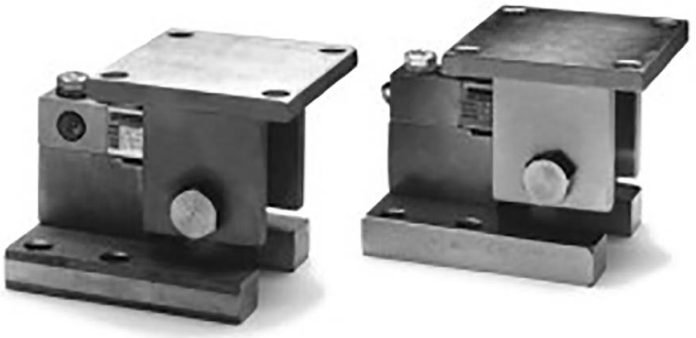
# RL1800 Series

*Weigh Module Kit*

# Installation Manual



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RICE LAKE WEIGHING SYSTEMS

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# 1.0 Introduction

The RL1800 Series Weigh Module is designed to accommodate normal vessel expansion in all directions while still exercising self-checking capabilities. The center-pivoting, tension-loading design incorporates spherical washers and a unique pivoting trunnion that self-restores to its center position. Vessel leveling and adjusting can easily be done with the center loading bolt, and the load cell can be replaced without raising the vessel.

Manuals and additional resources are available on the Rice Lake Weighing Systems website at **www.ricelake.com**
Warranty information can be found on the website at **www.ricelake.com/warranties**

## 1.1 Overview

The module is available in two sizes:

- Small – accepts load cells with capacities from 250 lb to 5,000 lb SE (small envelope load cells)
- Large – accepts load cells with capacities from 5,000 lb to 10,000 lb

Both sizes are available in tool steel or stainless steel.

Standard Features of the RL1800 Series Weigh Module include:

- Capacities (per module): 250-10,000 lb (113.4-4,535.9 kg)
- NTEP Certified cells in 1,000-10,000 lb (453.6-4,535.9 kg) capacities
- Zinc-plated mild steel construction
- Center-pivoted, tension-loading design
- Self-checking, multi-directional movement
- Load is suspended on high-strength bolt instead of wire rope
- Design incorporates spherical washers for self-centering

# 1.2 Safety

## Safety Signal Definitions:

**DANGER** *Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.*

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

**CAUTION** *Indicates a potentially hazardous situation that, if not avoided, could 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.*

### General Safety

*Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Contact any Rice Lake Weighing Systems dealer for replacement manuals.*

**WARNING**

*Failure to heed may result in serious injury or death.*

*Do not allow minors or inexperienced persons to install this unit.*
*Do not use for purposes other than 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 Mechanical Installation

**CAUTION** ***The installation should be planned by a qualified structural engineer. Each installation is unique, and this booklet is meant to serve only as an overview for installation of the RL1800 Series Weigh Modules.***

## 2.1 Installation Guidelines for Weigh Modules

In circular mounting configurations, the preferred mounting orientation is with the long axis of the load cell pointing toward the center of the vessel.

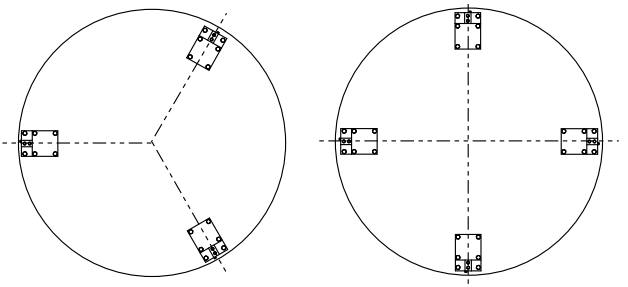

*Figure 2-1. Circular Mounting*

For rectangular vessels, the long axis of the load cell should be parallel to the long dimension of the vessel.

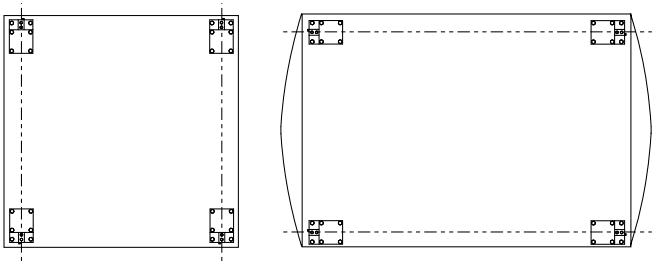

*Figure 2-2. Rectangular Mounting*

In any application where a recurring force is present in one direction, such as in a conveyor belt or roller platform, the long axis of the load cell should align with that force.

Mounting surface for base plate and top plate must be level within ± 0.5° to minimize side loads and extraneous forces.

- If the mounting surfaces are not level, shims or grout may be used to level the module.
- If possible, check level and plumb again when container is fully loaded; the deflections in legs and supporting structures may cause additional side forces which greatly affect accuracy.
- Reinforcement, such as cross bracing of legs or other support structures, may be needed to correct this.
- Deflections of modules top or base plate due to loading should not exceed ± 0.5°.

The load on each module should not more than 20%. During installation, add shims where needed to verify the correct load distribution is achieved on each module.

During installation, dummy load cells can be used to prevent overload damage.

**IMPORTANT** ***If the actual load cells are used during installation of the weigh module, extreme care must be taken to prevent overload damage. A tank or hopper weighing several tons can exert extreme forces when dropped only a fraction of an inch.***

All piping or conduit must be horizontal and flexible sections close to the vessel.

- 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.
- In smaller, lower capacity tanks and hoppers, isolating the resultant forces becomes extremely critical.
- If possible, use flexible conduit piping close to the vessel instead of the rigid variety.
- See the Weigh Modules & Vessel Weighing Systems manual (PN 22054) for more information.

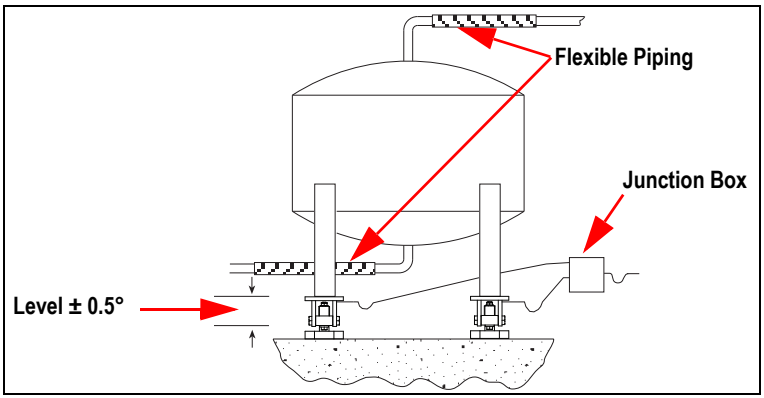


*Figure 2-3. Piping and Conduit*

**IMPORTANT** ***Load cells should not be installed in modules until 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, ground in such a manner as to prevent welding current from passing through the load cell.
- Ground the welder as closely as possible to the point of welding.

**IMPORTANT** ***Never rely on check rods or piping for grounding.***

When possible, use hermetically sealed load cells in washdown applications.

- Environmentally protected load cells are not suitable for such applications and will be damaged.

- If tanks and surrounding equipment are frequently steam cleaned, or if the load cell is subjected to direct washdown, a protective shroud for the weigh module is recommended.
- Proper drainage is necessary so the weigh module is not standing in water.

When installing the load cells, use the bolts provided or grade 5 (or stronger) hardened bolts. Pay particular attention to the recommended torque values.

- Some modules require very loosely torqued bolts to allow the load cells to flex easily.
- Some modules must be very tight to prevent the load cells from creeping or digging into the module.

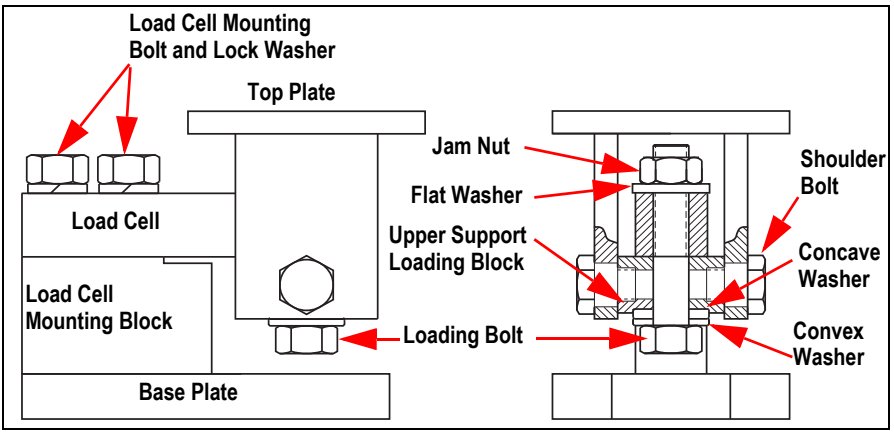


*Figure 2-4. Parts of the RL1800 Module*

## 2.2 Installing the RL1800 Module

The type of installation, structure of the vessel supports, and strength of the mounting surface govern the method of locating, attaching, and assembling the RL1800 Weigh Module. Carefully consider three areas which 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 flexing when the system is fully loaded?
- Is there attached equipment such as skirting, venting, or piping which is likely to cause binding or lack of flexibility?

To install the load cells, use the following directions:

1. Determine where to position the module and which direction it should be oriented.
2. Assemble the module and load cell (Figure 2-4).
    - Torque 1/2" load cell mounting bolts to 65 ft-lb (Small module only)
    - Torque 3/4" load cell mounting bolts to 175 ft-lb (Large module only)
3. Adjust center loading bolt on all modules to give the lowest overall profile height, leaving at least 1/8" gap between the load cell and the upper support loading block.

4. Lift and block the vessel to the same height as the assembled modules.
5. Lift one corner or side of the vessel enough to slide that module into place.
6. If the module is being fitted under the leg of a vessel, verify the leg's center line passes through the center of the top plate (and center of the load cell's load hole).
7. Secure top plate by bolting, do not fully tighten, shimming may be needed to level.
8. Repeat steps 5, 6 and 7 for the remaining modules. The vessel is now supported on the modules only.
9. Move the vessel to its final position, if necessary.
10. Verify that there is no initial misalignment between the base plate and top plate by lifting the vessel slightly at each support point in turn. This also indicates if the load is evenly distributed on all modules.
11. Shim as needed (this only applies to systems utilizing more than 3 modules).
12. Attach the base plates to the foundation using anchor bolts for concrete or by bolting or welding to a steel structure.
13. Verify that the base plates are no more than ±0.5° out of level. Shim if needed.
14. Check that the top plates are no more than ±0.5° out of level. Shim if needed.
15. Tighten the bolts.
16. Check the load distribution by connecting each load cell to the junction box and indicator in turn and measuring the output with a voltmeter. To verify wiring scheme, check the installation manuals for the junction box and indicator. The variation in load among the cells should be no more than 20%. Shim if needed.

# 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 150°F (66°C).

**IMPORTANT** ***Do not shorten any load cell cable.***

* *The load cell is temperature compensated with the supplied length of cable.*
* *Cutting the cable affects temperature compensation.*
* *Coil excess cable and protect it so it does not be mechanically damaged or sitting in water.*
* *Cutting the coil voids the warranty.*

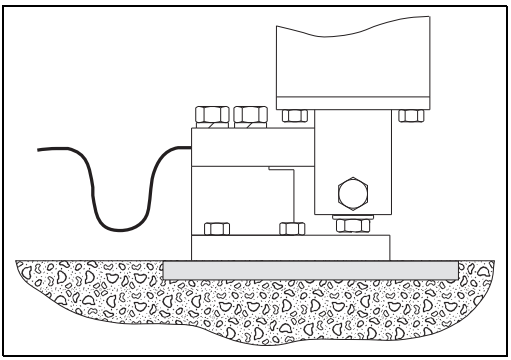

*Figure 3-1. Drip Loop*

2. Provide a dip loop in all cables so water or other liquids will not run directly down the cables onto the load cells or the junction box.
3. Attach load cell cable to the dead structure, not the vessel.
4. 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.
5. Connect cables for the load cells to the summing board in the junction box according to the junction box manual. To verify the wiring scheme, see the certification shipped with each load cell.
6. For better performance, use positive and negative remote sense lines if the wiring run from the junction box to the indicator is longer than 25'.

## 3.1 Junction Box Connection

Refer to the junction box manual for connections, adjustments and calibration. It also contains the trimming details.

Refer to indicator manual for system calibration guidelines.

# 4.0 Troubleshooting

If system powers up and displays some type of stable digital readout that varies with the load on the system, system problems are most likely caused by factors other than the load cells. Load cells are usually blamed for a malfunctioning system, however, 90% of the time the problem is mechanical.

| 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 |

*Table 4-1. Troubleshooting*

If system can be calibrated but does not return to zero, loses calibration or demonstrates non-linearity or non-repeatability, see Table 4-1 for possible causes and refer to the following list of checks.

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

If the problem is not found:

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

If a problem still cannot be isolated:

1. Reconnect all but one load cell.
2. 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 not to the simulator.

# 5.0 Repair Parts

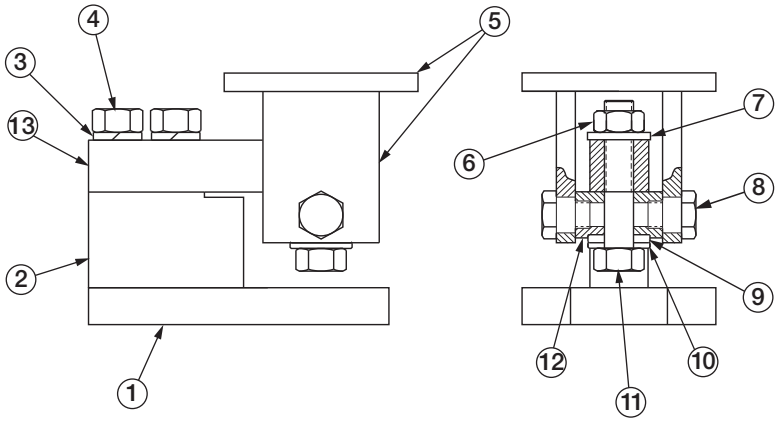


*Figure 5-1. RL1800 Parts Illustration*

| Item No. | Description | QTY | Replacement Part Numbers | |
|---|---|---|---|---|
| | | | 250 - 5,000 lb | 5,000 - 10,000 lb |
| 1 | Base Plate | 1 | 22723 | 22728 |
| 2 | Load Cell Mounting Block | 1 | 22724 | 22729 |
| 3 | Lock Washer | 2 | 15167 | 15181 |
| 4 | Load Cell Bolt | 2 | 14765 | 14788 |
| 5 | Upper Support | 1 | 22725 | 22730 |
| 6 | Jam Nut | 1 | 14664 | 14687 |
| 7 | Flat Washer | 1 | 15173 | 15179 |
| 8 | Shoulder Bolt | 2 | 22726 | 22726 |
| 9, 10 | Spherical Washer Set | 1 | 15198 | 15200 |
| 11 | Hex Head Loading Bolt | 1 | 14759 | 14786 |
| 12 | Upper Support Mounting Block | 1 | 22727 | 22731 |
| 13 | Load Cell | 1 | See Load Cell Selection Guide | |

*Table 5-1. RL1800 Tool Steel Replacement Parts*

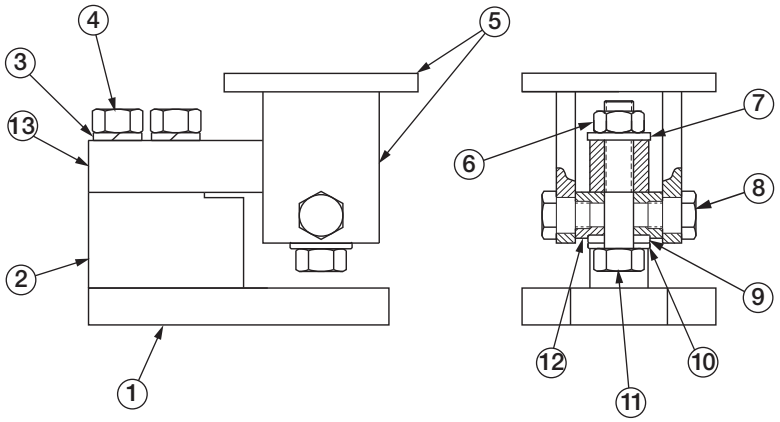


*Figure 5-2. RL1800 Parts Illustration*

| Item No. | Description | Qty. | Replacement Part Numbers | |
|---|---|---|---|---|
| | | | 1,000 - 5,000SE lb | 5,000LE - 10,000 lb |
| 1 | Base Plate | 1 | 22732 | 22739 |
| 2 | Load Cell Mounting Block | 1 | 22733 | 22740 |
| 3 | Lock Washer | 2 | 15168 | 15182 |
| 4 | Load Cell Bolt | 2 | 14766 | 14789 |
| 5 | Upper Support | 1 | 22734 | 22741 |
| 6 | Jam Nut | 1 | 14766 | 14688 |
| 7 | Flat Washer | 1 | 15175 | 15180 |
| 8 | Shoulder Bolt | 2 | 22735 | 22735 |
| 9 | Concave Washer | 1 | 22736 | 22742 |
| 10 | Convex Washer | 1 | 22737 | 22743 |
| 11 | Hex Head Loading Bolt | 1 | 14760 | 14787 |
| 12 | Upper Support Mounting Block | 1 | 22738 | 22744 |
| 13 | Load Cell | 1 | See Load Cell Selection Guide | |

*Table 5-2. RL1800 Stainless Steel Replacement Parts*

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