacity. Follow the calibration instructions in the manual provided with the scale terminal.

5 Routine Care and Maintenance

General

Once the scale has been installed, an authorized METTLER TOLEDO representative should inspect and calibrate it periodically. If the scale is used for legal-for-trade purposes, consult the local Weights and Measures Authorities for minimum inspection requirements.



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Inspection

Make sure that the scale site is in good condition. Check for changes to the surrounding floor, excessive vibrations, and possible overloading conditions.

Inspect the scale for the following:

- Are there any unusual wear points, paths, or marks on the weighing surface?
- Is the scale frame bent or damaged?
- Is the junction box lid properly sealed and all cable connectors tight?
- Is there any moisture or foreign material around or inside the junction box?
- Is the instrument cable damaged? Is it binding the scale?
- Has any debris or material built up under the platform, preventing it from moving freely?
- Is the pit's floor drain clear and providing adequate drainage?
- Visually inspect the load cells, rocker pins, and fixed bumpers for signs of unusual wear.

Perform shift adjustments and final calibration according to the manual for the METTLER TOLEDO scale terminal.

Load Cell Replacement

Use the following procedure to replace a defective load cell:

1. Make sure the platform is in the DOWN position and the pneumatic control box is locked.
2. Remove power from the scale terminal and disconnect the instrument cable.
3. Remove the access plate from the platform, and open the junction box.
4. Locate the cable for the defective load cell and disconnect it from the terminal strip on the PCB inside the junction box.
5. Loosen the watertight cable connector on the end of the junction box and remove the cable from the box.
6. Carefully remove the scale platform assembly from the subframe. To lift the assembly, insert eye bolts in the two threaded holes in the platform. Attach a chain and use a crane or forklift to move the platform assembly. Place the platform on a stable surface that allows access to the defective load cell and cable. Make sure that the other load cells are protected from damage.
7. Tie a string to the end of the defective load cell's cable. The string should be strong enough and long enough to pull the new load cell's cable through the platform structure.
8. Remove the two load cell mounting screws (see Figure 5-1). Lift the load cell from the mounting surface.

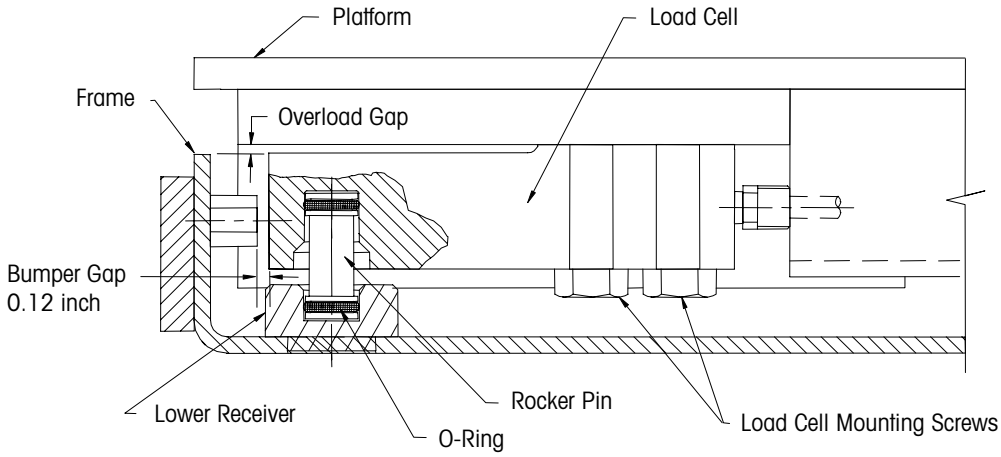


Figure 5-1: Load Cell Installation

9. Carefully pull the defective load cell's cable through the platform structure, while feeding the string in at the junction box opening. Once the string reaches the load cell mounting location, untie it from the load cell cable.
10. Remove the rocker pin from the defective load cell and place it in the new load cell.
11. Tie the string to the new load cell's cable, and carefully pull the new cable through the platform structure to the junction box opening.
12. Coil any excess cable and store it in the platform's side channel.
13. Bolt the load cell to the platform. Apply FDA-approved grease to the threads of the mounting screws and tighten them with a calibrated torque wrench (see Table 5-1).

Mounting Screw Size and Material	Torque
1/2-13 Stainless Steel	75 ft-lb
3/4-10 Stainless Steel	200 ft-lb
1/2-13 Carbon Steel	100 ft-lb
3/4-10 Carbon Steel	250 ft-lb

Table 5-1: Torque for Load Cell Mounting Screws

14. Make sure the load cell's overload gap is correct (see Figure 5-1 and Table 5-2).

Scale Capacity	Load Cell Capacity	Overload Gap
1,000 lb	500 lb	0.009 to 0.015 inch
2,500 lb	1,250 lb	0.012 to 0.018 inch
5,000 lb	2,500 lb	0.017 to 0.023 inch
10,000 lb	5,000 lb	N/A
20,000 lb	10,000 lb	N/A

Table 5-2: Load Cell Gap

15. Thread the load cell cable through the connector on the junction box far enough so that you will be able to connect its wires to the terminal strip on the PCB. Then tighten the connector.

16. Wire the load cell cable to the proper terminal strip according to the wiring code shown in Table 5-3.

Load Cell Wiring		Instrument Cable Wiring*	
Function	**Color**	**Function**	**Color**
+Excitation	Green	+Excitation	White
		+Sense	Yellow
+Signal	White	+Signal	Green
Shield	Yellow	Shield	Orange
-Signal	Red	-Signal	Black
		-Sense	Red
-Excitation	Black	-Excitation	Blue
		*Based on METTLER TOLEDO Cable Number 510624370	

Table 5-3: Wiring Codes

17. Replace the platform assembly on the subframe. Make sure that the rocker pins are properly seated and aligned with the receivers in the frame.

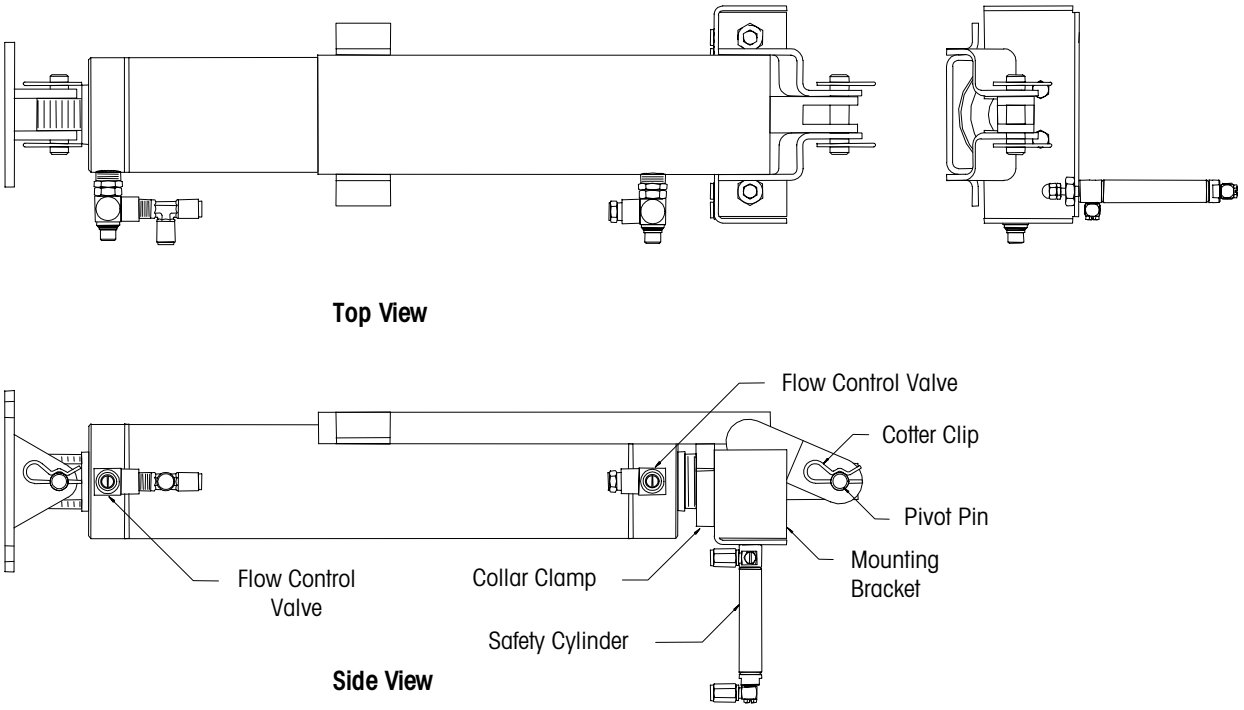
18. Attach the instrument cable and power up the scale terminal.

19. Perform a shift adjustment and recalibrate the scale.

Main Air Cylinder Replacement

Use the following procedure to replace a defective main air cylinder:

1. Make sure the platform is in the DOWN position and the pneumatic control box is locked. This will depressurize the system and allow you to remove the cylinder.
2. Remove the scale platform assembly from the subframe. To lift the assembly, insert eye bolts in the two threaded holes in the platform. Attach a chain and use a crane or forklift to move the platform assembly.
3. Remove the flow control valve (with air lines attached) from the base of the defective cylinder (see Figure 5-2). The valve and air lines will be used on the new cylinder.



NOTE: The safety cylinder and flow control valves will be located on either the right or left side of the main cylinder, whichever side is farthest from the pit wall.

Figure 5-2: Main Air Cylinder

4. Remove the safety cylinder mounting bracket (with cylinder attached) from the collar at the rod end of the cylinder. The air lines to the safety cylinder can remain attached. Remove the collar from the main cylinder.
5. Remove the flow control valve (with air lines and tee attached) from rod end of the defective cylinder. The valve and air lines will be used on the replacement cylinder.
6. Remove the cotter clips from the pivot pins at both ends of the main cylinder. Slide the pivot pins out, and remove the defective cylinder and the safety support channel.
7. Thread the collar onto the new main air cylinder. Attach the safety cylinder mounting bracket to the collar.

8. Position the new main cylinder in the mounting brackets, and reinstall the pivot pins and cotter clips. Be sure to reinstall the safety support channel at the rod end of the cylinder.
9. Attach the flow control valve (with air lines attached) to the intake port of the new cylinder. Attach the flow control valve (with air lines and tee attached) to the exhaust port.
10. Open the pneumatic control box switch and move the toggle switch to the UP position to pressurize the cylinder. Verify that the safety cylinder engages the safety support channel properly.
11. Lower the scale to the DOWN position and lock the control box.
12. Lower the scale platform assembly onto the subframe.
13. Make sure the new main air cylinder and the safety cylinder work properly.

Safety Cylinder Replacement

Use the following procedure to replace a defective safety cylinder:

1. Make sure the platform is in the DOWN position and the pneumatic control box is locked. This will depressurize the system and allow you to remove the cylinder.
2. Remove the scale platform assembly from the subframe. To lift the assembly, insert eye bolts in the two threaded holes in the platform. Attach a chain and use a crane or forklift to move the platform assembly.
3. Disconnect the air lines from the defective safety cylinder (see Figure 5-2). To disconnect, simply hold the insert with two fingers and pull the tubing out of the connector.
4. Remove the safety cylinder from the main cylinder mounting bracket. Save all mounting hardware and connector fittings from the defective cylinder.
5. Attach the mounting hardware and fittings to the new safety cylinder.
6. Mount the new safety cylinder to the main air cylinder mounting bracket.
7. Connect the air lines to the new safety cylinder by pushing the nylon tubing in until it bottoms in the connector.
8. Open the pneumatic control box and move the toggle switch to the UP position to pressurize the cylinder. Make sure the new safety cylinder works properly.
9. Lower the scale platform assembly onto the subframe, and check the system's operation again.

6 Troubleshooting

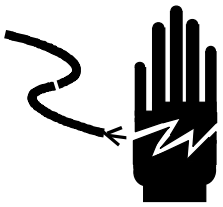
General

If the scale does not operate properly, find out as much about the problem as possible. Determine whether the problem is constant or intermittent. Be aware that problems can be caused by mechanical or electrical influences.

When troubleshooting an EZ-Clean scale, check for the following:

- Water
- Corrosive materials
- Unlevel floor
- Strong vibrations or wind currents
- Physical damage to the scale platform or frame

Check the instrument cable for damage, and check all connections for any loose or incorrect wiring.



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⚠ CAUTION

BEFORE CONNECTING OR DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM OR DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

Isolate the Problem

Determine whether the problem is in the scale or the scale terminal.

1. Remove power from the system, and then disconnect the scale from the terminal.
2. Connect the terminal to a load cell simulator.
3. Reapply power and test the terminal.
4. If the problem persists, its source is probably in the terminal. Consult the terminal's manual for further troubleshooting assistance.

Check Wiring

1. Remove power from the system.
2. Remove the access cover plate from the platform.
3. Open the junction box and check for moisture or foreign material inside the box.
4. Make sure that all wiring connections are tight and that no insulation material is touching the terminal contacts.
5. Make sure that all wires are connected to the correct terminals inside the junction box (refer to Table 6-1).

Load Cell Wiring		Instrument Cable Wiring*	
Function	**Color**	**Function**	**Color**
+Excitation	Green	+Excitation	White
		+Sense	Yellow
+Signal	White	+Signal	Green
Shield	Yellow	Shield	Orange
-Signal	Red	-Signal	Black
		-Sense	Red
-Excitation	Black	-Excitation	Blue
		*Based on METTLER TOLEDO Cable Number 510624370	

Table 6-1: Wiring Codes

6. Check all cable connectors on the junction box and tighten any loose connectors.

Check Load Cells

Check each load cell for proper bridge resistances (see Table 6-2).

Measuring Points	Resistance
+Exc (Green) to –Exc (Black)	385 ohms minimum
+Sig (White) to –Sig (Red)	348-352 ohms

Table 6-2: Bridge Resistances

If bridge resistances are within specification, perform a "shorted signal" symmetry check:

1. Check for a possible shorted lead by measuring resistance values between each lead and shield. Values should be approaching infinity.
2. Short the signal leads together. Place one multimeter lead on the shorted signals and one lead on the +Excitation wire. Note the resistance value. Place one multimeter lead on the shorted signals and one lead on the –Excitation wire. Both resistance values should be equal within 10 ohms.
3. If the cells pass Steps 1 and 2, reapply power to the scale platform. Confirm that proper excitation voltage is reaching the load cells by placing multimeter leads on the excitation positions of each load cell terminal (excitation voltage can vary from 5 VDC to 15 VDC depending on the application and scale terminal used).
4. If proper excitation voltage is reaching the load cells, check the output signal. If one cell has a particularly high or low dead-load output, it is suspect. The maximum output possible from any cell is 30 mV at 15 VDC excitation and loaded to gross capacity.
5. If any cell has an unusual signal, remove all load from that cell by raising the platform. With the power still on, measure the output from the suspect load cell. The "no-load" zero output should be ±1.5% of the full scale output. For example, if the excitation voltage is 15 VDC, then the full scale output is 30 mV. Therefore, the no-load zero output should be within ±0.45 mV. Replace the load cell if it is out of specification.

Replace any load cells that fail any part of this test.

Check Mechanical Components

Because the EZ-Clean design is so simple, only a few mechanical components require troubleshooting. Make sure that the platform can move freely and that the load cells do not rest against the fixed bumpers. If the load cells touch the fixed bumpers with no motion in the scale platform, check the following:

- Is the platform level? If not, re-shim it.
- Check the rocker pins for unusual wear. Replace any rocker pins that are unevenly worn or have flattened bearing surfaces.
- Inspect the platform for physical damage. Replace the platform if it is bent or has broken welds.

Check Pneumatic Components

Table 6-3 lists potential problems with the pneumatic system and the probable causes and solutions. Refer to Figure 2-2 for a schematic drawing of the pneumatic system. Note that the air cylinders cannot be repaired and must be replaced when defective.

Problem	Possible Cause	Solution
Main cylinders will not extend or retract.	No air pressure or low pressure.	Adjust air pressure regulator.
	Faulty pneumatic switch.	Replace switch in control box.
	Punctured air line.	Replace air line.
	Leaking connector.	Tighten or replace connector.
	Worn cylinder.	Replace main cylinder.
	Damaged or bent cylinder rod.	Replace main cylinder.
	Live load on platform.	Remove live load before lifting.
	Cylinder improperly placed in pit.	Refer to pit drawings.
Safety cylinders will not extend or retract.	No air pressure or low pressure.	Adjust air pressure regulator.
	Faulty pneumatic switch.	Replace switch in control box.
	Punctured air line.	Replace air line.
	Leaking connector.	Replace connector.
	Worn cylinder.	Replace safety cylinder.
	Damaged or bent cylinder rod.	Replace safety cylinder.
	Foreign material in flow control valve.	Clean flow control valve.
Platform lifts too fast.	Air pressure too high.	Adjust air pressure regulator.
	Flow-control valves on main air cylinders are maladjusted or worn.	Adjust or replace flow control valves.
Platform lowers too fast.	Flow control valves are maladjusted or worn.	Adjust or replace flow control valves.
	Worn main cylinder.	Replace main cylinder.

Table 6-3: Pneumatic System Troubleshooting

7 Parts

Refer to the following drawings and tables when ordering parts for an EZ-Clean floor scale.

Load Cell and Rocker Pin Assembly

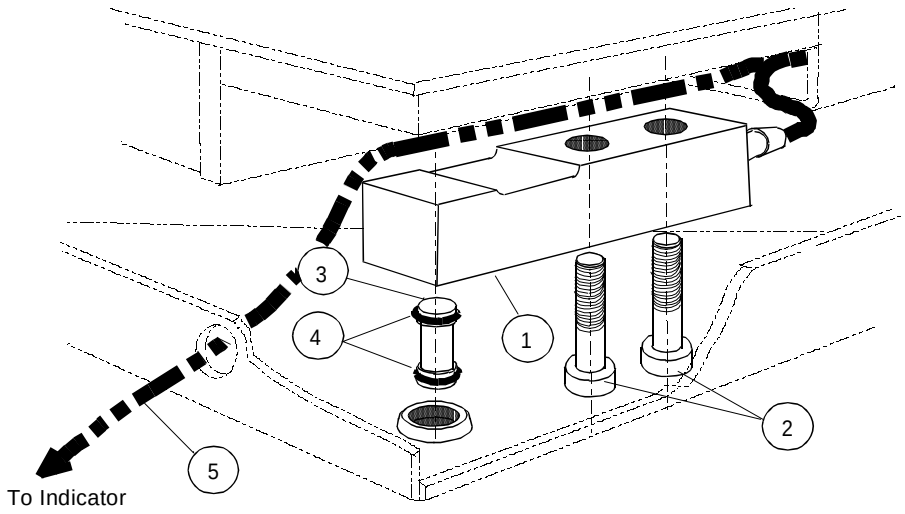


Figure 7-1: EZ-Clean Load Cell and Rocker Pin Assembly

Item No.	Part Number	Description	Qty.
1	TB600488	250-lb Load Cell (5,000d) with 7.5-foot cable	4
	TB600488-1	250-lb Load Cell (5,000d) with 15-foot cable	
	TB600529-2	500-lb Hermetic Load Cell (5,000d) with 7.5-foot cable	
	TB600529-3	500-lb Hermetic Load Cell (5,000d) with 15-foot cable	
	TB600363-1	1,250-lb Hermetic Load Cell (5,000d) with 7.5-foot cable	
	TB600363	1,250-lb Hermetic Load Cell (5,000d) with 15-foot cable	
	TB600342-1	2,500-lb Hermetic Load Cell (5,000d) with 7.5-foot cable	
	TB600342	2,500-lb Hermetic Load Cell (5,000d) with 15-foot cable	
	TB600343-1	5,000-lb Hermetic Load Cell (5,000d) with 7.5-foot cable	
	TB600343	5,000-lb Hermetic Load Cell (5,000d) with 15-foot cable	
	TB600364-1	10,000-lb Hermetic Load Cell (5,000d) with 15-foot cable	
	TB600647-2	220-kg Hermetic Load Cell (C3 R60 OIML) with 7.5-foot cable	
	TB600647-3	220-kg Hermetic Load Cell (C3 R60 OIML) with 15-foot cable	
	TB600454-2	550-kg Hermetic Load Cell (C3 R60 OIML) with 7.5-foot cable	
	TB600454	550-kg Hermetic Load Cell (C3 R60 OIML) with 15-foot cable	
	TB600455-2	1,100-kg Hermetic Load Cell (C3 R60 OIML) with 7.5-foot cable	
	TB600455	1,100-kg Hermetic Load Cell (C3 R60 OIML) with 15-foot cable	
	TB600456-2	2,200-kg Hermetic Load Cell (C3 R60 OIML) with 7.5-foot cable	
	TB600456	2,200-kg Hermetic Load Cell (C3 R60 OIML) with 15-foot cable	
	TB600457-2	4,400-kg Hermetic Load Cell (C3 R60 OIML) with 7.5-foot cable	
	TB600457	4,400-kg Hermetic Load Cell (C3 R60 OIML) with 15-foot cable	
2	MZ0901010333	Bolt, 1/2-13 x 1.75 inches long, carbon steel (0.25K-2.5K load cell)	8
	MZ0901010409	Bolt, 1/2-13 x 2 inches long, carbon steel (5K load cell)	
	MZ0901010430	Bolt, 3/4-10 x 2.5 inches long, carbon steel (10K load cell)	
	TN800646	Bolt, 1/2-13 x 1.75 inches long, stainless steel (0.25K-2.5K load cell)	
	TN800649	Bolt, 1/2-13 x 2 inches long, stainless steel (5K load cell)	
	TN800655	Bolt, 3/4-10 x 2.5 inches long, stainless steel (10K load cell)	
3	TN200050	Rocker Pin (0.25K-2.5K load cell)	4
	MN21018	Rocker Pin (5K load cell)	
	TN201975	Rocker Pin (10K load cell)	
4	MZ0909000005	O-Ring (0.25K-5K load cell)	8
	MZ0909000050	O-Ring (10K load cell)	
5	510624370	Shielded Home Run Cable, 24 gauge, six conductor	Varies

Table 7-1: EZ-Clean Load Cell and Rocker Pin Assembly

Junction Box and Quick-Pit Frame Hardware

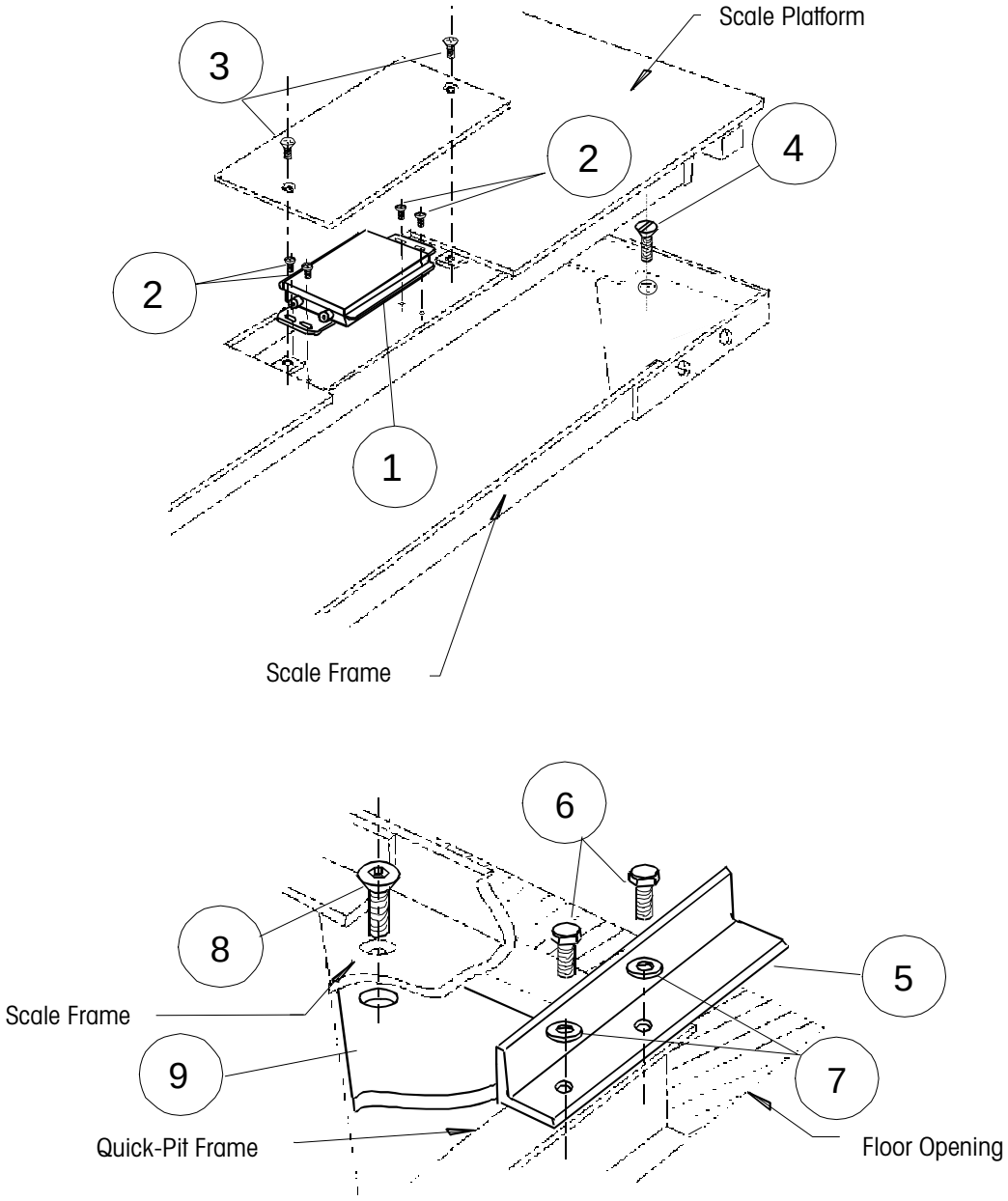


Figure 7-2: EZ-Clean Junction Box and Quick-Pit Frame Hardware

Junction Box

Item No.	Part Number	Description	Qty.
1	TB100395	Analog Junction Box Assembly (Model 2158): *13640300A Analog PCB TA800218 Desiccant Bag	1
	TB100515-5	DigiTOL Junction Box Assembly (Model 2160): *13839900A DigiTOL PCB TA800218 Desiccant Bag	
	09-000001	IDNet Junction Box Kit of Parts (Model 2162): TB100569-4 IDNet Junction Box Assembly ME200308 Lock Nut ME209911 Washer ME504235 Cable, IDNet x 5 meters long	
2	MZ0901010379	Phillips Head Screw, 1/4-20 x 1/4 inch long	4
3	MZ0901010035	Flat Head Screw, 3/8 x 3/4 inch long	2
4	MZ0901010298	Flat Head Screw, 1/2-13 x 1.5 inches long	8

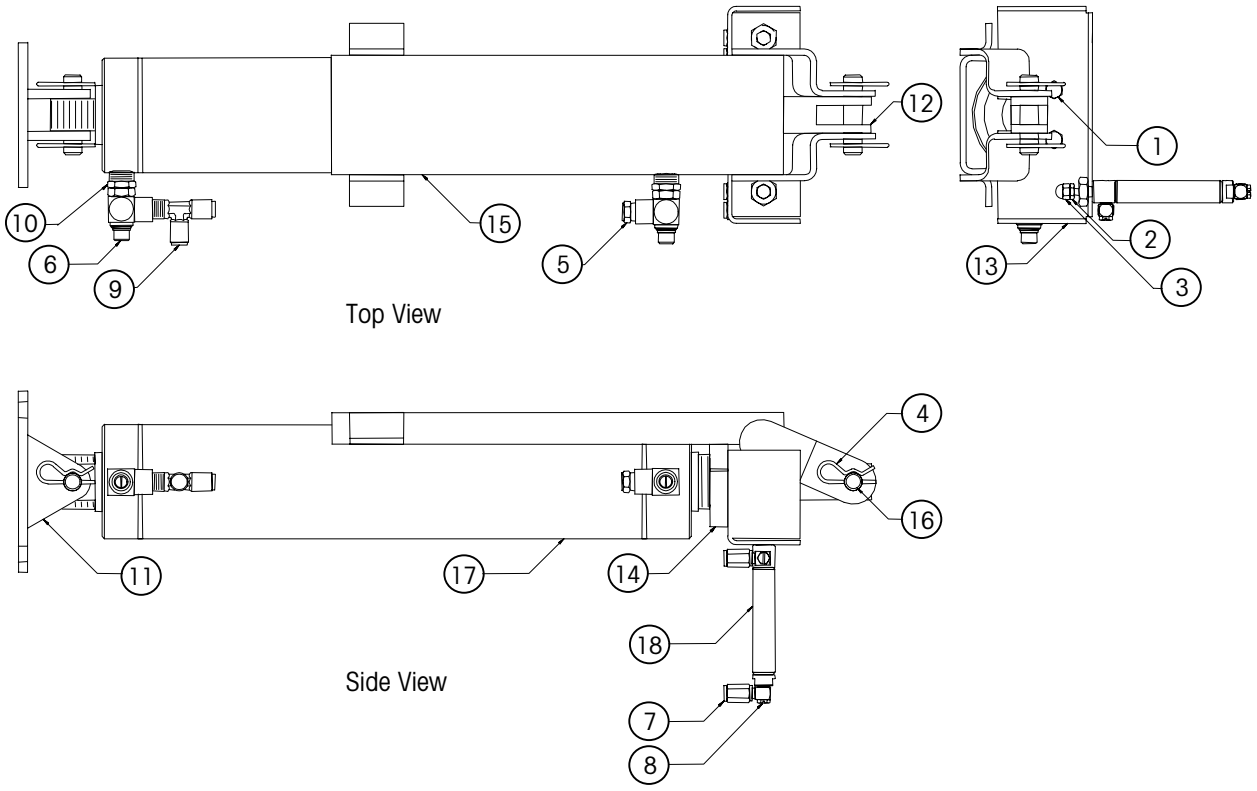
Quick-Pit Frame Hardware

5	TN202623	Shipping Angle	4
6	MZ0901010033	Hex Head Screw, 3/8-16 x 3/4 inch long	8
7	MZ0901030011	Zinc Washer, 3/8 inch	8
8	MZ0901010449	Flat Head Screw, Hex Socket, 1/2-13 x 3/4 inch long**	8
9	TN202420	Spacer Plate, 5/8 inch (UHMW poly)**	4

* May have alpha prefix. **Parts for 10K capacity only.

Table 7-2: EZ-Clean Junction Box and Quick-Pit Frame Hardware

Cylinder Assemblies



NOTE: The safety cylinder and flow control valves will be located on either the right or left side of the main cylinder, whichever side is farthest from the pit wall. This is indicated in the part number by –R or –L (–R cylinder shown above).

Figure 7-3: EZ-Clean Cylinder Assemblies

Item No.	Part Number	Description	Qty.
1	MZ0901010127	Hex Head Cap Screw, 1/4-20 x 1/2 inch, SS	2
2	MZ0901020033	Hex Nut, 10-32, SS	1
3	MZ0901020088	Hex Nut, Acorn, 10-32, SS	1
4	MZ0904000065	Cotter Pin, #3, 0.091 inch diameter, SS	4
5	MZ1405000167	Straight Fitting, 1/4 Tube, 1/4 NPT Male, Nickel Plate	1
6	MZ1003000020	Flow Control Valve, 1/4 NPT, Recessed	2
7	MZ1405000154	Fitting, 1/4 Tube, 10-32 Male, Nickel Plate	2
8	MZ1405000156	Adjustable L-Fitting, 10-32, Nickel Plate	2
9	MZ1405000157	Male Run Tee, 1/4 to 1/4 NPT, Nickel Plate	1
10	MZ1405000158	Reducer, 3/8 Male, 1/4 NPT Female, SS	2
11	TA202380	Pivoting Cylinder Mounting Bracket, SS	1
12	TA202382	Cylinder Rod Clevis, SS	1
13	TA202388	Air Cylinder Mounting Bracket, SS	1
14	TA202389	Collar Clamp, AISI 308 SS	1
15	TB202280* TB202386** TB202387*** TB305160****	Support Channel, 3 feet, SS Support Channel, 4 feet, SS Support Channel, 5 feet, SS Support Channel, 6 feet, SS	1
16	TN202381	Pivot Pin, 1/2 x 2-3/16 inches long, SS	2
17	TN202398* TN202397** TN202305*** TN305161****	Air Cylinder, 3-inch bore x 12-inch stroke Air Cylinder, 3-inch bore x 16-inch stroke Air Cylinder, 3-inch bore x 20-inch stroke Air Cylinder, 3-inch bore x 24-inch stroke	1
18	TN202663	Air Cylinder, 9/16-inch bore x 2-inch stroke	1

* Used with 3-foot-wide platforms (-3R).

** Used with 4-foot-wide platforms (-4L/-4R).

*** Used with 5-foot-wide platforms (-5L/-5R).

**** Used with 6-foot-wide platforms (-6L/-6R).

Note: The width is the lesser of the two platform dimensions.

Table 7-3: EZ-Clean Cylinder Assemblies

Pneumatic Control Box

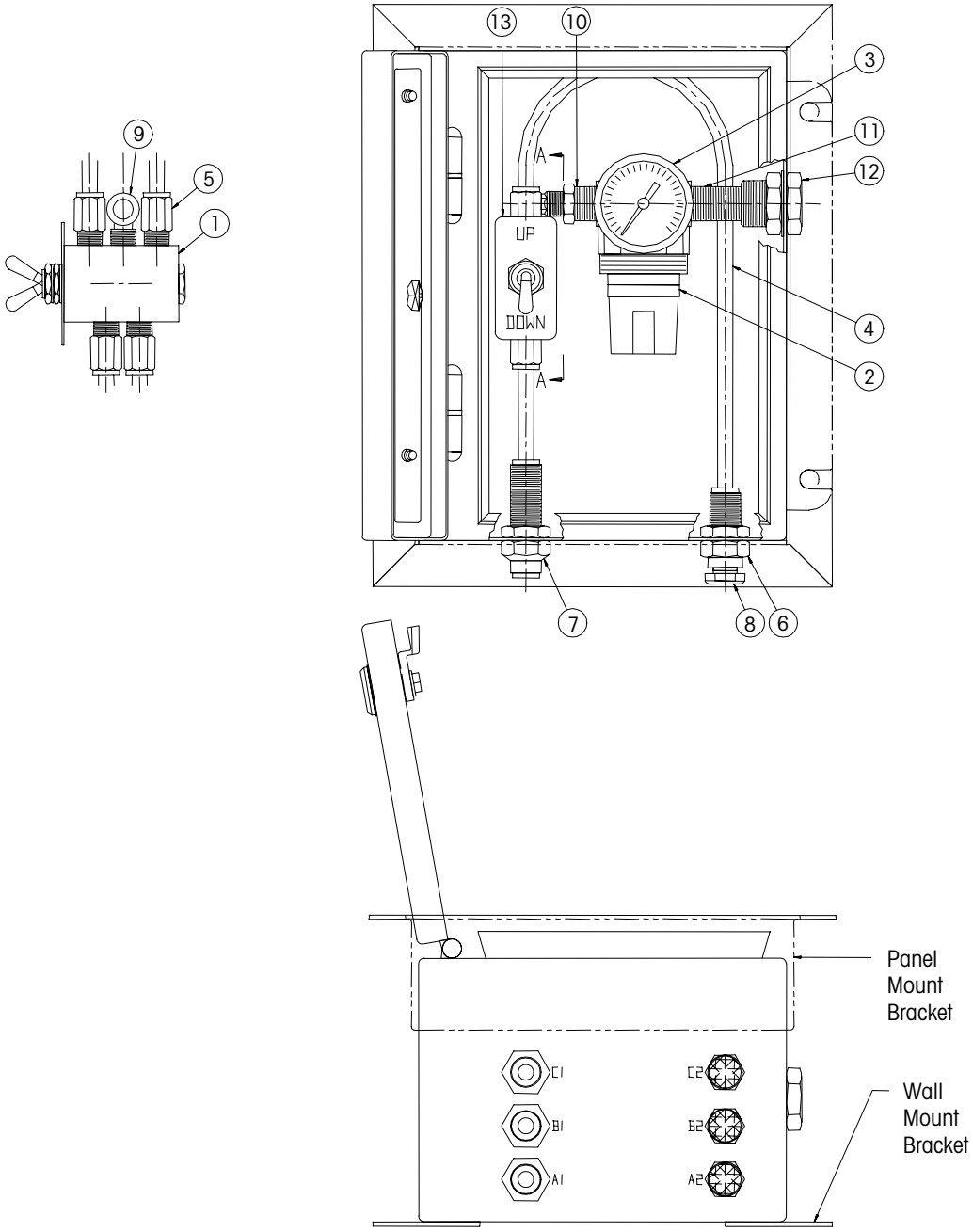


Figure 7-4: EZ-Clean Pneumatic Control Box

Item No.	Part Number	Description	Qty.
1	MZ1003000017	Valve, Four-Way, Two-Position, Toggle Switch, Five 1/8-inch Ports	1
2	MZ1003000018	Pressure Regulator, 0-125 psi, 1/4 NPT	1
3	MZ1003000109	Pressure Gauge, 0-160 psi, 1/8 NPT, 1.5-inch diameter	1
4	MZ1206000008	Nylo-Flux Tubing 1/4 inch x 104 feet long	1
5	MZ1405000141	Straight Fitting, 1/4 Tube, 1/8 NPT Male	4
6	MZ1405000160	Bulkhead Fitting, 1/8 NPT, 1/4 Tube, Nickel Plate	3
7	MZ1405000161	Bulkhead Fitting, 1/4 Tube, 1/4 Tube, Nickel Plate	3
8	MZ1405000162	Muffler Fitting, 1/8 NPT, Nickel Plate	3
9	MZ1405000163	Elbow Fitting, 1/8 NPT Male	1
10	MZ1405000164	Bushing Fitting, 1/4 Male, 1/8 Female	1
11	MZ1405000165	Long-Nipple Fitting, 1/4 NPT, 1.50L	1
12	MZ1405000166	Bulkhead Fitting, 1/4 NPT, Nickel Plate	1
13	TN800707	UP-DOWN Label, 20 Gauge x 1 x 2, SS	1
–	MZ1405000155	Union-Tee Fitting, 1/4 Tube, Nickel Plate	3
–	TB100647 TB100655	Junction Box, Wall Mount, 5 x 6 x 8 inches Junction Box, Panel Mount, 5 x 6 x 8 inches	1

Table 7-4: EZ-Clean Pneumatic Control Box

METTLER TOLEDO

Publication Suggestion Report

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Publication Name: METTLER TOLEDO EZ-Clean Floor Scale Installation and Service Manual

Publication Part Number: B14604400A **Publication Date: 8/99**

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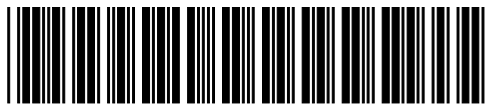

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