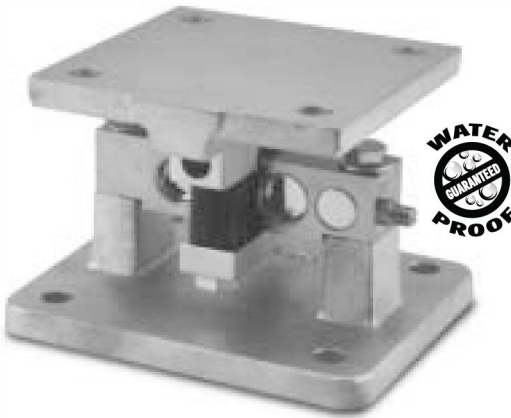


SURVIVOR[®] 2100HE

Weigh Module Kit

Installation Guide



RICE LAKE[®]
WEIGHING SYSTEMS
To be the best by every measure[®]

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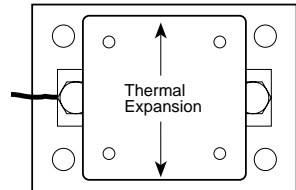
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1.0 Introduction

The 2100HE Weigh Module Kit provides an extremely accurate method for weighing medium and large capacity tanks and hoppers that are subject to harsh, hostile environments. The design uses a double-ended shear beam load cell (700Ω bridge) and transmits the load with a sliding pin on the load bearing groove of the cell. This design allows thermal expansion/contraction with little friction.

In the majority of applications, the assemblies are self-checking and held captive with no need for check or stay rods. The sliding pin design eases load cell installation and replacement without the need to raise the weighed vessel a large amount, which may disturb piping and other connections.



The 2100HE module is available in stainless steel in two sizes in capacities ranging from 20,000-100,000 lb. The mount is compatible with RL75060 and Sensortronics 65103 load cells.

The installation should be planned by a qualified structural engineer. Each installation is unique, and this manual is meant to serve only as a general guideline for installation.

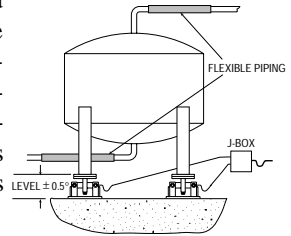
2.0 Mechanical Installation

2.1 General Installation Guidelines for Tank Mounts

1. The mounting surface for the base and top plate must be level. After installation, the top and bottom plates must be level within $\pm 0.5^\circ$. If the mounting surfaces are not level, then shims and/or grout may be used to level the mount.

If possible, check that the mount is level when the vessel is fully loaded because excessive deflections in legs and supporting structures may cause additional side forces which greatly affect accuracy. Deflection of the mount's top or base plate due to loading should not exceed $\pm 0.5^\circ$. Reinforcement of legs or other support structures may be necessary to correct this. Vessels with long legs should have cross bracing applied between adjacent legs to keep them from spreading under load.

2. Compression mounting systems use three, four, or more mounts. More than eight-module systems should be avoided as even weight distribution becomes extremely difficult to achieve. The load on each mount assembly should vary by no more than 20%. During installation, add shims where necessary to achieve correct load distribution.
3. If the actual load cells are used during installation of the weighing assembly, extreme care must be taken to prevent overload damage. A tank or hopper weighing several tons can exert huge forces when dropped only a fraction of an inch. Dummy load cells can be used during installation.
4. It is crucial that all piping or conduit be horizontal and flexible. If flexible piping is not used, make sure the distance from the vessel to the first pipe support is 20-30 times the pipe diameter. For details, see the technical information section of the RLWS Load Cell Product Selection Guide. In smaller, lower capacity tanks and hoppers, isolating the resultant forces becomes extremely critical.

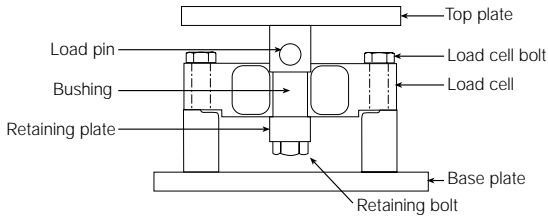


5. Load cells should not be installed in the mounts until all welding is completed. The heat generated from welding current passing through a load cell can damage the adhesive holding the strain gauge to the body. If possible, use a dummy load cell when welding to maintain finished height. If welding is unavoidable after load cell installation, connect the ground in such a way that the current does not flow through the load cell. For example, if welding on the mount top plate, the ground must be connected to the vessel, not to the mount base or support structure. Also, protect the load cell and cable from weld splatter.

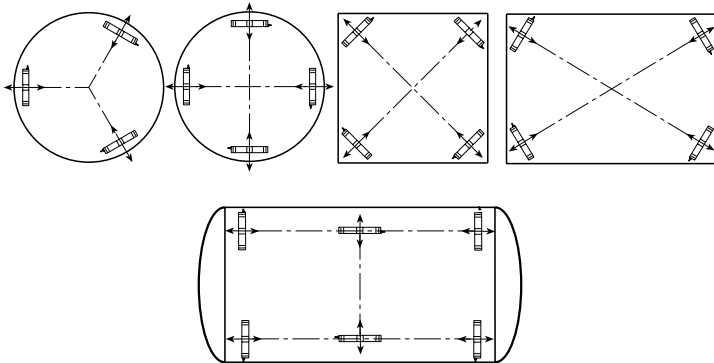
Note: The arrow on the load cell should point in the direction of the load.

6. All support points should be equally stiff so that they deflect by the same amount as the vessel is loaded.

2.2 Installing the 2100HE



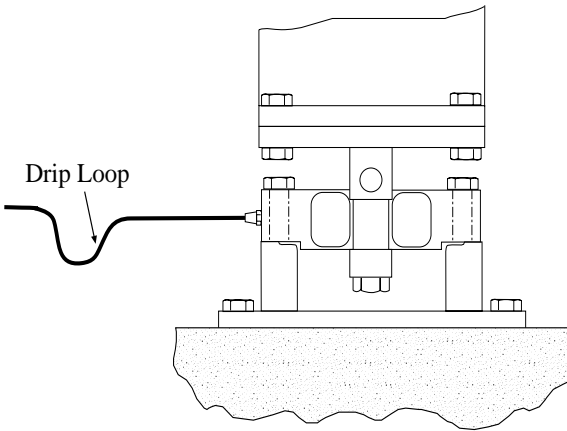
1. The type of installation and strength of the mounting surface governs the method of locating, attaching, and assembling the 2100HE module. Carefully consider three areas that commonly cause accuracy problems:
 - Are the supporting legs adequately braced so they will not spread when the system is fully loaded?
 - Does the supporting structure have the necessary strength to prevent excessive deflection when the system is fully loaded?
 - Is there attached equipment such as skirting, venting, or piping that is likely to cause binding or lack of flexibility?
2. Determine where to position the mount and in which direction it should be oriented. The 2100HE is designed to allow for lateral movement in the direction perpendicular to the longitudinal axis of the load cell. These tank weighing units should be oriented so that the movement due to thermal expansion/contraction is perpendicular to the longitudinal axis. Sample mounting orientations to accommodate expansion for different vessel shapes are as follows:



3. Assemble the mounts by inserting the LOAD PIN into the TOP PLATE. The RETAINING BOLTS are passed through the RETAINING PLATE and BUSHINGS and threaded into the TOP PLATE. Insert the LOAD CELL into this assembly so that the load pin sits in the groove at the center of the cell and tighten bolts to approximately 50ft.lb. Set the top plate/load cell assemble in position on the BASEPLATE. Pass the LOAD CELL BOLTS through the LOAD CELL and thread into the BASEPLATE. Leave loose for now.
4. Lift and block the vessel to the same height as the assembled mounts.
5. Remove the block from one support point and slide that mount into position.
6. If the mount is being fitted under the leg of a vessel, verify that the leg's center line passes through the center of the TOP PLATE (through the center of the load cell).
7. Lower the corner or side of the vessel carefully onto the TOP PLATE. The force of a vessel weighing several tons can damage a load cell if dropped only a fraction of an inch.
8. With the TOP PLATE positioned approximately level, mark holes for attaching the TOP PLATE to the vessel's mounting surface. Make holes and attach the TOP PLATE loosely to the vessel with suitable fasteners.
9. Repeat steps 4-8 for the mounting assemblies at the remaining corners or sides.
10. Verify that there is no initial misalignment between the BASE PLATE and TOP PLATE and that the LOAD PIN is centered in the groove of the LOAD CELL. Relocate if necessary.
11. Attach the BASE PLATES to the foundation using suitable anchors for concrete or by bolting or welding to a steel structure or subplate. Verify that the BASE PLATES are no more than $\pm 5^\circ$ out of level. Shim as necessary.
12. Check that the TOP PLATES are no more than $\pm 5^\circ$ out or level. Shim if necessary and fully tighten mounting bolts.
13. If dummy cells were used, replace with the LOAD CELLS.
14. To achieve equal load distribution, final height adjustments can be made with shims between the TOP PLATE and the weighing vessel. The variation in load among the cells should be no more than 20%. The load distribution can be checked accurately by exciting each load cell in turn and measuring the output with a voltmeter.
15. Tighten the bolts securing the load cell to the BASE PLATE. Torque the LOAD CELL BOLTS to only 20 foot-pounds. This allows the double-ended load cell to flex under load.

3.0 Load Cell Wiring

1. Route the load cell cables so they will not be damaged or cut. Cable should not be routed near heat sources greater than 400° F. **Do not shorten any load cell cable.** The load cell is temperature compensated with the supplied length of cable. Cutting the cable will affect temperature compensation. Coil and protect excess cable so it will not be mechanically damaged or be sitting in water.
2. Provide a drip loop in all cables so that water or other liquids will not run directly down the cables onto either the load cells or the junction box. Attach load cell cable to the dead structure, not the vessel.
3. If conduit protection is necessary against mechanical or rodent damage to the load cell cables, use flexible conduit and conduit adapters at the load cells.
4. Connect cables for standard RL75060 or Sensortronics 65103 cells to the summing board in the junction box according to the guide shown below and the labels on the terminal strips of the junction box. To verify the wiring scheme, see the certification shipped with each load cell.
5. For better performance, use positive and negative remote sense lines if the wiring running from the junction box to the indicator is longer than 25 feet.



| LOAD CELL WIRE COLOR | FUNCTION |
|----------------------|----------|
| Red | +EXC |
| Black | - EXC |
| Green | +SIG |
| White | - SIG |
| Gray or Bare | SHIELD |

4.0 Junction Box Connections, Adjustments & Calibration

1. Refer to the Junction Box manual for trimming details.
2. Refer to the indicator manual or the “Technical Information” section in the Rice Lake Weighing Systems’ Load Cell Product Selection Guide for system calibration details.

5.0 Troubleshooting

If the system powers up and gives some type of stable digital readout that varies with the load on the system, any system problems are probably caused by factors other than the load cells. The load cells are often blamed for a malfunctioning system, but the majority of the time, the problem lies elsewhere. Look for mechanical causes for your problem first.

If the system can be calibrated but doesn’t return to zero, loses calibration, or demonstrates non-linearity or non-repeatability, see the following chart for possible causes and do the following checks.

| Symptom | Possible Cause |
|-------------------|--|
| No return to zero | Mechanical binding or debris in seals or under load cells; may have lost system calibration |
| Non-linearity | Thermal expansion or deflection under load causing binding or side load |
| Non-repeatability | Loose load cell mount; drifting caused by moisture, load cell overload or shock damage; mechanical binding |
| Lost calibration | Out of level or plumb; moisture problem; mechanical binding |
| Drifting readout | Moisture in junction box, cables, or load cell; mechanical binding |

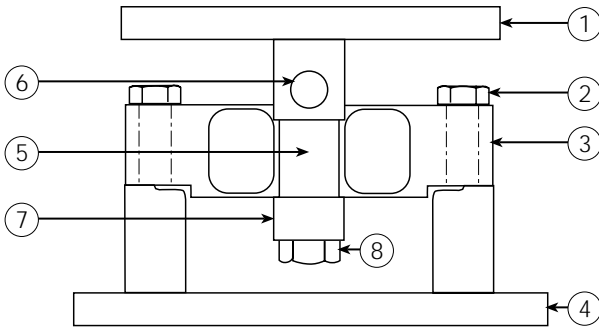
1. Check load cell mount for debris restricting load cell movement or debris between scale and structure.
2. Check that tank/vessel and mounts are plumb, level, and square at the critical areas.
3. Check all piping and conduit for connections which restrict vessel movement.
4. If check rods are used, loosen all connections to finger tight only for testing.
5. Check load cell cables for physical or water damage.
6. Check all electrical connections, especially in the junction box.

If the problem still is not found:

7. Check possible indicator malfunction by using a load cell simulator to input a known good signal into the indicator.
8. Disconnect each load cell's signal leads at the junction box and check individual load cell outputs with a multimeter. Then check input/output impedances for comparison with load cell manufacturer's specifications.

If after all these checks the problem still cannot be isolated, reconnect all but one load cell. Replace the load cell with a load cell simulator. Alternate so that each load cell is individually disconnected and replaced with a simulator. If there is a problem with a particular load cell, the symptom should disappear when that load cell is disconnected and replaced with the simulator.

6.0 Maintenance and Replacement Parts



| Ref # | Part # | Description |
|------------------------------------|--------|----------------------------------|
| 20,000 lb capacity | | |
| 1 | 33013 | Top plate, stainless steel |
| 2 | 33474 | Load cell bolts (2) |
| 3 | 30877 | Load cell, RL75060-20,000 lb |
| 4 | 33012 | Base plate, stainless steel |
| 5 | 33015 | Bushing set, rubber tube |
| 6 | 33014 | Load pin, stainless steel |
| 7 | 33105 | Retaining plate, stainless steel |
| 8 | 33473 | Retaining bolts (2) |
| 35,000-75,000 lb capacities | | |
| 1 | 33008 | Top plate, stainless steel |
| 2 | 33431 | Load cell bolts (2) |
| 3 | 30876 | Load cell, RL75060-35,000 lb |
| 3 | 30875 | Load cell, RL75060-50,000 lb |
| 3 | 30874 | Load cell, RL75060-60,000 lb |
| 3 | 30878 | Load cell, RL75060-75,000 lb |
| 4 | 33007 | Base plate, stainless steel |
| 5 | 33020 | Bushing set, rubber tube |
| 6 | 33009 | Load pin, stainless steel |
| 7 | 33106 | Retaining plate, stainless steel |
| 8 | 33469 | Retaining bolts (2) |
| 100,000 lb capacity | | |
| 1 | 33008 | Top plate, stainless steel |
| 2 | 33431 | Load cell bolts (2) |
| 3 | 32950 | Load cell, RL75060-100,000 lb |
| 4 | 33007 | Base plate, stainless steel |
| 5 | 33010 | Bushing set, rubber tube |
| 6 | 33009 | Load pin, stainless steel |
| 7 | 33107 | Retaining plate, stainless steel |
| 8 | 33430 | Retaining bolts (2) |

Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS brand load cells properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications. All load cell products are warranted against defects in materials and workmanship for two (2) years. Products marked as “waterproof” are warranted against defects in materials and workmanship relating to moisture ingress.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such non-conformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- At the option of RLWS, the equipment will be returned to RLWS at the expense of the Buyer.
- Examination of such equipment by RLWS confirms that the non-conformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NEITHER RLWS NOR DISTRIBUTOR WILL, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

RLWS AND BUYER AGREE THAT RLWS'S SOLE AND EXCLUSIVE LIABILITY HEREUNDER IS LIMITED TO REPAIR OR REPLACEMENT OF SUCH GOODS. IN ACCEPTING THIS WARRANTY, THE BUYER WAIVES ANY AND ALL OTHER CLAIMS TO WARRANTY.

SHOULD THE SELLER BE OTHER THAN RLWS, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.

No terms, conditions, understanding, or agreements purporting to modify the terms of this warranty shall have any legal effect unless made in writing and signed by a corporate officer of RLWS and the Buyer.

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