



437/737

BENCH SCALE

INSTALLATION and

MAINTENANCE MANUAL

Emery Winslow Scale Company

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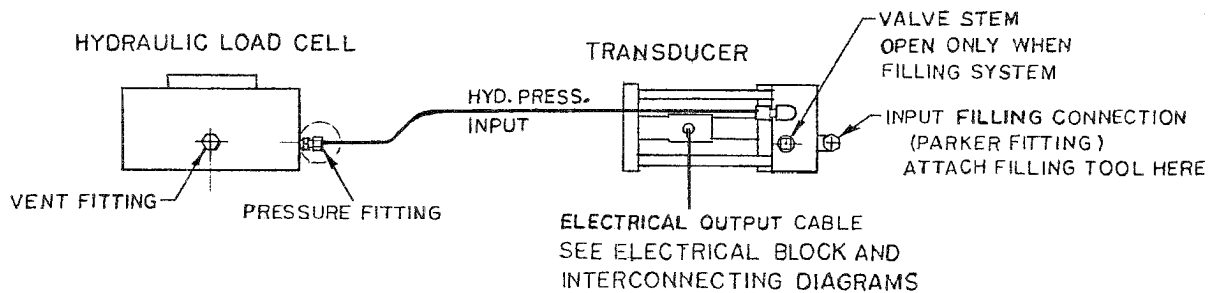
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SECTION 1 - COMPONENT INTRODUCTION

Description

Emery Winslow weigh scales are designed for durability and long life. They use several high precision Hydrostatic™ Load Cells and a Hytronic® Totalizer to measure the weight on the scale.

Functional Overview



- 1) The mass to be weighed is placed on the scale.
- 2) The Hydrostatic™ Load Cell is compressed under the load and outputs a pressure signal.
- 3) The pressure signal is transmitted, via capillary tubing, to a Hytronic® Transducer.
- 4) The Transducer outputs an electrical millivolt signal to the instrumentation.
- 5) The electrical signal is directly proportional to the weight of the mass.

Weighing System Components

1. Weighsquare: The weighsquare typically consists of a removable cover, one (1) hydrostatic load cell, and assembly consisting of a top frame, two (2) torque arms and a base frame.

2. Hydrostatic™ Load Cell: The Model 102 Hydrostatic™ Load Cell consists of a head assembly, a base assembly and a diaphragm.



The load cell works on the formula-

$$\text{pressure (PSI)} = \text{load (lb)} \div \text{area (sq in)}$$

The area of the cell is constant, therefore, the pressure output is proportional to the load. The vertical motion of the load cell is less than 0.010" from no load to full load conditions.

Load Cell Gauging: The load cell must be filled with a precise amount of cell fluid to function as designed. To determine if the cell is filled with the recommended amount of fluid, a procedure called "Gauging" is used. The process of "Gauging a load cell" is similar to gapping a spark plug. A go/no-go gauge, such as a feeler gauge, is used to precisely determine the distance between 2 points in the load cell body.

Cell Fluid: The typical cell fluid used in the scale is Emery Winslow BL-15. This inert blue fluid is supplied with each system as part of the accessory package.

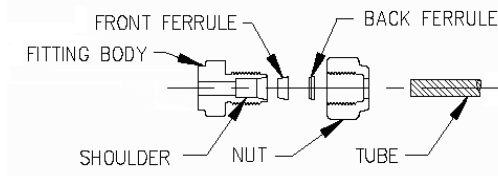
DO NOT use automotive engine oil or hydraulic brake fluid.

Filling Tool: A filling tool is used to fill the system with cell fluid.

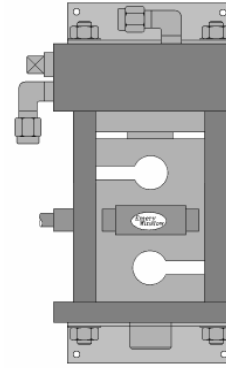
3. Tubing: The 1/8" OD tube transmits the Hydrostatic™ pressure signal from the load cell to the Hytronic® Totalizer. The tubing is thick wall capillary tubing.

Stainless steel tubing is recommended for corrosive or food process environments and is supplied standard on weighsquare systems.

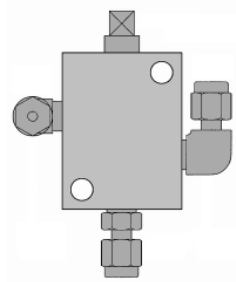
4. Fittings: The tubing is connected with compression fittings. The fitting consists of a body, two ferrules (front and back) and a nut.



5. Hytronic® Transducer: In single load cell systems, the load cell output pressure is transmitted to the transducer. A transducer in the unit produces an electronic signal that is proportional to the input pressure from the load cell.



6. Fill Valve: In weighsquare systems without a transducer, a fill valve is supplied. The fill valve is used to purge the tubing and load cell.



7. Digital Indicator: Most strain gauge digital indicators can interface with the Emery Winslow Hytronic® Transducer. For details about the system's indicator, see the digital indicator manual.

SECTION 2 - SYSTEM INSTALLATION

When installing an Emery Winslow weighsquare, reference the Installation Drawings in conjunction with this manual.

If you have questions, or need further assistance, please contact the Emery Winslow Service Department. We will provide assistance to ensure the installation will result in a properly functioning weigh system.

Installation Requirements

Base must be installed on a rigid, flat surface.

Each corner of the scale must have rigid support for accurate weighments. The scale can be installed in a sloped, non-leveled position.

Scale Installation

Place the scale on the floor or bench in the proper location. Ensure that the base makes contact with the floor/bench at the 4 corners. If any corner is not rigid, use shims or adjust the leveling feet (if supplied) to obtain the necessary support.

The base can be anchored to hold it securely in place. Use the mounting holes as a template to install the anchors. If leveling feet are supplied, remove the feet and use these holes as anchoring holes. Install the anchor bolts per the manufacturer's instruction.

Remove the cover and set the rotational stops to a gap of 0.06" (4 places).

For factory purged and calibrated systems -

Remove the shipping stop from the load cell and check the load cell gauging. Purge and fill the load cell if the gauging is out of range (see Section 3).

Verify the calibration of the scale. If the calibration is within the accuracy band, the scale is ready for use.

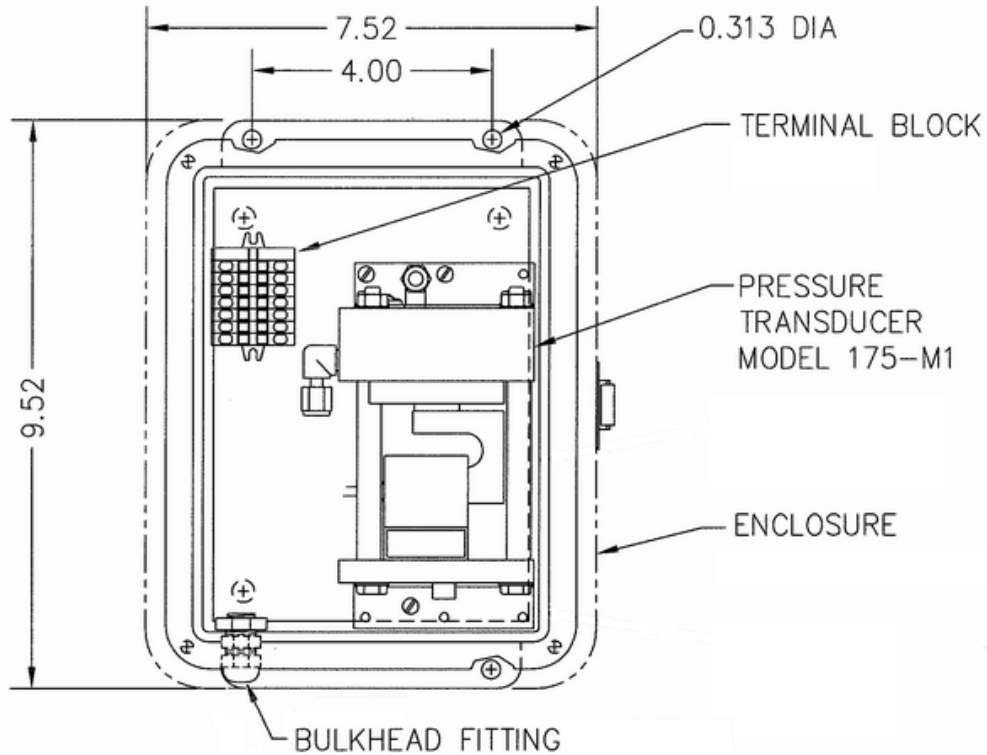
If the transducer enclosure is not factory installed on a pedestal, the following applies.

Transducer Enclosure Installation

The standard transducer enclosure supplied is a Nema 4x FRP (fiberglass reinforced plastic) enclosure. Other materials such as painted carbon steel or stainless steel are available.

Besides housing the transducer, this enclosure also serves as the field interface box for the signal cables. A terminal strip is provided for that purpose.

If the transducer enclosure is not factory installed on a pedestal, it will need to be field mounted.



standard transducer enclosure

When laying out the installation, the transducer enclosure should be installed as close to the load cells as possible. On a standard system, 25' of tubing per load cell is included.

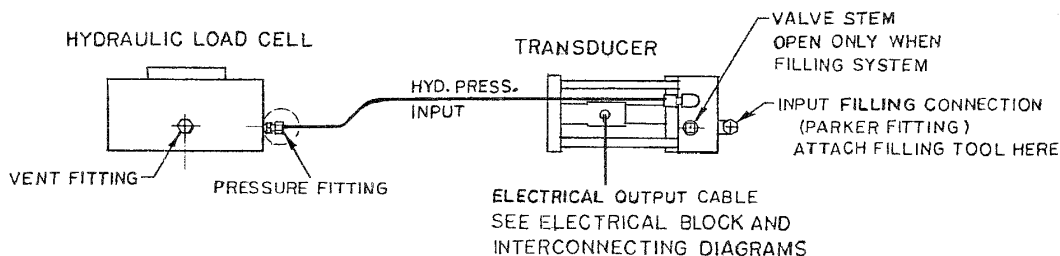
Note: The totalizer should not be mounted more than 4 feet above the scale.

Tubing Installation

Install the Tubing Runs - When laying out and installing the tubing, be guided by the following notes and tubing diagram.

Important Notes:

- A) Tubing must be protected from damage and should be run through minimum 1" diameter conduit. (Minimum 1.5" diameter for stainless tubing.)
- B) Conduit sweep(s) should have minimum 6" radius. When using stainless steel tubing, do not utilize more than (3) three 90° sweeps in the conduit run.
- C) Tubing runs should be as short as possible.
- D) When planning tubing runs, avoid steam lines and other sources of heat or cold which cause large temperature changes from ambient.
- E) In each tubing run, leave a few extra feet of tubing in the run. Coil this extra tubing and place it in a safe, accessible location. This extra tubing will facilitate making a new connection at the load cell or totalizer in the future.
- F) When cutting the tubing, use a good quality pipe cutter to produce a clean and burr free end for the Nut and Ferrules to slide over. Do not use any type of pincher cutter to cut the tubing. After cutting the tubing, inspect the cut end for any burrs. Use a fine, hard file to remove the burr from the edge of the tubing. Check the tubing bore to make sure it has not been pinched closed during the cut.
- G) A brass fitting must never be used with stainless steel tubing. Brass is not strong enough to make a leak-proof connection.



Tube Fitting Installation

Each load cell has two fittings. They are interchangeable in their function. One connects to the tubing and the other is used to purge the cell of air during start up and maintenance. Connect the tube to the fitting that provides the most protection for the tubing. The other fitting then becomes the purge fitting.

When installing the fitting nut on the tubing, please see the installation instruction on drawing A-34055, shown on the next page.

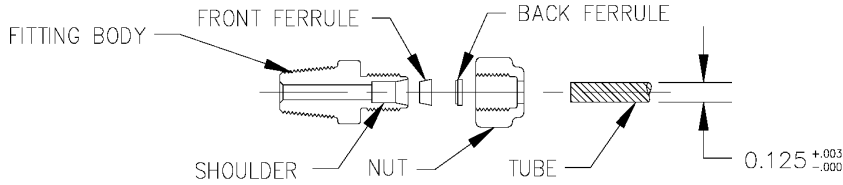
IMPORTANT Install the tubing through the totalizer enclosure's bulkhead connector before installing the fitting nut on the end of the tubing.

If the nut and ferrules do not slide over the tubing, use a fine hard file to remove the burr from the edge of the tubing.

A-34055

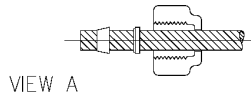
The tubing connections between the load cells and the totalizer are important to the installation of an Emery Winslow Hydrostatic Scale system. Making these connections is more simple than tubing a brake line on an automobile and just as important.

This connection utilizes a "Double Ferrule" design. Each fitting includes a Fitting Body, a Front Ferrule, a Back Ferrule and a Nut.



The cut tubing end should not be deformed. For stainless tubing use tube cutters with "RIDGID" #3469 wheel for 0.125 dia tubing. Use "KLEIN" #1004 cutters with spring for copper tubing only. Check the inside diameter of the tubing to be sure it is clear of any burrs and unrestricted.

Slip the Nut, Back Ferrule and Front Ferrule onto the cut end of the tubing as shown in VIEW A.

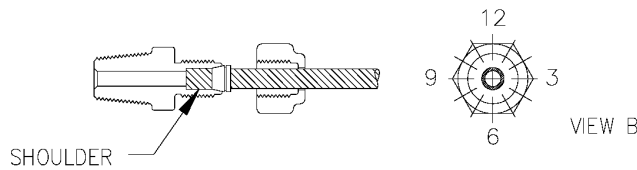


Emery Winslow recommends to pre seat the fitting as follows:

1. Clamp a Fitting Body with a vise or vise grip at its hexagon. Pre seat tubing, Nut and Ferrules.
2. This pre seating Fitting Body must be discarded after use.

Insert the cut tube end into the Fitting Body. Make sure that the tubing rests firmly on the shoulder of the Fitting Body. Tighten the Nut finger tight.

Before further tightening the Nut, scribe it at the 12 o'clock position as shown in VIEW B.



For Stainless Tubing check at 5 o'clock position that the connection feels "snugged down", for Copper Tubing check at 7 o'clock position, otherwise turn one or two more clock positions further. Do not over tighten!

Final Connection: Place pre seated Fitting into Body. Tighen the Nut finger tight. With wrench tighten by rotating the nut 3 clock positions.

EMERY WINSLOW SCALE CO.
SEYMOUR, CT. USA TERRE HAUTE, IN.

DOUBLE FERRULE FITTING
INSTALLATION INSTRUCTIONS

ALL SHARP CORNERS AND
EDGES TO BE BROKEN

DIMENSIONS ARE IN INCHES.
TOLERANCES UNLESS SPECIFIED OTHERWISE:
MACHINING .XX = ± .01
.XXX = ± .005

DRAWN DATE 11/21/01
CHECKED DATE
ACAD FILENAME: ACC0885
LAYERS USED: ALL

REDRAWN ON CAD, WAS "B" SIZE
DATE 11/21/01
BY CBM

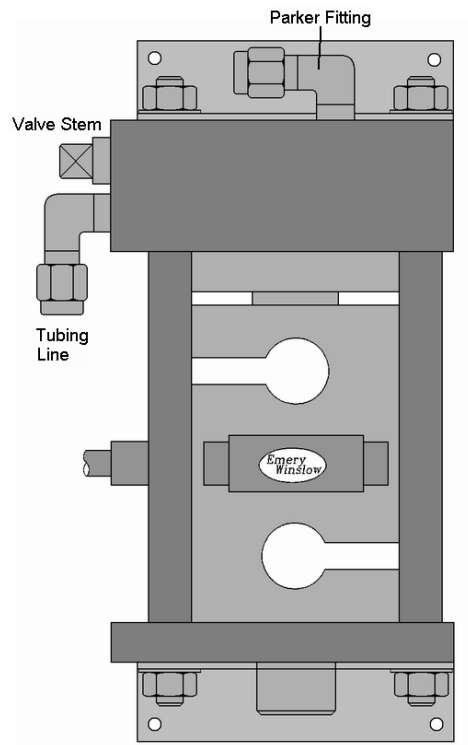
THIS DRAWING IS THE PROPERTY OF EMERY WINSLOW SCALE CO SEYMOUR, CONNECTICUT.
THE INFORMATION CONTAINED HEREIN IS CONFIDENTIAL AND IS NOT TO BE USED OR DISSEMINATED
TO OTHERS WITHOUT THE EXPRESS WRITTEN CONSENT OF EMERY WINSLOW SCALE CO.

SCALE 1:1
FIRST USED ON A-34055
REV. A

To continue the installation process, go to Section 3.

SECTION 3 - PURGING AND FILLING THE SYSTEM

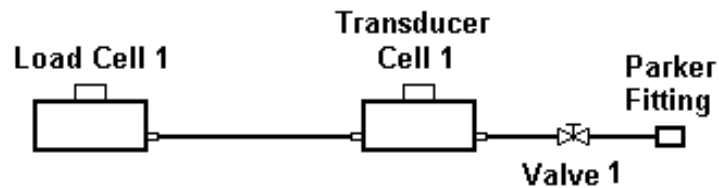
Transducer Components



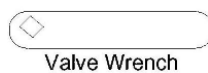
The **Transducer Manifold** directs the cell fluid from the load cell to the transducer cell.

The **Parker Fitting** is used to add or remove cell fluid from the individual load cell circuits. The Filling Tool is attached to the Parker Fitting to fill the system.

The **Valve** opens or closes the load cell / transducer cell circuit to the Parker Fitting. Refer to the schematic diagram below.



The valve wrench is used to open and close the valve.



Fill the Filling Tool

Pull out the T-handled follower rod. When it is fully extended pull the rod sideways to latch the groove of the rod into the key hole slot of the cap.

Remove the head from the filling tool.

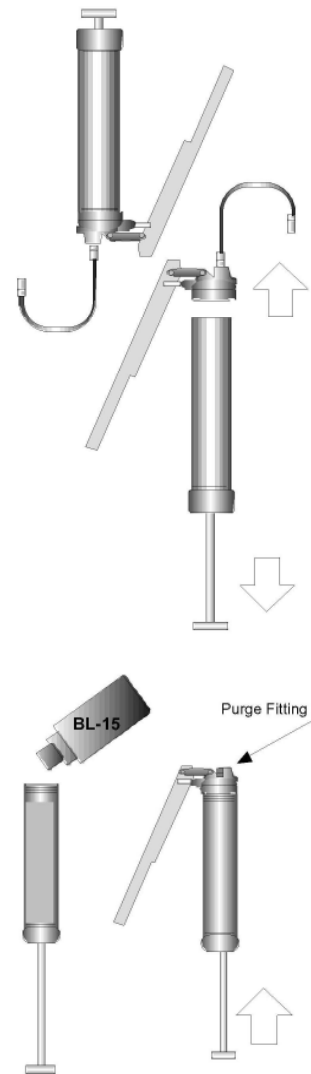
Fill the filling tool with Cell Fluid to within one inch of the top.

Reassemble the filling tool. Screw the head on tight. Release the follower rod.

Holding the head up, open the Purge Fitting slightly to let the air escape. Keep it open until oil flows out.

While holding the head end up, pump the handle several times to clear the pump and the connecting tube of air. The Filling Tool is now purged and ready.

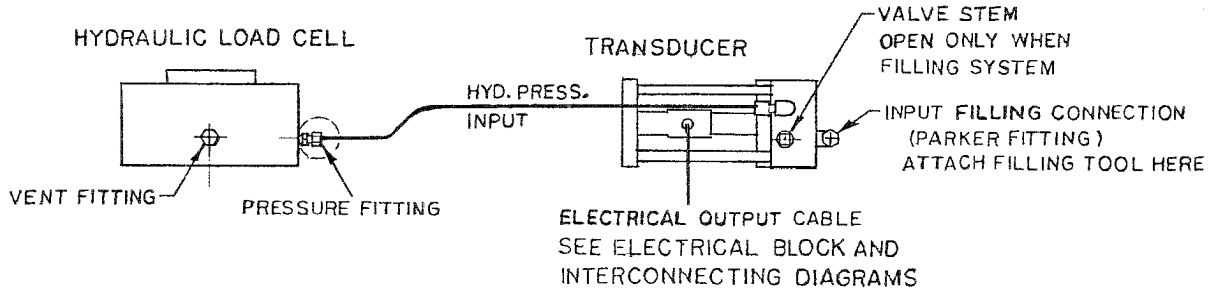
During use check for free travel of the follower rod frequently by pulling the rod outward. If the follower rod has one inch or less of free travel fill the Filling Tool again. An empty Filling Tool will fill the system with air and cause weighing errors.



Connect the Tubing Lines

Install the tubing from the load cell to the transducer, through the enclosure's bulkhead connector. Do not connect the tube to the load cell yet.

Before attaching the fitting nut to the tube, please review the installation of the Double Ferrule Tube Fitting.

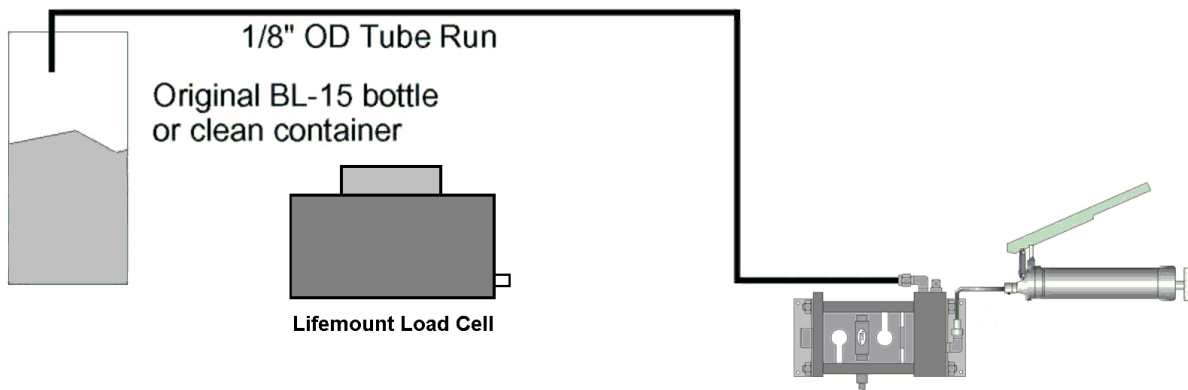


Connect the tube from the load cell to the tube fitting on the Transducer Manifold.

Purge Air From The Tubing and Load Cell

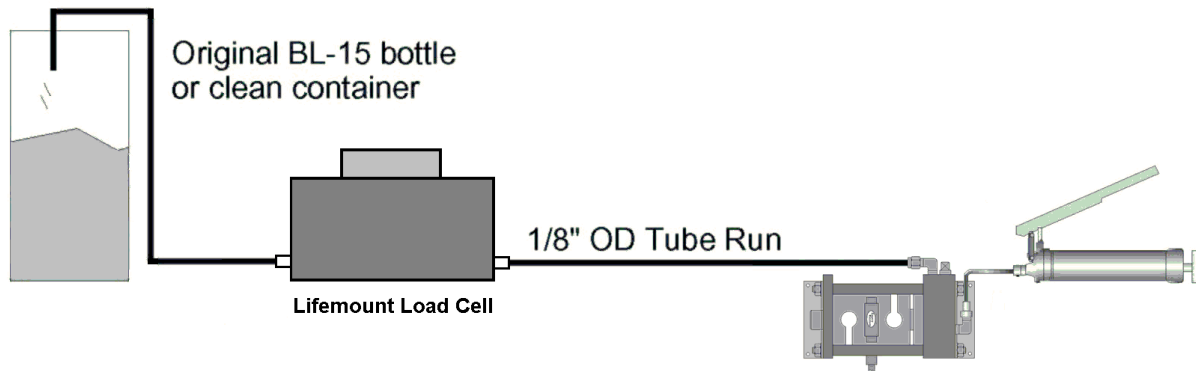
Attach the Filling Tool to the Parker Fitting. Remove the cap from the Parker Fitting on the Transducer Manifold. Screw on the Filling Tool Hose by using the swivel nut on the hose. Place the cap to the side. **After filling the system this cap must be replaced.**

Perform the purging steps below for the tubing line and load cell.



Use the Valve Wrench to open the Valve and pump fluid through the tubing until the flow is free of air. Catch the purged cell fluid in the original container.

To purge the load cell, connect the tubing to the Tube Fitting of the load cell. Then remove the cap from the Purge Fitting of the cell and attach the short length of Purge Line. Place the other end in the cell fluid container.



Pump the fluid through the Manifold, connecting tubing, and the load cell until the air bubbles stop coming out of the open end of the purge line. Remove the purge line and replace it with the fitting cap. Tighten the cap while fluid is seeping out of the connection.

Note: The captured cell fluid can be reused if it is not contaminated. If the captured cell fluid is contaminated with dirt or other fluids, dispose of in accordance with applicable regulations.

Gauge the Load Cell- 102

To fill each load cell, open the valve and pump additional fluid into the system circuit until the recommended feeler gauge reading is reached. As you pump fluid into the cell the gauging gap will increase on the load cell. After the cell is gauged to the recommended gauging, close the valve.

If the cell is accidentally overfilled you can remove fluid by slightly loosening the purge fitting cap. This will let the cell fluid leak out slowly.



The load cell must be filled with the fluid to the recommended gauging. Consult the installation drawing supplied with your system.

Typical load cell gauging is listed in the chart below:

Model Number	Capacity	Part Number	Gauging
102-1.5-M1	1,500 lb	B-34326	1/8" \pm 1/32"
102-2.5-M1	2,500 lb	B-34326-1	1/8" \pm 1/32"
102-3.5-M1	3,500 lb	B-34326-2	1/8" \pm 1/32"
102-5.0-M2	5,000 lb	B-34321	3/16" \pm 1/32"
102-10.0-M2	10,000 lb	B-34321-1	3/16" \pm 1/32"

Record the final gauge reading for each load cell in the system.

Remove the Filling Tool and replace the cap on the parker fitting.

Note: Remove any excess fluid from the fittings on the totalizer manifold and load cell. This will allow prompt detection of leaks should they occur.

Instrumentation Hookup

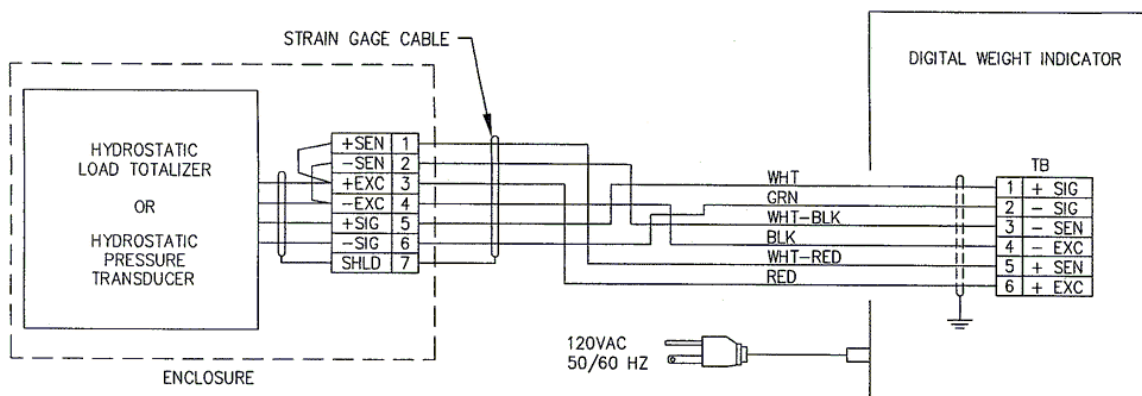
The electrical output of the weigh system is a millivolt level signal. Typically, a terminal strip is located in the totalizer enclosure to allow wiring the weigh system to a digital indicator or process control instrumentation.

The color code for the totalizer transducer cable is:

4 wire transducer	
Red	+ excitation
Black	- excitation
Not wired	+ sense
Not wired	- sense
Green	+ signal
White	- signal

Reference the indicator or process instrumentation manual to determine the proper load cell cable hookup. A typical wiring diagram for a digital indicator is shown below.

Note: If Emery Winslow supplied the weight indicator as part of the system, reference the wiring diagram included with the system manual.



Once the instrumentation is connected and functional, the weigh system can be calibrated. Consult the indicator or process instrumentation manual to determine the correct calibration procedure.

SECTION 4 - PERIODIC INSPECTION

Inspect the system after about one month of service. If there are no repairs needed, the system can be checked yearly. Keep a record of the inspection data. It can assist in troubleshooting if the need arises.

Making the Inspection:

Check the following when inspecting the system.

1. Check For Proper Load Cell Gauging. To check this insert a feeler gauge into the gauging space. The measurement should be taken at the same location each time. A continuing downward trend of this measurement indicates a loss of fluid.
2. Check all fitting nuts visually. If there is evidence of leakage tighten the fitting nut slightly. DO NOT OVER TIGHTEN.
3. Check that the transducer valve is tight.
4. Check for cell damage. If the load cell is damaged return it to the factory for overhaul.
5. Check that the flexures are flat and straight. Check that the torque arms can move up and down freely.

SECTION 5 - SPARE PARTS

The following is a list of the spare parts we recommend the user/dealer keeps in stock to minimize down-time.

To order, please contact your dealer or the Emery Winslow Service Department.

Qty	Part #	Description
6	SS-202/3/4-1	Tube Nut and Ferrule Assembly
4	SS-200-6	Union for 1/8" tubing
25'	T18S-S	Stainless Tubing
1	BL-15Q	Quart of cell fluid
1	B-35548	Filling Tool with hose
1	PT-100	Nylon Purge Line
1	A-29595	Valve Stem Wrench
1	See Loading Data Sheet	Totalizer Cell Diaphragm
2		Load Cell Diaphragm
1		Strain Gage Transducer

SECTION 6 - TROUBLESHOOTING

PROBLEM? - WHAT TO CHECK

Please check the following if there is a problem with the scale. If you have questions or need more information, please contact your dealer or Emery Winslow Aftermarket Support. Procedures to repair various problems are included in the following pages

1. Verify the scale is installed per the installation drawings.
2. Inspect the load cell, transducer and all fitting nuts for evidence of leakage. Check the transducer valve is closed. Repair as needed.
3. Check the load cell's gauging for proper gap. If needed, fill the cell to recommended gauging. No system recalibration is required when this is performed. Monitor the gauging over time and find the leak.
4. If the load cell will not gauge as cell fluid is added and the fluid is observed flowing out of the gauging area, the load cell or transducer cell probably has a blown diaphragm. Replace the diaphragm- see the Diaphragm Replacement Procedure.
5. The scale could be grounded. Correct to eliminate grounding. Check for rubbing against neighboring equipment. Check for direct connections between the scale and ground, such as material build-up. Check that the flexures can move as specified.
6. Check the transducer excitation and signal voltages.

Note: When checking voltages, use a voltmeter with a high input impedance, 10 meg ohm or above.

The loading data sheet gives the millivolt output voltages at the tare (empty condition) and gross (full condition).

Check the excitation voltage and verify the excitation voltage of the indicator is the same as shown on the loading data sheet. If the excitation voltage is off by more than $\pm 10\%$, the digital indicator may need repair.

If the excitation voltage is within specification, check the signal voltage. Use the voltmeter's DC millivolt range and observe the correct polarity. The loading data sheet gives the transducer's output voltages for the tare and gross loading. Under partial loading, between tare and gross, the transducer's millivolt level will track the weight on the scale in a linear relationship.

7. Reseat each signal wire (White and Green) in the terminal block. The output signal strength from the transducer is a millivolt level (0.001 V) signal and is susceptible to interference from even the slightest corrosion.

Service Information

Need Assistance with:


- Installation?
- Start-up?
- Calibration?
- Maintenance?
- Troubleshooting?

Let an Emery Winslow Service Technician help.

-
- If you need immediate assistance with installation or calibration:
Call 203-881-9333 x24 or email: Parts@emerywinslow.com
 - If you are troubleshooting, and need fast technician assistance:
Call 203-881-9333 x23 or email: Service@emerywinslow.com


Note: When calling, please have all the information from **one** of the labels below. We need this information to assist you quickly and accurately.

Load Cell Label

 SEYMOUR, CT - TERRE HAUTE, IN MADE UNDER U.S. PAT. NO. 4,261,428	MOD. <input type="text"/>	S/N <input type="text"/>
	DWG. <input type="text"/>	CAP. <input type="text"/>

Located on the side of each load cell

Transducer Label

	<i>Emery Winslow Scale Company</i> <i>Seymour, CT Terre Haute, IN USA</i>	
Model <input type="text"/>	Job <input type="text"/>	
Drawing <input type="text"/>	Ref <input type="text"/>	
Questions? Please call 203-881-9333		
B-34821-7 MADE UNDER ONE OR MORE OF THE FOLLOWING PATENTS 3178937-3992946		

Located on the front of the enclosure

SECTION 7 - EVALUATION AND REPAIR PROCEDURES

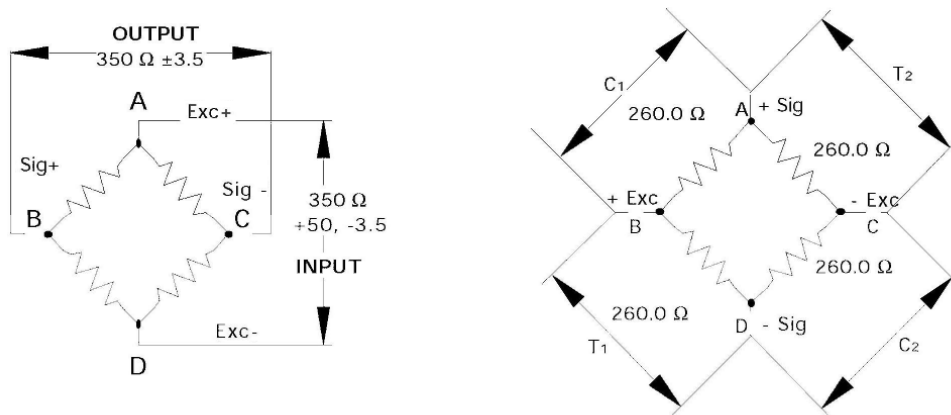
Transducer Strain Gauge Evaluation- Model 175

It is easy to make a quick diagnostic check of the transducer. The purpose of this check is to identify the source of a problem. These checks can be performed with a high quality voltmeter/ohmmeter.

Note: These tests can diagnose specific defects in a strain gauge transducer. Other defects, such as linearity or repeatability problems, may not be diagnosed with these checks. Only a factory evaluation can give a complete analysis of the strain gauge transducer's condition.

Bridge Circuit Test- out of circuit

The bridge circuit test is used to test the condition of the bridge circuit. This test is performed with an ohmmeter.



Measure the resistance across opposite corners of the bridge: the **Input** (+ and - Excitation) and the **Output** (+ and - Signal).

The following measurements should be made. The reading across:

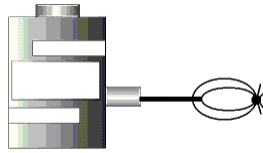
1. the Red (A) and Black (D) leads should be 350 ohm. (+ 50 ohms, - 3.5 ohms).
2. the White (B) and Green (C) leads should be 350 ohm. (± 3.5 ohm).

A reading outside the tolerance indicates a damaged strain gauge, possibly overload or water damage.

Insulation Resistance Test- out of circuit

The bridge circuit test is used to test the condition of the bridge circuit. This test is performed with an ohmmeter.

Note: A megohm meter can yield more accurate results, but extreme care must be used in the testing process.



Connect the bridge wires (exc+, exc-, sig+, sig-) together and measure the resistance between the wires and the body of the strain gauge transducer. Do not include the shield wire when connecting the wires. If the resistance is above 5 megohms (5,000,000 ohms), the transducer is probably OK.

Low resistance (below 5 megohms) is often caused by moisture or pinched wires. The cause and extent of damage must be established at the factory to determine if it can be repaired.

Note: Some kinds of electrical shorts show up only when using a megohm meter or with voltages higher than most ohm meters can supply. When a megohm meter is used, its output voltage **MUST** be limited to 50 V. All corners of the bridge must be tied together or the bridge may be damaged.

Factory Evaluation

If the strain gauge transducer is defective for reasons other than overload, return it to the factory for a detailed evaluation. Factory evaluation may show that the transducer is repairable.

Strain Gauge Replacement

This procedure is used to replace the strain gauge in the transducer.

The easiest way to remove the strain gauge from the Transducer is to completely remove the Transducer from the enclosure. To remove the Transducer from the enclosure, the load cell circuit must be drained of fluid and the tubing at the Transducer Manifold must be disconnected. The strain gauge cable will also need to be disconnected from the terminal block.

To drain the system attach one end of the Fill Pump hose to the Parker Fitting and place the other end into a cup to catch the fluid. Open the Valve. To push the fluid out from the circuit, press down on the scale platform.

After noting the terminal block wiring, disconnect the strain gauge cable. Remove the screws holding the transducer in the enclosure.

Remove the transducer from the enclosure and place it on a clean, dry, stable work surface.

Loosen the socket head screw in the base of the transducer with an Allen Wrench.

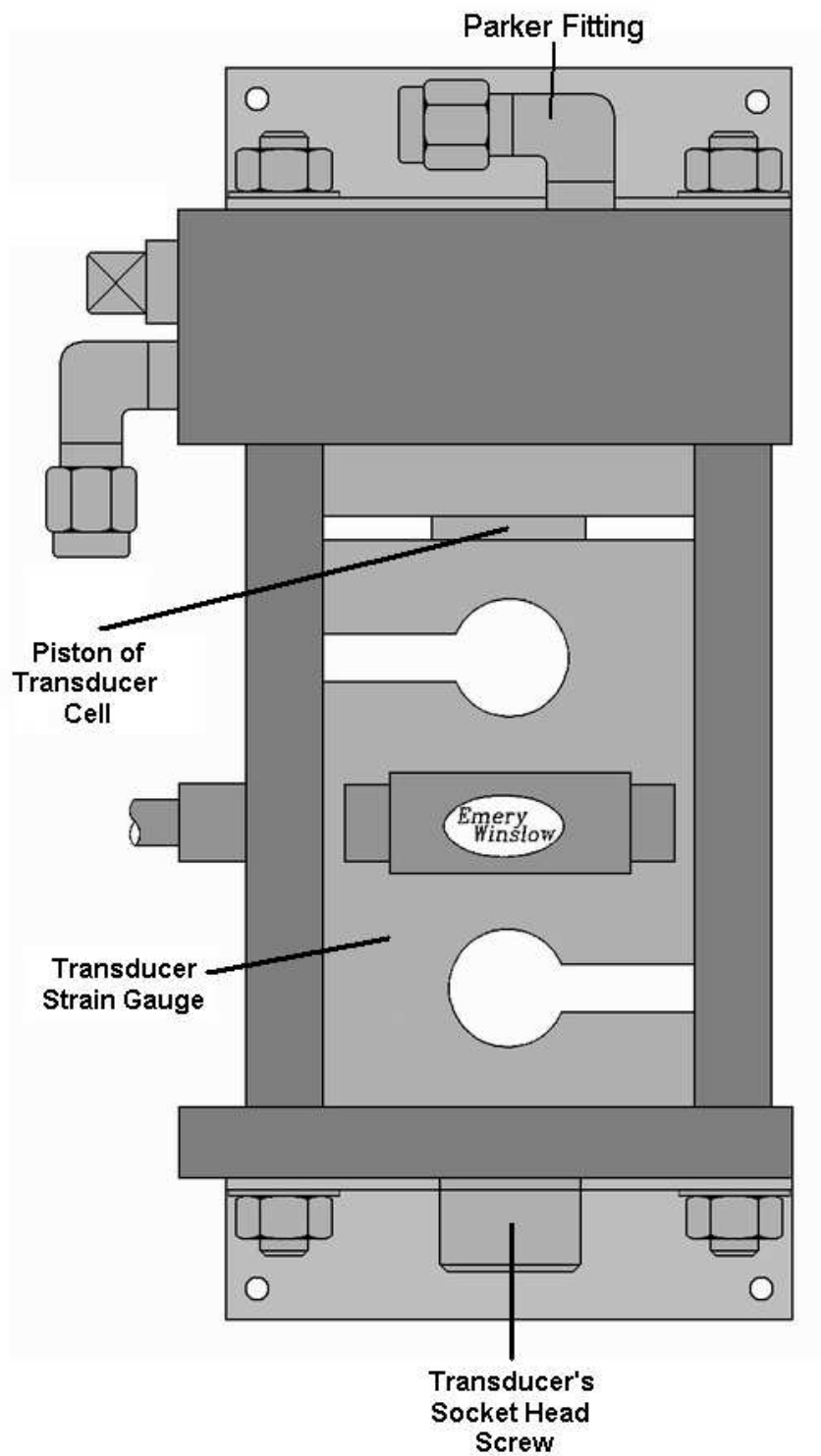
The strain gauge can be slipped out between the Transducer spacer posts. Use care that the piston does not drop out of the manifold load cell.

Emery Winslow Scale utilizes special strain gauge cells in the Transducer. It is strongly recommended only an authorized replacement strain gauge cell be used. System performance can not be guaranteed and product warranty is void if a substitute strain gauge cell is used.

Install the new strain gauge in the transducer base and secure it with the socket head cap screw. Realign the piston by checking for equal spacing between the piston and the ring all around.

Install the Transducer in the enclosure, attach the cable to the terminal block, and install the mounting screws.

Follow the purging and gauging instructions to purge the air from the tubing and load cell and gauge the load cell to the required gap.



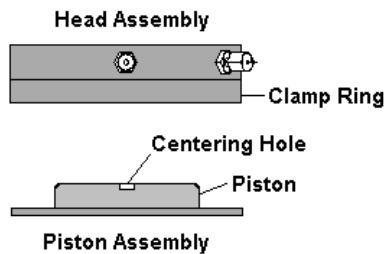
Diaphragm Replacement- Model 102 Load Cell

This procedure is used to replace the load cell's diaphragm.

1. To drain the system attach one end of the fill pump hose to the fitting and place the other end into a cup to catch the fluid. Open all valves. The tare weight of the scale will push the fluid out from each circuit.
2. Lift the scale deck and remove the load cell from the scale assembly. Be careful to prevent both halves of the cell from separating as they are removed.



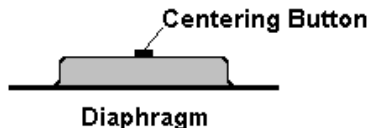
3. Place the cell in a clean dry area. Separate the load cell piston and head assembly.



4. Turn the head assembly over and remove the screws from the clamp ring. This allows you to remove the diaphragm and the O-ring. Clean all parts and surfaces carefully.
5. The replacement diaphragm kit includes the diaphragm and O-ring. Always replace the O-ring when replacing the diaphragm.

The following technique insures a smooth diaphragm convolution and proper centering button position after the two halves of the load cell are reassembled.

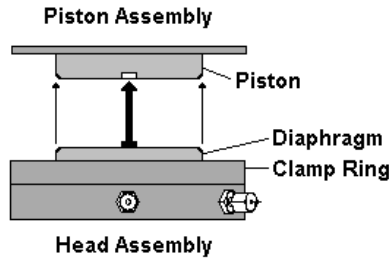
6. Insert the new O-ring. A small amount of light oil may be used around the O-ring seat to help keep it in place during installation. Place the new diaphragm over the screw holes. Be careful not to move the O-ring from its position.



7. Position the clamp ring over the diaphragm while holding the diaphragm in place. Install and tighten the clamp screws. Tighten them to low torque first, then complete tightening to a torque value of 85 inch lbs.

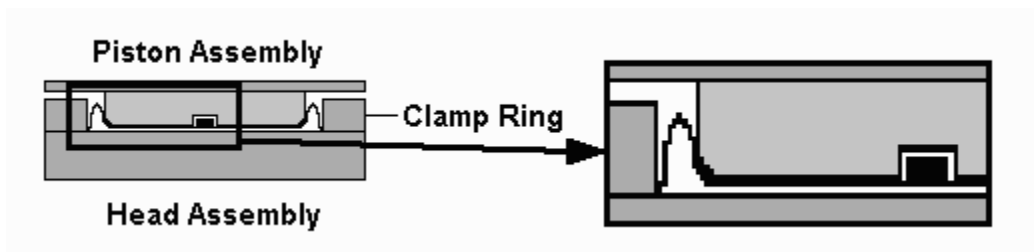
8. Install the fitting cap on the purge fitting. Keep the other fitting open to atmosphere. Grasp the diaphragm centering button and pull outward gently to draw air into the load cell. Hold a finger over the open fitting to seal the air in.

9. Invert the piston assembly and position the centering button over the piston's centering hole. Be sure the centering button enters the hole straight. With the finger over the fitting, press the two halves together. As the two halves press together, the pressure inside the diaphragm will increase and expand the diaphragm to fit properly around the piston.



10. Gradually, release the finger over the open fitting to allow air to escape as you press the top half into the base. The two halves should be closed with a uniform set. If the cell is slightly cocked, it indicates the centering button is not properly installed.

The enlarged cutaway drawing of the load cell, shown below, illustrates the diaphragm convolution roll and centering button correctly set.



Note: A cocked centering button will produce non-repeatable and non-linear weight output from the load cell.

The load cell is now ready to be reinstalled into the scale assembly.

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