RLTM

Stainless Steel Tank Weigh Module

Installation Manual

RICE LAKE®
WEIGHING SYSTEMS

PN 170479

Contents

*Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at **www.ricelake.com/training** or obtained by calling 715-234-9171 and asking for the training department.*

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1.0 Introduction

The RLTM weigh module as shown on the cover of this manual, consists of a standard welded sealed shear beam type load cell secured to a rectangular stainless steel base plate. The free end of the load cell is fitted with a top plate assembly containing a rocker pin to transmit the vertical force into the load cell. A countersunk high strength high standard stainless steel bolt, passing through an oversized hole in the top on both sides of the load cell, and screwed into the base plate, provides integral vessel retention for protection against lateral and uplift forces.

The unique design of the module with its 360° lateral relief permits orientation in any position with respect to the vessel being weighed, tangentially or radially, thereby avoiding any restrictions that may be imposed upon the supporting structure.

This manual provides general information, installation and operating instructions, and maintenance information for 500 lb through 10k models of the RLTM tank weigh modules.

Manuals can be viewed or downloaded on the Rice Lake Weighing Systems distributor site at www.rlws.com
Warranty information can be found on the website at www.ricelake.com/warranties

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1.1 Safety Section

1.1.1 Safety Symbol Definitions:

DANGER *Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.*

WARNING *Indicates a potentially hazardous situation that, if not avoided could result in serious injury or death, and includes hazards that are exposed when guards are removed.*

Caution *Indicates a potentially hazardous situation that, if not avoided may result in minor or moderate injury.*

Important *Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.*

1.1.2 General Safety

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in this manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing System dealer for replacement manuals. Proper care is your responsibility.

WARNING

Before attempting to operate this unit, make sure every individual who operates or works with this unit has read and understands the following safety information.

Failure to heed may result in serious injury of death.

Do not allow minors (children) or inexperienced persons to operate this unit.

Do not use for purposes other then weight taking.

Do not place fingers into slots or possible pinch points.

Do not use any load bearing component that is worn beyond 5% of the original dimension.

Do not use this product if any of the components are cracked.

Do not exceed the rated load limit of the unit.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Keep hands, feet and loose clothing away from moving parts.

2.0 Installation

The installation procedures described in this section are based on the assumption that the vessel, tank, bin, or scale to be supported by the RLTM weigh modules have been properly designed for such usage and that the bearing surfaces on which the weigh modules will be installed are reasonably flat and firm enough to support the weigh structure and its full contents. Questions concerning the design of load cell weighing systems can be directed to the Rice Lake Weighing Systems engineering department.

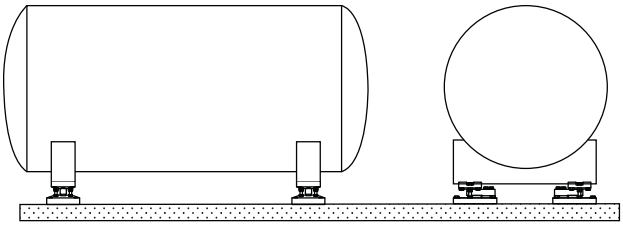
2.1 Weigh Structure Preparation

Prepare the vessel structure by placing spacers under each vessel support point. Spacers should be the same height as the weigh modules and have the same mounting hole layout to permit the vessel to be completely installed and piped.

2.2 Module Installation

The weigh modules are shipped from the factory with the top plate properly aligned and locked in position to prevent damage during shipment. The modules should remain locked until the vessel has been completely installed and all bolts are initially tightened.

Figure 2-1 shows the preferred orientation of the weigh module beneath the vessel with the load cell cable exiting toward or beneath the vessel and out of harm's way.



Horizontal tank with four point support. Weigh modules oriented with exiting toward pairs on each end.

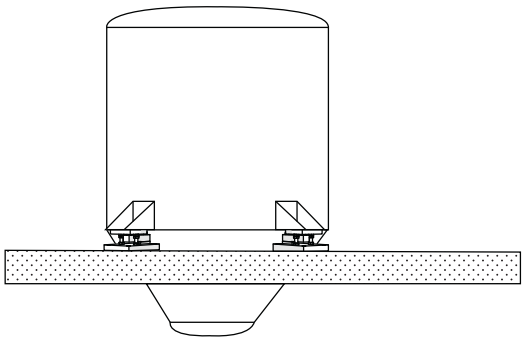


Figure 2-1 Preferred Weigh Module Orientation

If spacers were used, raise the vessel sufficient to remove the spacers and replace with the tank weigh modules. Care should be taken not to lift the vessel any more than necessary so that undo strain is not placed on piping that may be attached to the vessel. If spacers were not used, the modules should be placed in position beneath each vessel support point for the purpose of marking for the mounting hole locations. this should be done prior to attaching any piping since raising the vessel will be required to drill mounting holes in both the vessel support on the vessel and the support for the weigh module. To make it easier, calculate the position for the base of the weigh module and drill and secure the base in position and then position the vessel on the weigh module and drill in place. Stainless steel fastening hardware is recommended for ease of removal if required in areas of high corrosion or in outdoor applications.

If modules are to rest on concrete piers or on a concrete floor, it's recommended that the modules be secured to an interface plate that has been drilled and tapped to accept the weigh modules base plate stainless steel mounting bolts. The interface plate, in turn, would be anchored to the concrete using j-bolts embedded in concrete.

Note ***Welding the base plate of the module to the support surface is not recommended in the event future module replacement is required. Stray welding currents could also pass through the load cell and could destroy the strain gages.***

2.3 Leveling

Check the level in longitudinal and lateral surfaces of the module base plates with a spirit level. Bases should be level within one degree in both directions. Base plates that are not level within the specified tolerances can be brought into level by installing metal shims beneath the plates. Stainless steel shims are recommended. To install shims, remove fasteners from the bottom plate and raise the support high enough to allow the placement of the shims below the base plate. Shims can be staggered as shown in Figure 2-2. After shimming, lower the vessel back down onto the weigh module; install and tighten fasteners. Verify that the module is level. Repeat the procedure adding additional shims as required. After obtaining level in the base plate, grout all voids beneath and around the base plate.

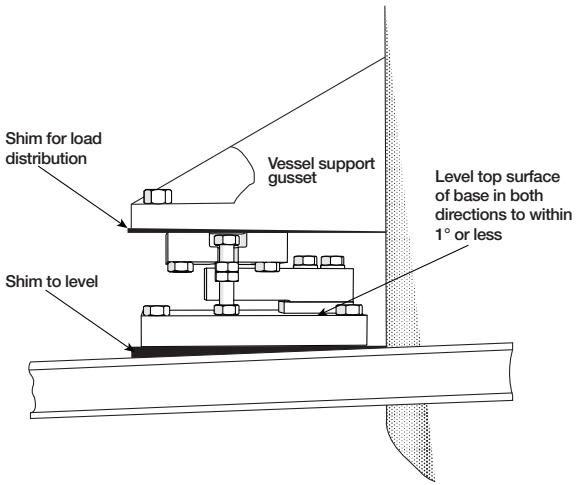


Figure 2-2 Leveling

2.4 Adjusting for Load Distribution

The weigh structure's dead load weight should be equally shared by the weigh modules supporting the structure. A three module installation would require that each module support 33% of the load. In a four module installation each module would support 25% of the dead load.

Adjustment for unequal load distribution is accomplished by placing shims between the top bearing plate of the module and the support point of the vessel at the load point exhibiting the lowest reading compared. Stainless steel shims are recommended (see Figure 2-2). Monitor the output of the module with the highest output while adding shims to the other modules. When the instrument reading indicates that the module under observation is receiving its share of the load, disconnect the instrument and check the output of the other modules. Continue this procedure until each module is sensing its share of the load within 10% of each other. Tighten all hardware securely and then verify the module outputs to ensure the load distribution has not been altered.

Note ***The dead weight distribution should be checked after the weigh vessel, bin, hopper, or scale has been loaded to its full capacity several times. At this point, load distribution degradation can be considered acceptable if the individual module outputs are within 20% of each other.***

2.5 Over Lift Stop Adjustment

The over lift and lateral stop bolt (shown in Figure 2-3), should be set for a clearance of 1/8 of an inch beneath the head of the bolt, or for a clearance which permits full lateral travel of the top plate without the head of the over lift bolt making contact with the top bearing plate. Once positioned, use a thread locking adhesive on the bolt threads to prevent the bolts from becoming loose.

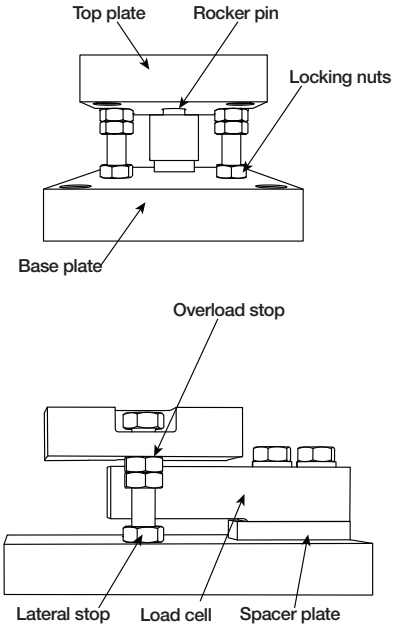


Figure 2-3 Lateral and Overlift/Overload Stops

2.6 Overload Stop Adjustment

After the weigh module has been adjusted for proper load distribution, the overload stops may be adjusted for protection of the load cell against any unexpected overload conditions.

The full scale deflection of the load cell used in the RLTM weigh module is only .010" for up to 4K capacities and .012 for 5K and 10K capacities. However the stops should be set for .020" to permit full excursion of the rocker pin prior to engaging the walls of the thru holes in the top plate with the lateral stop bolts.

Using a feeler gage between the underside of the top plate and the top of the overload stop nut, adjust for a clearance of .020" at the point of closest contact between the two surfaces. Once set, lock the nut in position by tightening the lock nut against it.

2.7 Electrical Installation

RLTM weigh modules are equipped with 15 feet of 4-conductor shield, color coded cables exiting the load cell through a standard conduit fitting. The cable leads are pre-tinned to allow soldering directly to a connector or crimp terminal fitting. The cable color code is shown in Table 6-1 on page 12. Read the junction box and other instrument manufacturers interconnecting wiring instructions before connecting the modules to the associated equipment. Also, check the output of the instrument's load cell excitation power supply to ensure that it does not exceed the module's maximum excitation rating (15 VDC or 15 VAC rms).

Module cables running through areas where they are vulnerable to mechanical damage should be protected by conduit, where possible. Conduit is also recommended in outdoor installations, as well as installations where cleaning by washdown is used. Unsheathed cables used in areas of high humidity should be dressed to include a drip loop both at the module and at the point of termination in the cable extension box and/or summing junction box.

Line Losses

Weigh modules are factory calibrated with 15 foot cables attached. When cables are extended via cable extension boxes, etc., the output of the module will decrease slightly due to the added resistance of the cable. Signal degradation due to increased cable resistance is approximately 0.1 to 0.3%/ohm (dependent on the load cell impedance). This minor loss can be compensated for by calibrating the readout instrument after system installation has been completed.

Temperature Induced Errors

Long runs of interconnecting cables are subject to resistance changes caused by variations in ambient temperature, particularly in areas where wide temperature swings are encountered. Rice Lake Weighing Systems recommends readout instrumentation equipped with a remote sensing load cell excitation power supply and the use of six conductor shielded cable to eliminate temperature related errors. Remote sensing loops should be completed as close to the module as practical.

Lightning Protection

Weigh modules used in outdoor applications where the possibility of a lightning strike exists, should be protected by installing an electrical bypass cable across each weigh module. Electrical bypasses are also recommended where welding will be performed after the installation of the modules.

Due to the magnitude of the energy produced by a lightning strike, mere use of a grounding strap does not guarantee the load cell will be 100% protected.

3.0 Operation

The instrumentation used in conjunction with weigh modules serves as a system test device during initial system operation. Data taken during this period can be used to check weigh module performance and the electrical and mechanical installation such as tank freedom on load modules, non-linearity, hysteresis effect, vibration, etc. Weigh module instrumentation should include a wide range zero control for canceling dead weight, container weight, and a span or calibration control for adjustment of live load tracking and display. Instrument adjustments are generally covered in the associated operation and service manual.

3.1 Temperature

The temperature compensated range for the RLTM weigh module is 15 to 115°F (-10 to +45°C). Modules will provide optimum performance operated within this temperature range. Temperature should be held uniform at each module position, where possible. If it becomes necessary to operate the weigh modules at temps above or below the specified limits, suitable protection in the form of insulation, shielding heating (in the case of extreme cold), should be provided.

Operation of the associated instrumentation within its specified limits is also necessary for good system performance.

3.2 Load

RLTM weigh modules are protected against overload damage by adjusting the overload stops described in Section 2.6 on page 7.

3.3 Calibration

RLTM weigh modules should be calibrated using standards directly traceable to the National Institute of Standards and Technology (NIST). A calibration summary sheet is supplied with each weigh module. Data contained in the calibration sheet can be used for reference when conducting independent calibration checks. Weigh module performance cannot be altered externally.

4.0 Maintenance

Module locations should be periodically checked for buildup of dirt and debris. Interconnecting cables also should be inspected for evidence of mechanical damage such as cuts or punctures which could eventually result in short or open circuits.

4.1 Troubleshooting

The following section covers some of the troubleshooting solutions that can arise with the RLTM weigh module.

4.1.1 Electrical Troubleshooting

Troubleshoot for any electrical malfunctions using the following procedure.

1. Check instrument power and fuses.
2. Check to determine connections to the instrument are correct and tight.
3. Check instrument performance independently and follow manufacturer's recommended procedure.
4. Check the continuity of interconnecting leads.
5. Check the junction box connections (where applicable).
6. Check for proper bridge excitation voltages.
7. Check the output of each weigh module for comparable output levels.
8. Make the following resistance checks — measured values should be greater than 5000 megaohms.

   Ground to a lead of the interconnecting cable.

   Weigh module load cell case to cable lead.

   Weigh module load cell case to cable shield.
9. Disconnect the weigh module cable leads from the instrument or junction box and measure the resistance between the input leads and output leads. Input resistance should be 350 ohms minimum and output resistance could be 350 + or - 10 ohms.

Note *The ohm meter used to measure input and output resistance should not apply more than 50 volts to the weigh module load cell bridge.*

Resistance errors indicate faults within the weigh module's load cell bridge circuitry. The load cell is not field repairable and must be returned to Rice Lake Weighing Systems for repair. Contact the repair department to obtain an RMA number (Return Material Authorization tracking number). Place this on the outside of the package.

4.2 Mechanical Troubleshooting

Erratic system operation (not attributable to electrical failure) indicates problems with the weigh structure. Thoroughly check the structure for evidence of weld cracks, breaks, blockages, etc. Check each weigh module position and mounting. Correct any failures as required.

Load Cell Wiring Color

Cable Color	Description
Green	+ Excitation
Black	- Excitation
White	+ Signal
Red	- Signal

Table 4-1. Load Cell Wiring

5.0 Options

5.1 Spacers and Dummy Weigh Modules

Spacers are typically I-beam sections fabricated to the exact same height dimensions as the weigh module including the associated mounting holes.

Rice Lake Weighing Systems can manufacture dummy load cells that can be assembled in the weigh module during installation. The purpose of a dummy module is to permit welding and all other operations to be performed on the vessel or weigh structure which could otherwise destroy the active load cell due to high electrical currents or overload conditions. The module is shipped with the top plate positioned and locked in place by the overload stop bolts to secure the correct position of the rocker pin during module installation. Contact Rice Lake Weighing Systems for availability of dummy load cells.

5.1.1 Installation of a Dummy Weigh Module

The use of dummy weigh modules prior to installation of the RLTM weigh module allows the installer to position the vessel/weigh structure and pre-drill weigh module mounting holes in both the weigh structure and the support bearing surfaces. The modules should be oriented beneath each structure support point with the cable exiting inward towards the vessel and the hole locations marked for drilling. When all holes are clearly and properly marked, the modules are removed to facilitate drilling the holes. The vessel or structure, is then lowered again onto the weigh modules and secured in place with stainless steel fasteners.

The fasteners need not be tightly fastened at this time since shimming will inevitably be required to assure proper load distribution after installation of the live load cells.

5.1.2 Installation of Live Load Cells

Replacement of the dummy load cell with the live load cell should be done when the vessel is empty to permit use of the overload stoop to be used as a jack to support the structure. The nuts on each side of the load cell may be turned up again the bottom side of the top plate of the module with an additional half turn given after contact. The latter half turn provides enough support of the vessel/structure, so that the dummy load cell can be removed.

Removal of the cell is accomplished by removing the two bolts securing the load cell to the base plate. Tilt the cell forward so that part of the load cell (the end beneath the center of the top plate) downward to permit clearing the rocker pin from its recess in the dummy load cell and position it in the recess of the live load cell.

Install the load cell in the reverse sequence of the dummy load cell removal. Care should be taken to align the load cell parallel with the base plate to permit the rocker pin to sit in its relaxed vertical position when engaged in the recess of the top plate. when proper alignment has been achieved, tighten each bolt equally until a torque of 100 inch pounds has been applied to each bolt.

6.0 Specifications

Rated capacity	500lb, 1.25k, 2.5k, 4k, 5k, 10k
Rated output	2.0± .002 m/V
Combined effect due to	
non-linearity and hysteresis	±0.05 %
Nonrepeatability	0.01 %
Creep in 20 minutes	0.03 %
Zero balance	1.0 %
Compensated temp range	+15 to +115°F (-10 to +40°C)
Temperature effect	
Output	(% of load / 100 F) 0.08
Zero balance	(% / 100 F) 0.25
Terminal resistance	
Input	Min. 350 Ω
Output	350 Ω
Excitation voltage	Max. VDC or VAC rms15
Insulation resistance	Min. 5000 Mega Ohms
Maximum load, safe	300 %
Deflection at rated capacity	5k, 10k =.012 500lb, 1k, 2.5k, 4k =.010
Maximum side load	100 % rated capacity

Percentages relative to rated output, except as noted.

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