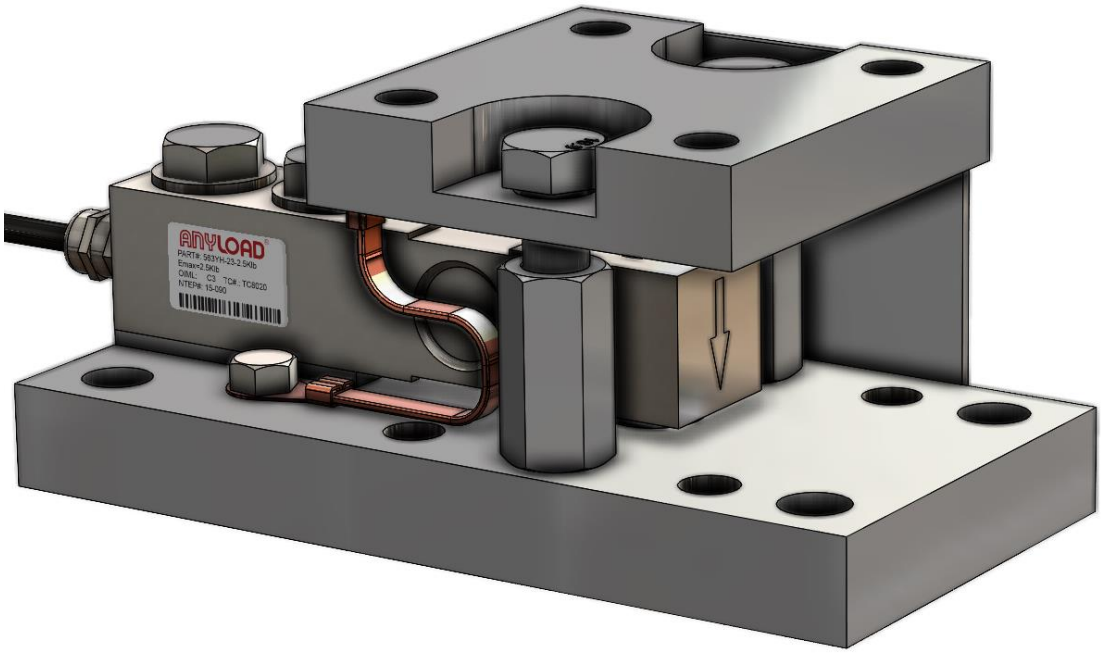
563YHM4-02 Installation Manual



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I. ABOUT THIS MANUAL

Thank you for choosing Anyload 563YHM4-02 Weigh module assembly for your various applications. This weigh module has been designed intelligently with real feedback from the field technicians and engineers to accommodate better installation, safety and accuracy. This manual provides how to assemble and install 563YHM4-02 weigh module in the application. This manual is intended to be used by trained service technicians and installers. It is recommended to go through the manual in details before installing, operating or configuring the instrument. For further information please contact Anyload or authorized dealer.

II. DISCLAIMER

Information in this Technical Manual is subject to change without notice due to correction or enhancement. The information described in this manual is the property of Anyload. All other brand or product names within this publication are trademarks or registered trademarks of their respective companies. All information contained within this publication is, to the best of our knowledge, complete and accurate at the time of publication.

III. SAFETY

General safety

Standard safety practices are required before conducting any installation, maintenance, or procedure on device. It is recommended to read and understand the instructions and warnings in this manual before performing any procedure on device. Failure to follow the instructions and warnings could result in injury or death.

Definition of the safety symbols is described in table below.

Symbol	Description
	***WARNING!*** Indicates a potentially hazardous situation which may result in serious injury or death Indicates a potentially dangerous procedure which may cause injury or death
	***CAUTION!*** Indicates a potentially wrong procedure which may result in damage to device Indicates a potentially wrong procedure which may result in loss of warranty
	***NOTICE!*** Indicates a procedure which may need more instructions Indicates a procedure which has more information available

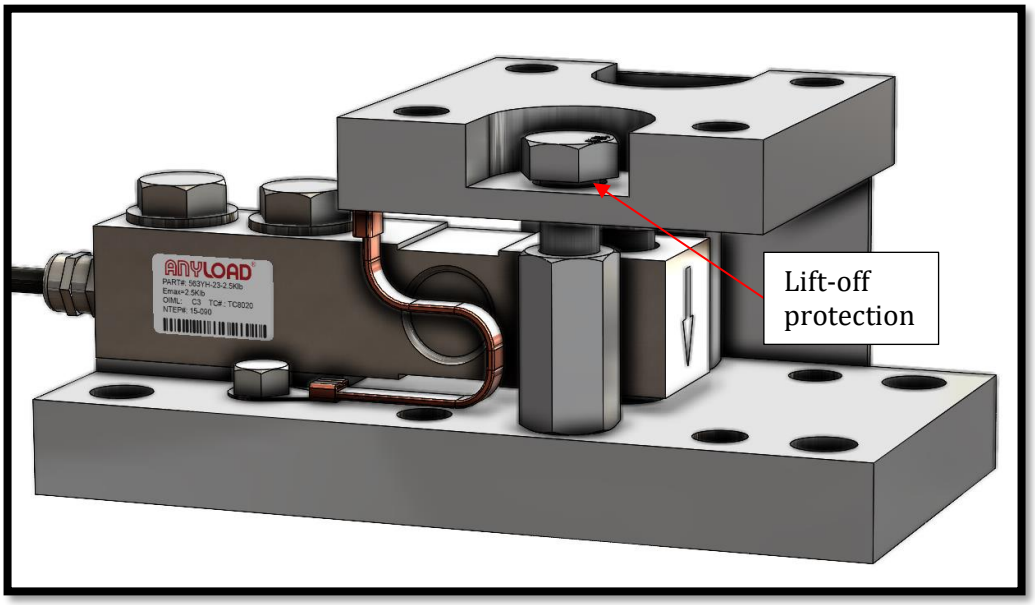
Safety of the weigh module

- Do not drop the package. If it is noticed any damage on the weigh module or the load cells, please contact Anyload customer support team immediately with clear images.
- Do not carry the load cell by the cable.
- Do not cut/damage the cable.
- Protect the load cells from shock loading/overloading during the installation and any other handling. This weigh module does not have an integrated overload stopper for the load cell.

1. INTRODUCTION

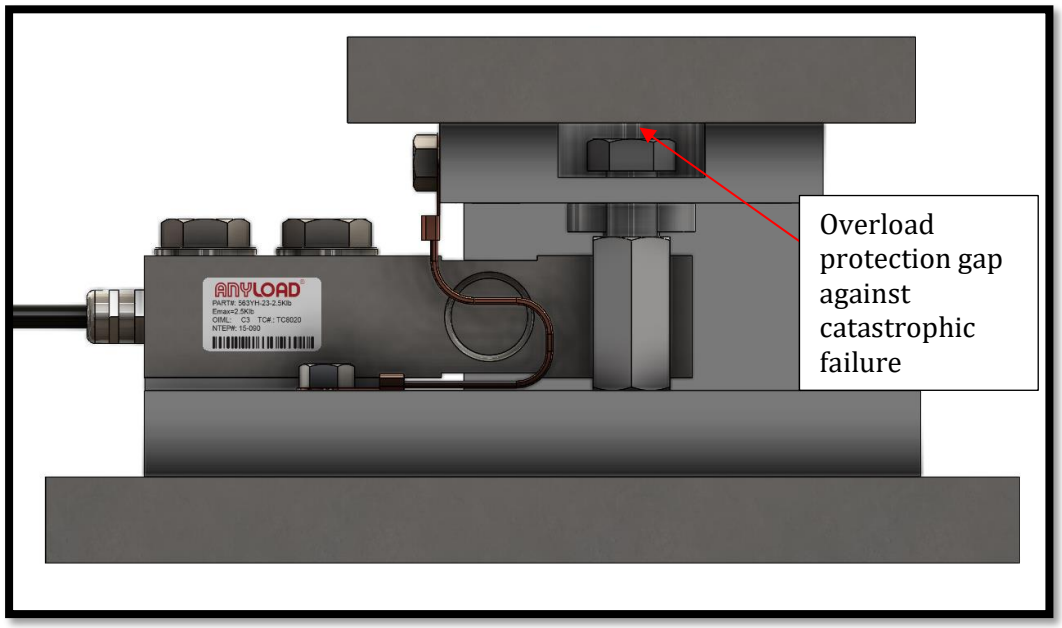
The 563YHM4-02 weigh module is a versatile weigh module design with superior load introduction. It is constructed with superior Alloy Steel material and capacity range is from 100lb to 20klb. This design includes integral uplift protection and overload protection mechanism against catastrophic failure. Both 563YH and 563YH-23 load cell types are compatible for use in the 563YHM4-02 weigh module.

- **Lift-off protection of 50% from the rated capacity**
  Lift-off protection is very important feature for a tank weigh module to withstand against the side forces on the tank such as wind forces. Two bolts' heads from both sides of the weigh module ensure the lift-off protection up to 50% of the rated capacity (largest capacity of the range).

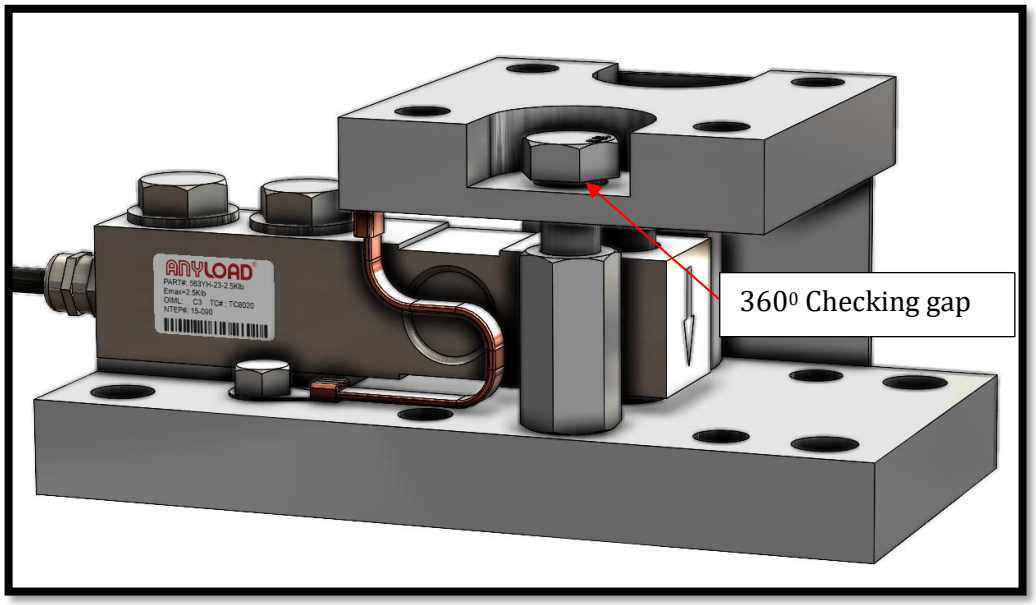


- **Overload protection against catastrophic failures**

  Top plate will be rested on top of two solid hex bolt heads to protect in case of catastrophic failure happened.



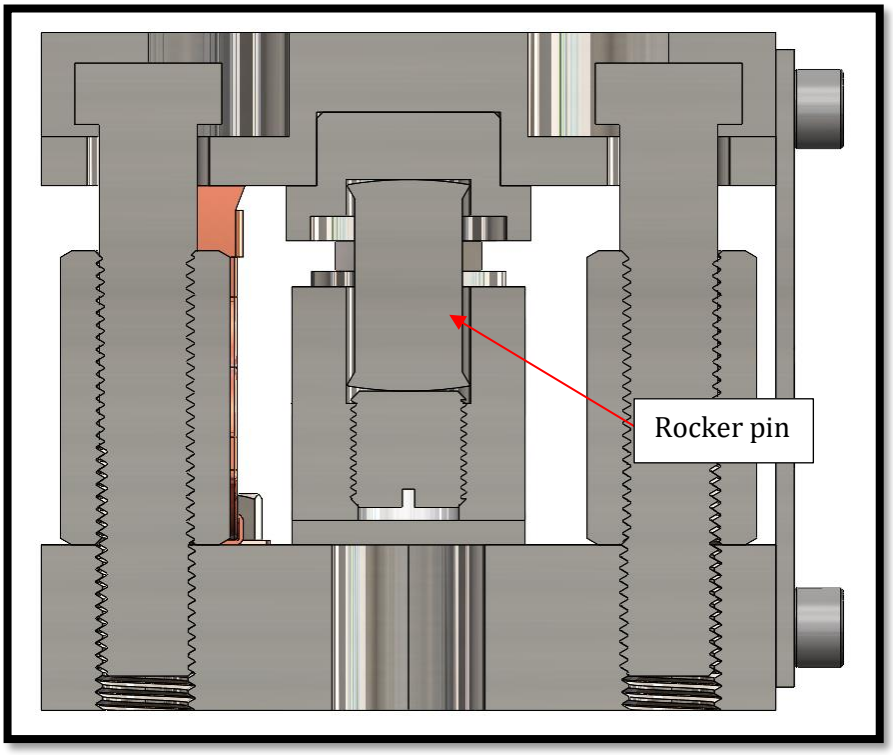
- **360⁰ checking & side load protection of 50% from the rated capacity**
  The gap between the bolt and the through hole on the top plate allow and ensure 360⁰ checking and the side load protection up to 50% of the rated capacity (Largest capacity of the range).



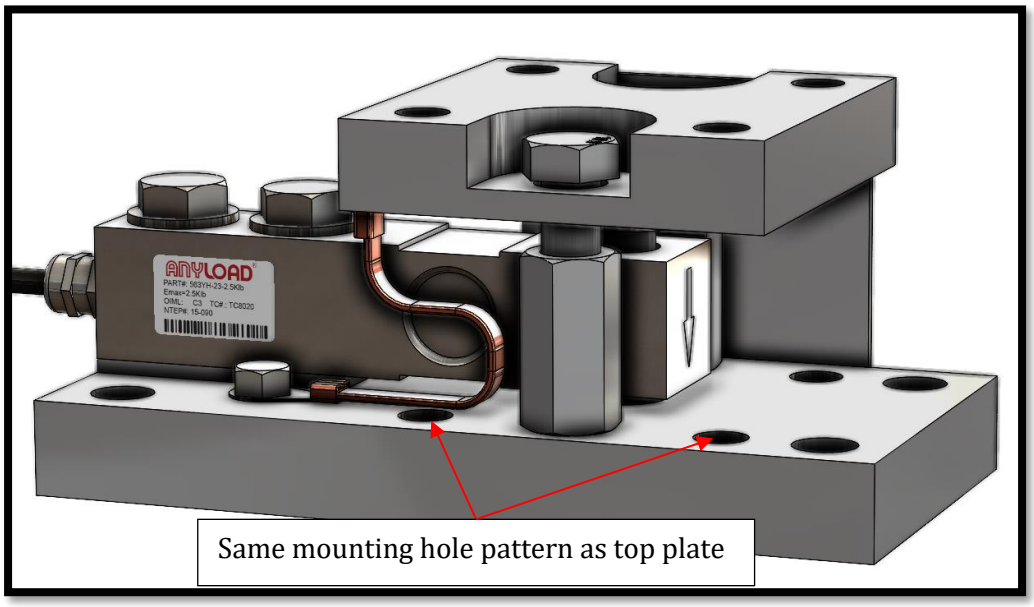
- **Allows for large amount of vessel expansion/ contraction due to temperature variation**
  Above mentioned gap also allows to top plate to move against the tank/vessel expansion and contraction due to the temperature variation due to the seasonal changes during the year.

- **Higher accuracy loading introduction with rocker pin design.**

  Harden rocker pin loading introduction ensure the accuracy of the load cell reading as it helps to apply the load to the true center of the load cell.



- **Versatile mounting options for conventional tank/vessel leg**
  - Able to use existing 4-square tank leg mount holes in floor
  - Free to rotate for fixed position 360° w/same 4-mount holes
  - Able to flip entire mount 180° for further mount options



- Fast load cell installation/replacement
- Flexible stainless steel braided grounding strap
- Capacity range: 100lb-20Klb/100kg-10t
- NTEP certified load cells from 1Klb-10Klb
- OIML certified load cells from 500kg-2.5t
- FM approval, CE and RoHS certified load cells
- Simple, low-cost installation with no specialist tooling required

2. WEIGHING SYSTEM CONFIGURATIONS

Number of weigh modules

It's determined by the number of existing support legs of the tank/silo. If a tank has four legs, then four weigh modules are needed. Compression mounting systems usually use three, four, or more mounts. It should be avoided more than eight modules' systems as even weight distribution becomes extremely difficult to achieve as it lowers the weighing accuracy.

Selecting the weigh module capacity

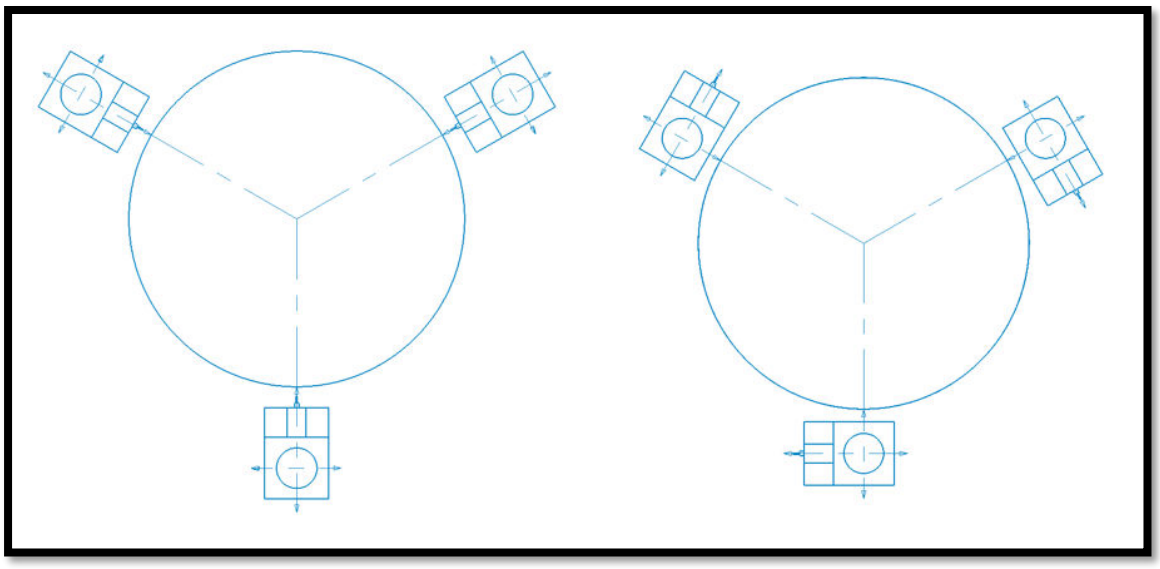
Selecting right load cell capacity is very important as it may cause many troubles if select inappropriate capacity such as overloading, low accuracy, etc. All the load cells capacities and impedances must be matched each other. In usual tank weighing applications, the Gross Weight of the system is evenly distributed among the number of load points. The Gross Weight of the tank weighing system is the dead load of the structure which includes empty tank, valves, motors, piping, etc, plus the maximum live load of the system when the tank is full. The minimum load cell capacity can be determined with the formula below,

$$\textbf{\textit{Minimum load cell capacity}} = \frac{\textbf{\textit{Dead weight + Live weight}}}{\textbf{\textit{Number of load points}}}$$

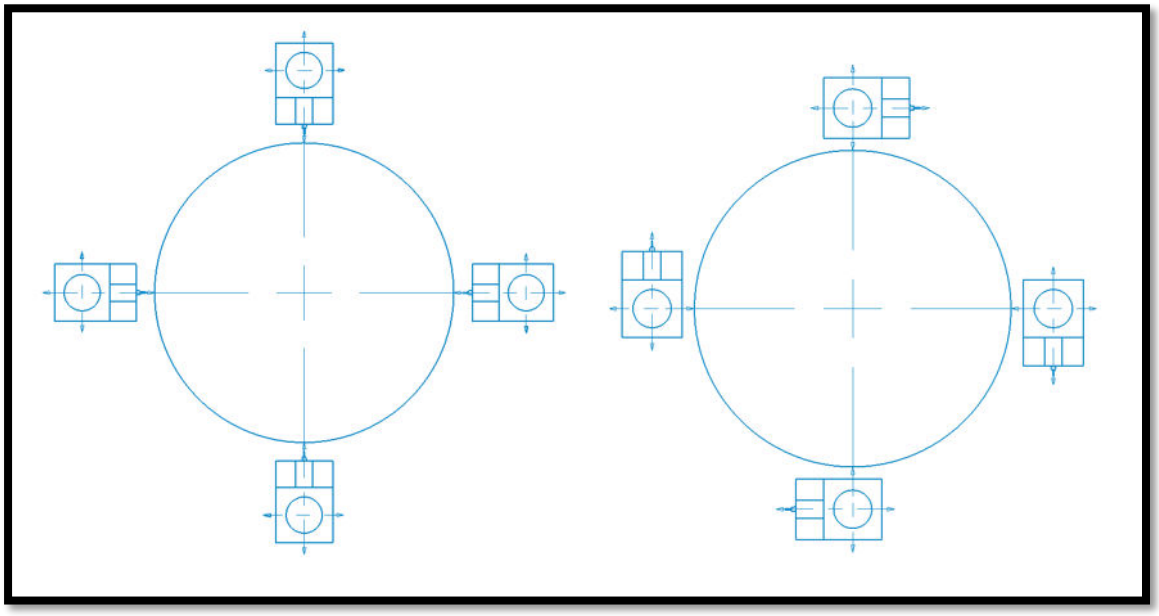
In cases where the applied load is uneven, it must be increased the load cell capacity to match the largest load applied leg of the tank. For example, if one leg bares more load due to the motor, pipe, etc then it must be using the heaviest load capacity load cell for all the legs.

Weigh module positioning layouts

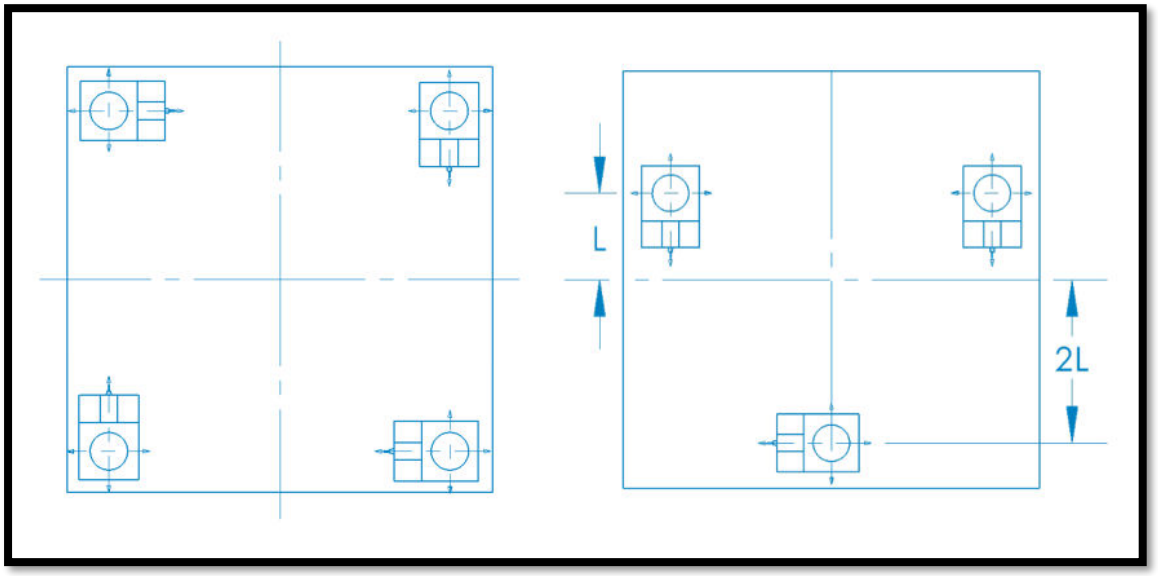
Circular tank – Three legs system



Circular tank – Four legs system



Square tank – Four & Three legs systems



3. UNPACKING

- Inspect the packing box and products carefully for any signs of damage that might occur during shipment.
- Load cells are shipped separately for a better protection during the shipping.
- Anyload recommends to remove the load cells and weigh module from the packaging just before installation as they are more secure inside the packaging than outside.

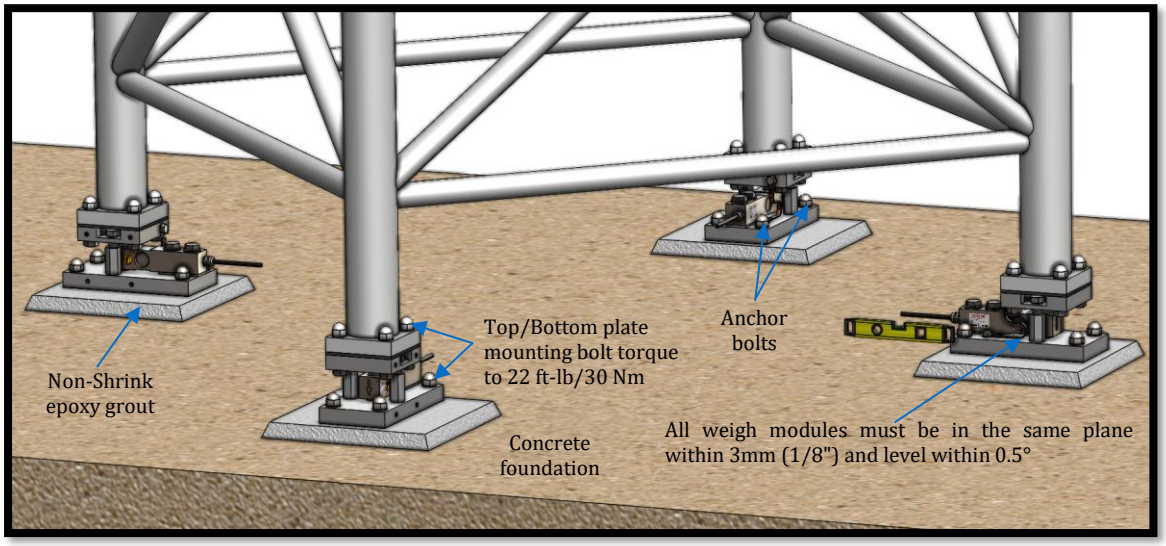
- Although both load cells and the weigh modules are designed for harsh environments, the load cells are precision instrument and should be handled very carefully. UNDER NO CIRCUMSTANCES SHOULD THE LOAD CELLS EVER BE LIFTED BY THE CABLE. IT SHOULD BE ALWAYS PICKED UP THE LOAD CELL BY IT'S BODY.
- The purpose of the shipping spacer is to keep the top and bottom plates aligned during installation. THE SHIPPING STOPPER CANNOT BARE THE WEIGHT OF THE TANK AS IT'S ONLY FOR HORIZONTAL ALIGNMENT PURPOSE.
- Write down the serial number(s) of the load cells, the weigh modules and store this information in a secure location for future reference.
- Keep all the documents including this manual in a secure place. This manual will be available on the website 24 hours.

4. INSTALLATION

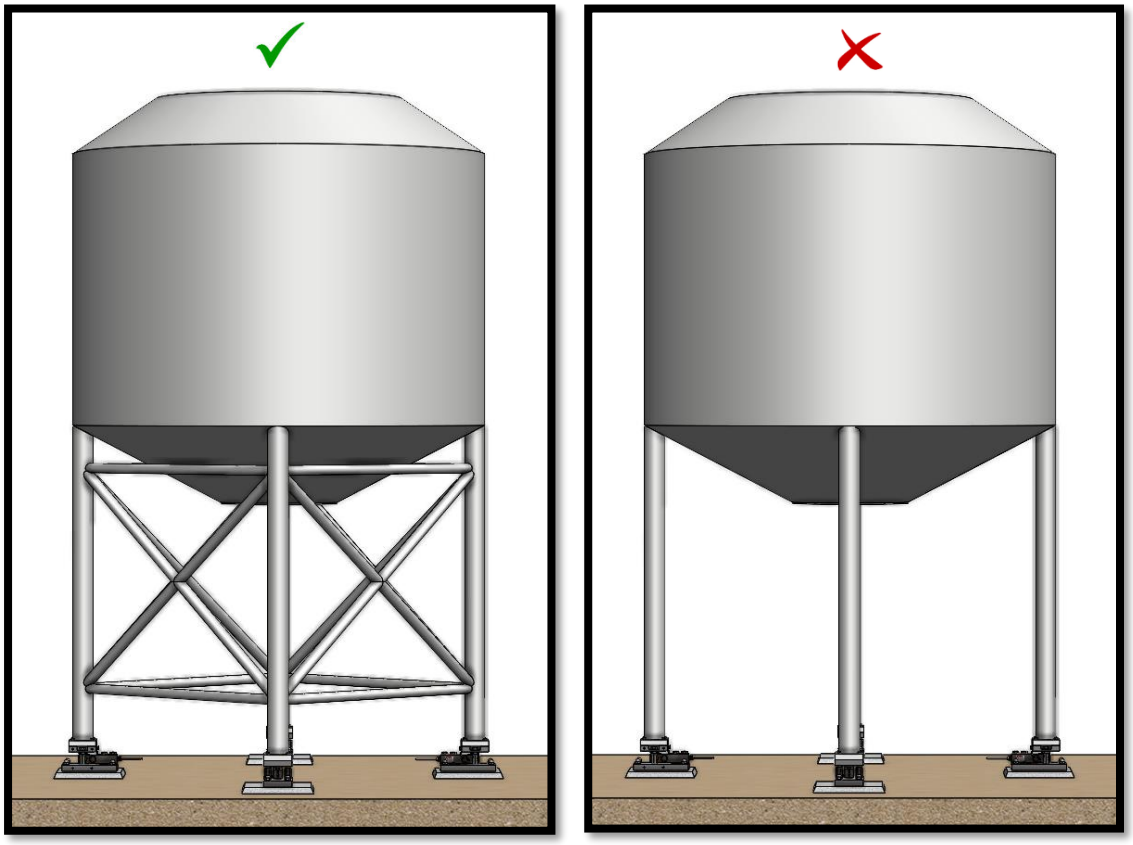
Site preparation for the weighing system

It's important to have a strong foundation for the weighing system to get accurate weighing reading avoiding any errors due to the vibration, deflection, etc. It can be a structural beam or concrete pier. Mounting surfaces should be flat within 1/8" (3mm), level within 0.5°, rigid, and should be able to withstand the tank weight plus full load.

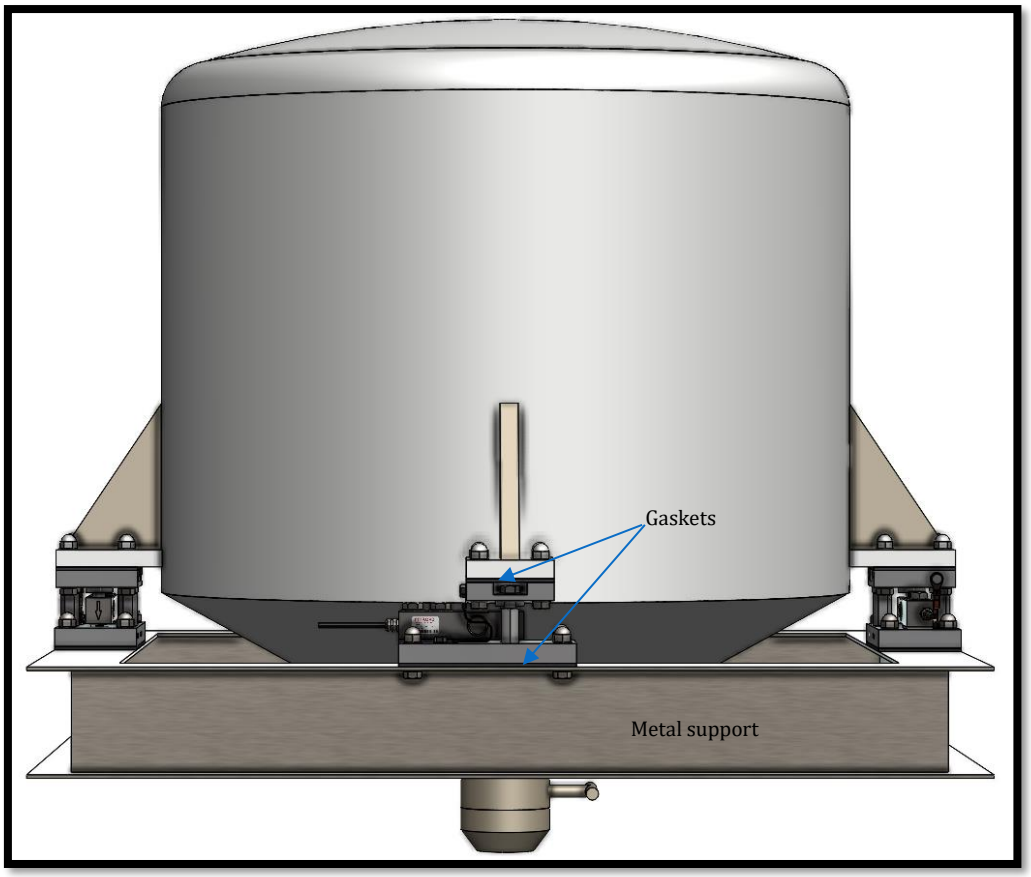
Installation on concrete pier

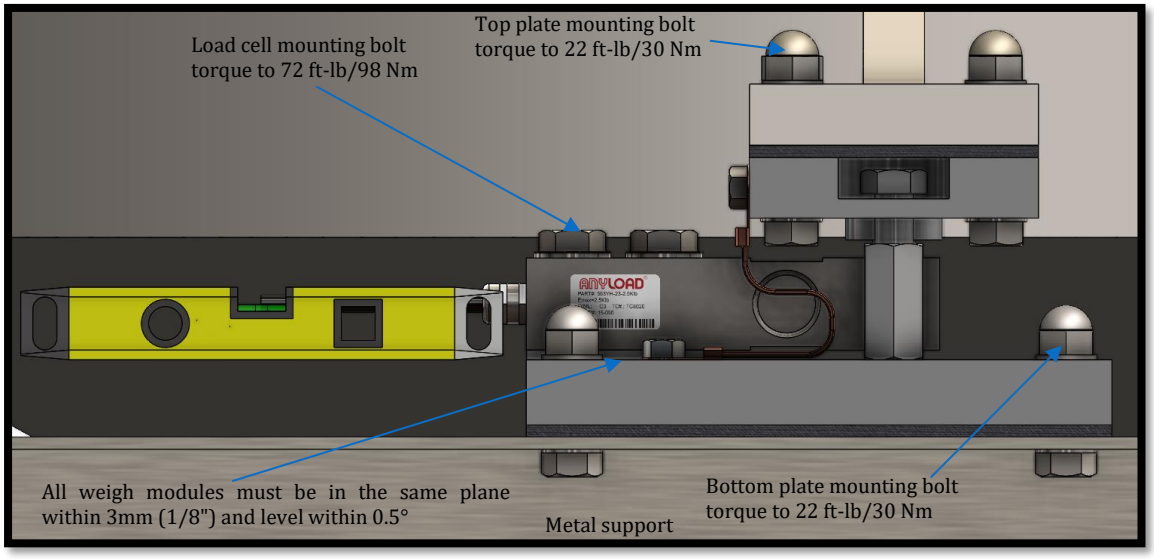


When use the metal supports, it's recommended to reinforce the structure to avoid any buckling, deflection to get an accurate weighing reading.

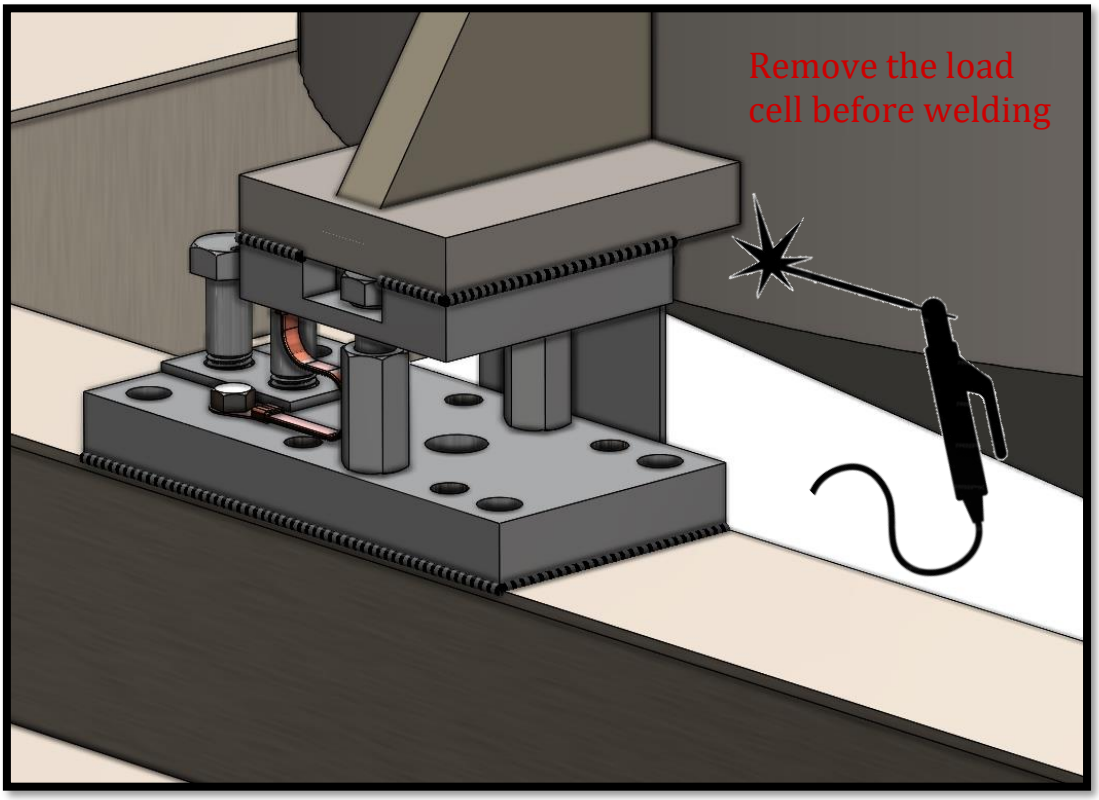


Installation on metal support with bolts

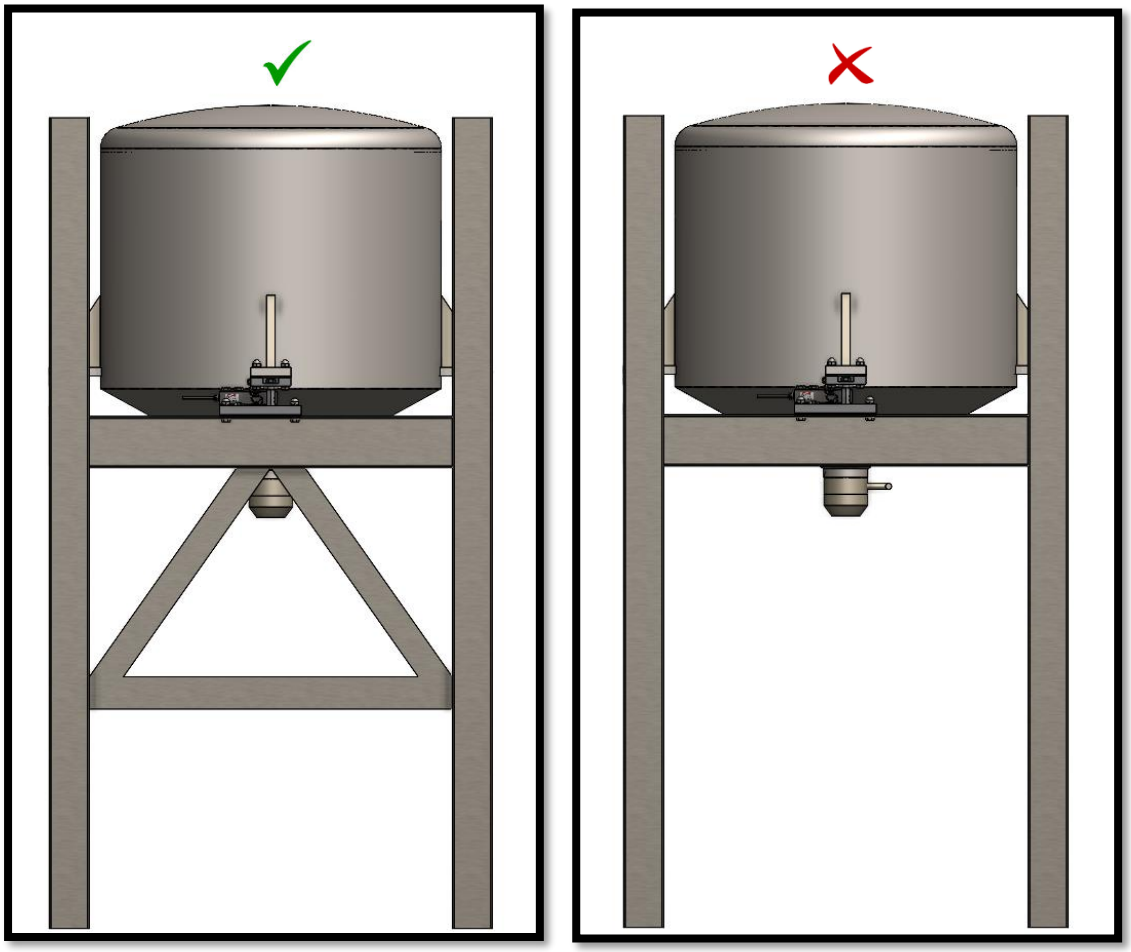




Installation on metal support with welding

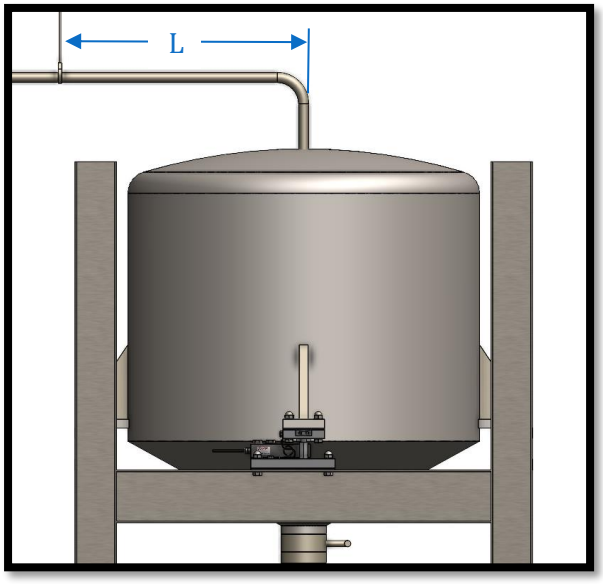


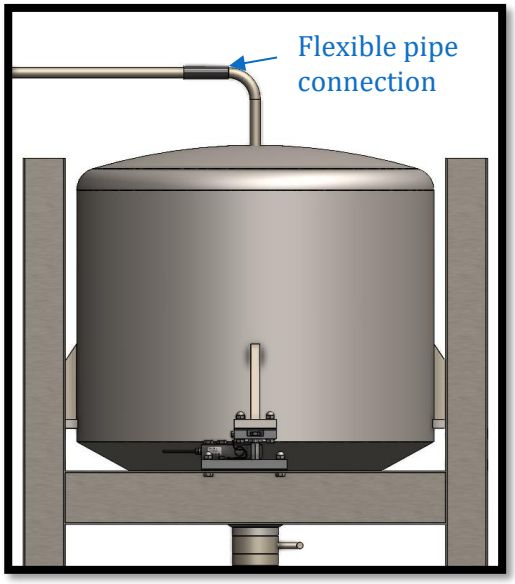
When use the metal supports, it's recommended to reinforce the structure to avoid any buckling, deflection to get an accurate weighing reading.



Pipe connection

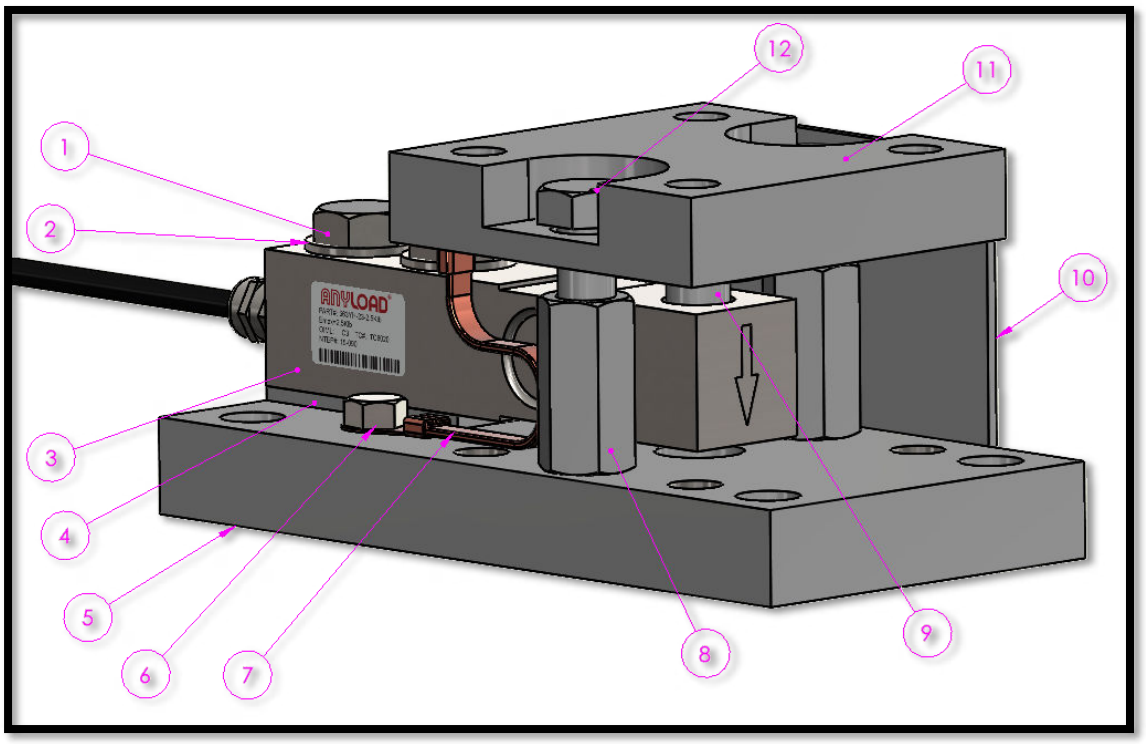
All the pipes must be horizontal to avoid any vertical forces to the tank weighing system. Solid pipe connection can cause an error for the weighing accuracy adding or subtracting the weight from the actual value. Anyload recommends to use flexible connection between the tank and the pipe as illustrated in the picture below. If the rigid connection cannot be avoided, then it's recommended to keep the first pipe support far away (L) as long as possible to have a flexibility.





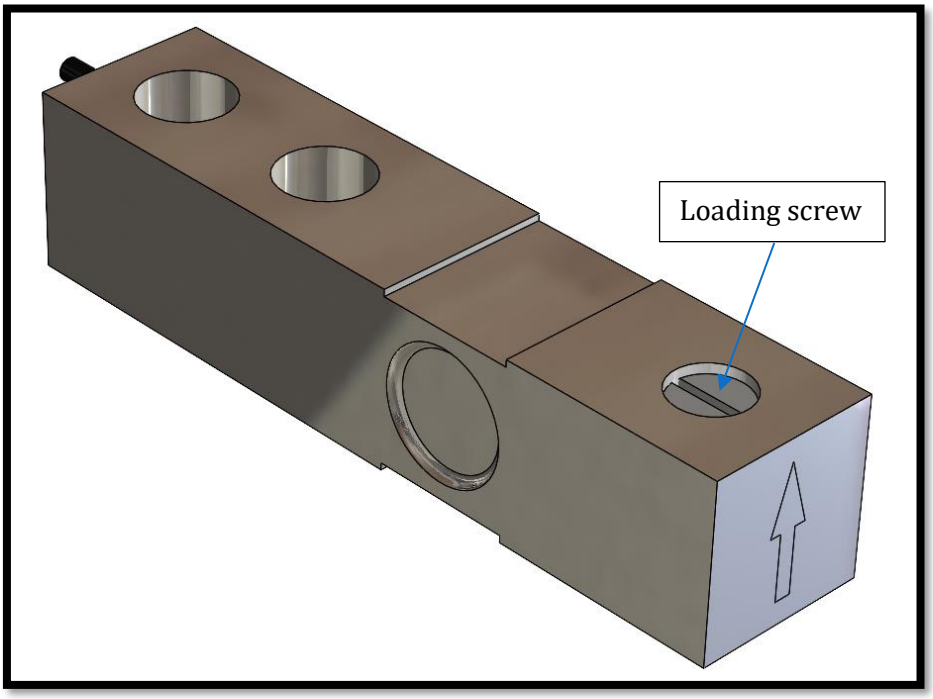
Load cell assembling to the weigh module

563YHM4-02 weigh modules and load cells are shipped separately and they may need to be assembled together before install to the tank weighing system depending on the installation method. Follow the steps below to assemble the load cell to the weigh module,

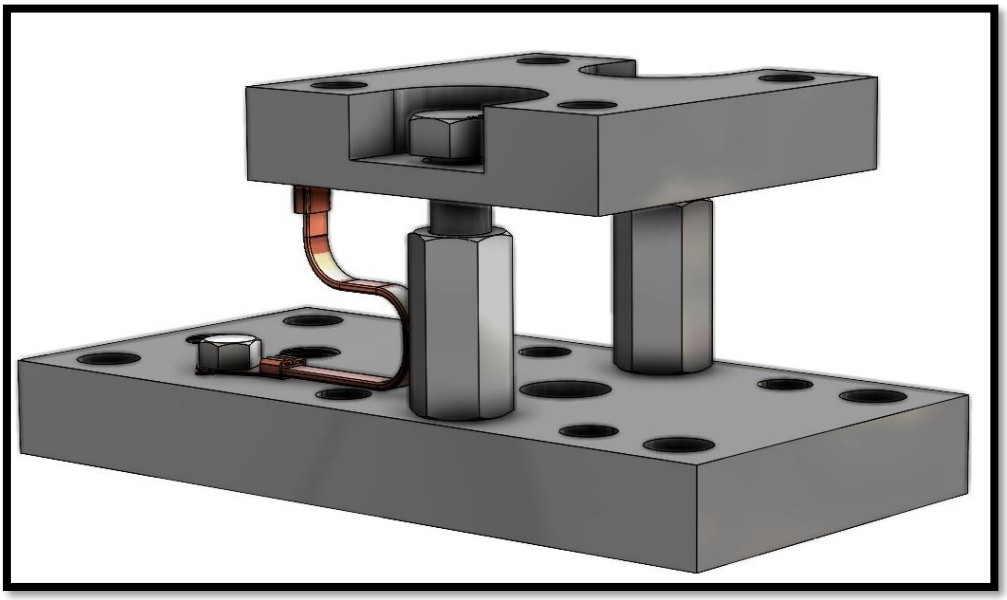


DO NOT ADJUST LIFT-OFF PROTECTION BOLTS (#12) AND CHECK NUTS (#8) AT ANY TIME.

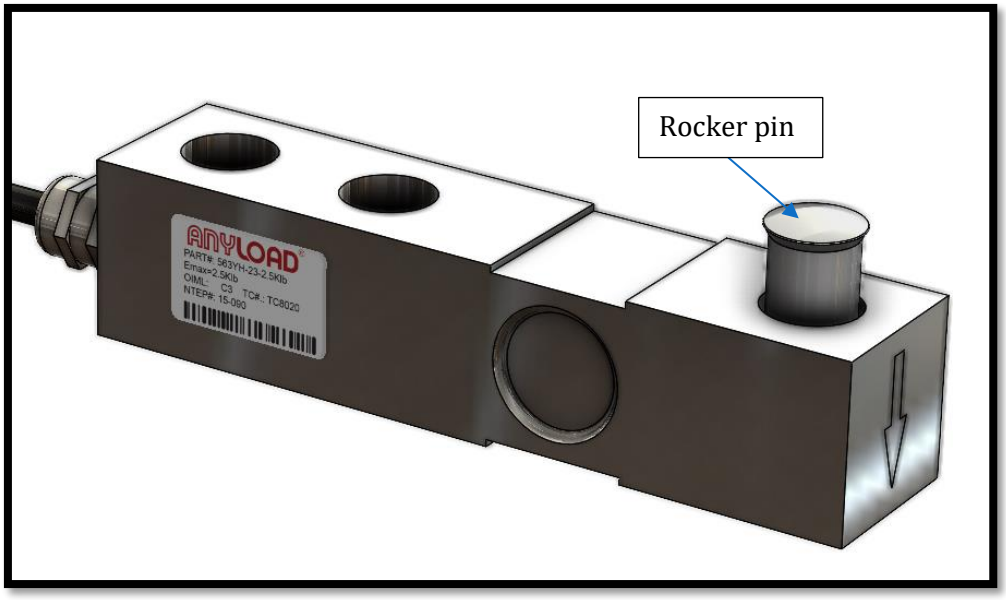
1. Install the loading screw to the load cell as shown below,



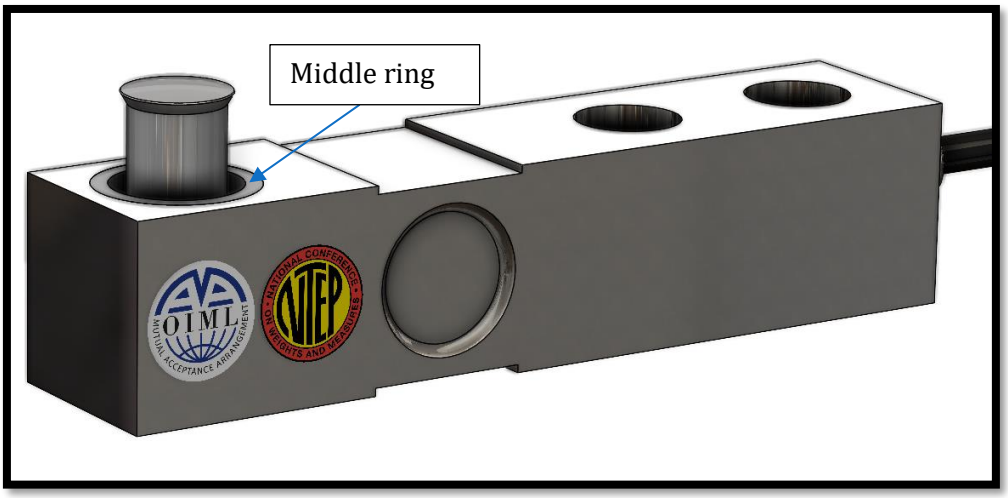
2. Remove the side plate (#10) from the weigh module.



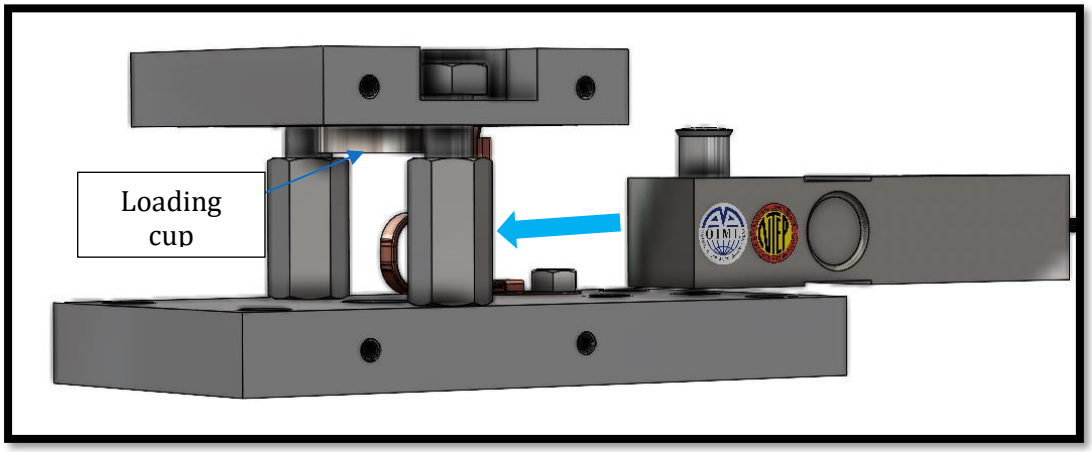
3. Insert the rocker pin (#9) to the load cell from the top side (this is for 563YH-23 type load cell)



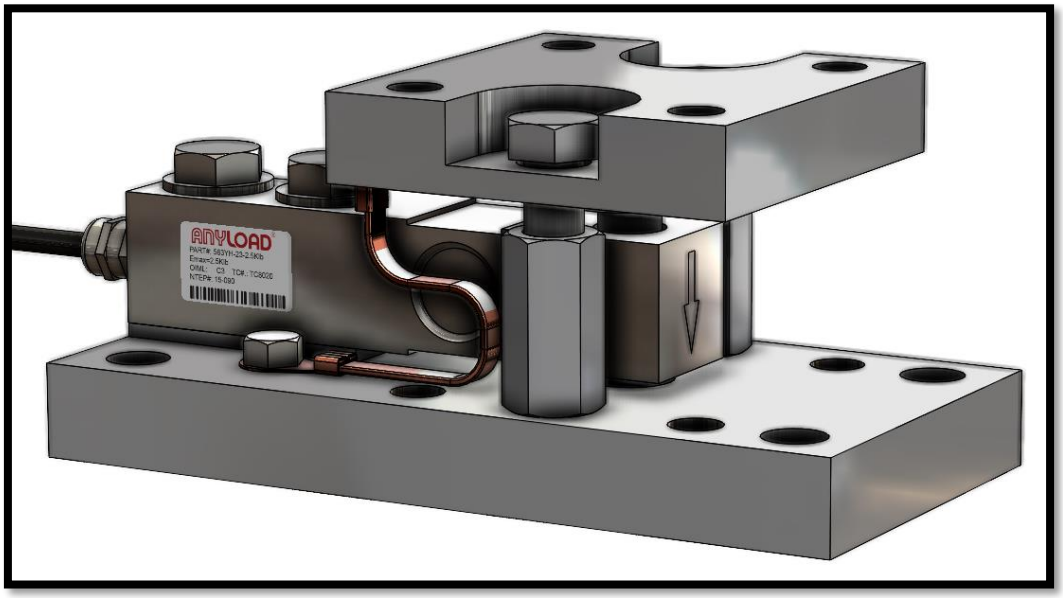
For the 563YH type load cell, use the extra ring as shown below,



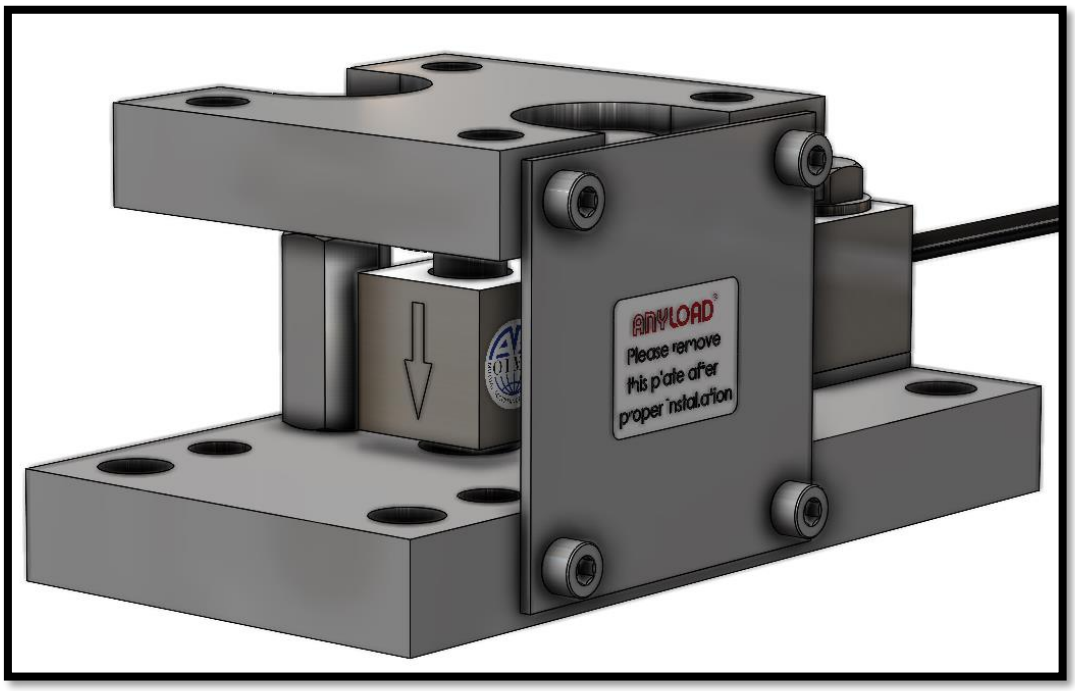
4. Install the loading cup to the top plate and insert the load cell + rocker pin at the same time such as the loading cup sit on the rocker pin.



5. Place the spacer (#4) underneath of the load cell and two washers on top of the load cells as shown below and tighten the load cell bolts with 72ft-lb/98Nm.



6. Fix the shipping/alignment stopper back.

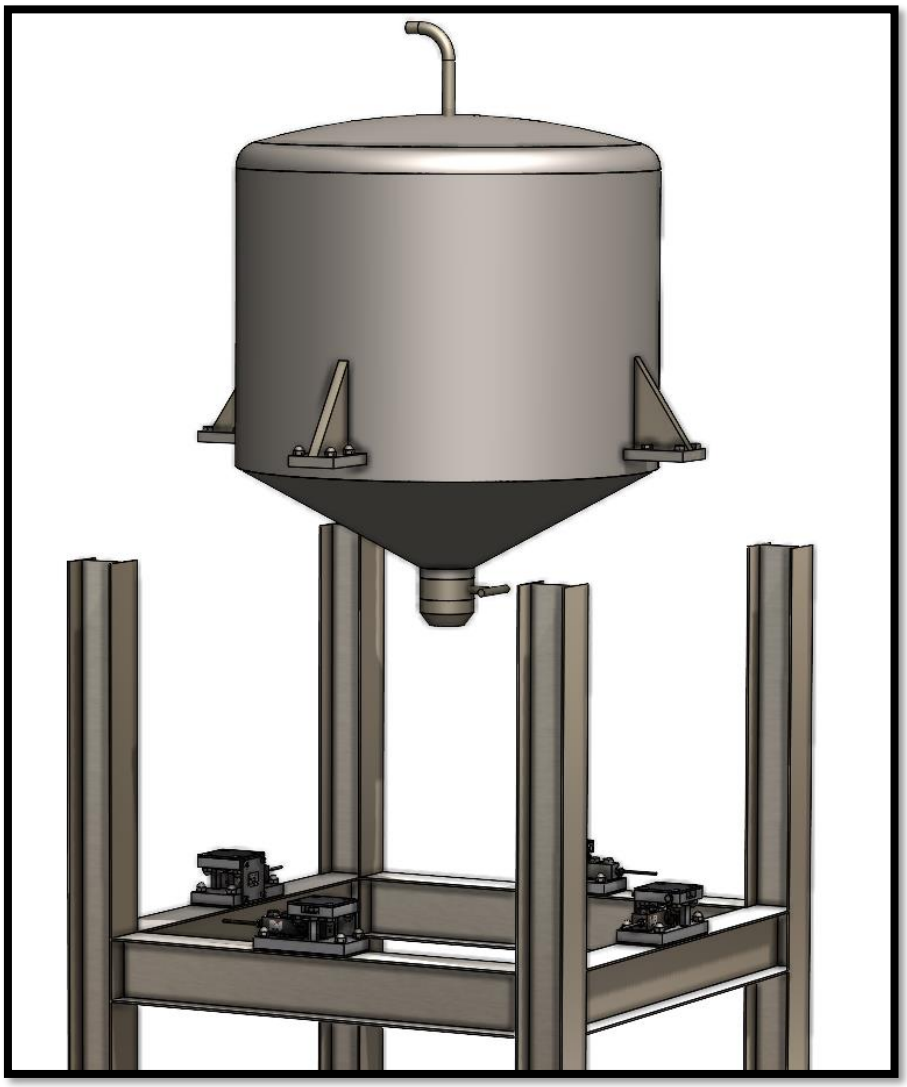


Weigh module installation on to the weighing system

Installation method 1

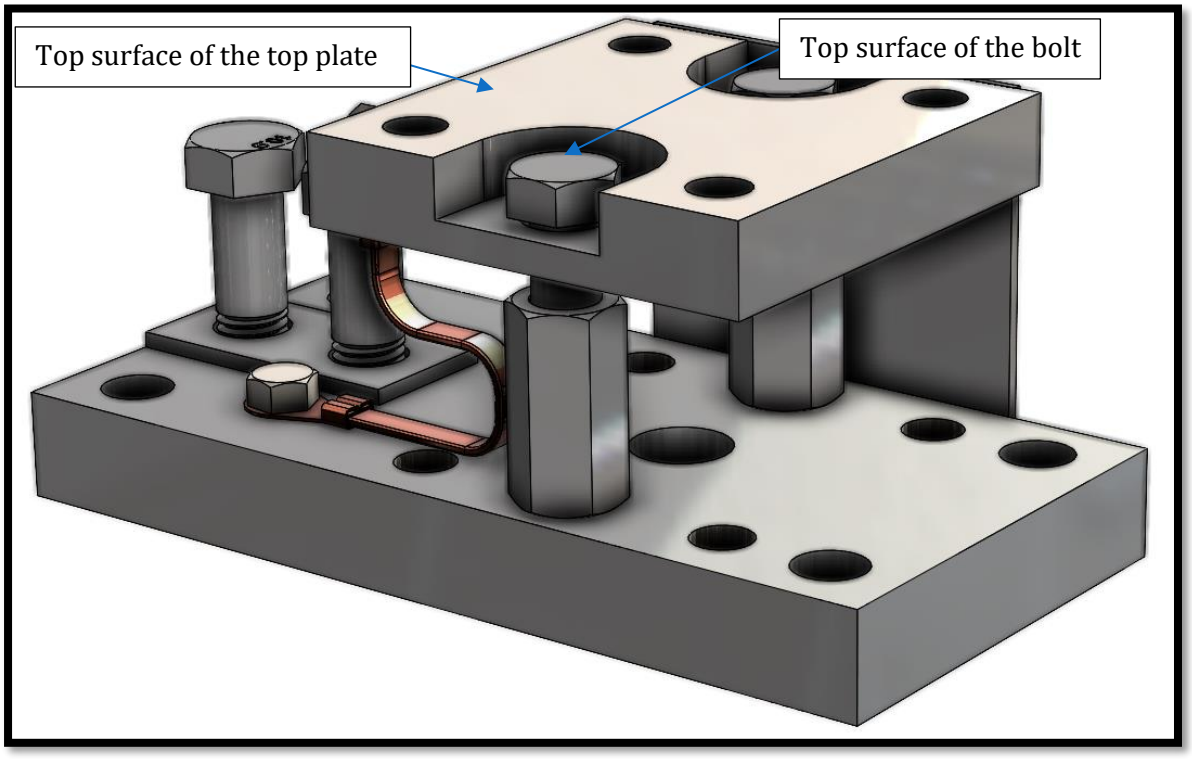
Mount the load cell pre-assembled weigh modules to the base of the weighing system. Carefully lower the tank on to the weigh modules and then remove the alignment stoppers after proper alignment and installation. Alignment stoppers should be removed before the weighing system calibration. In this method the tank installation should be carried out with extra careful as the

load cells have already been installed in the weigh modules and they can be damaged due to the shock loads with sudden lowering the tank.

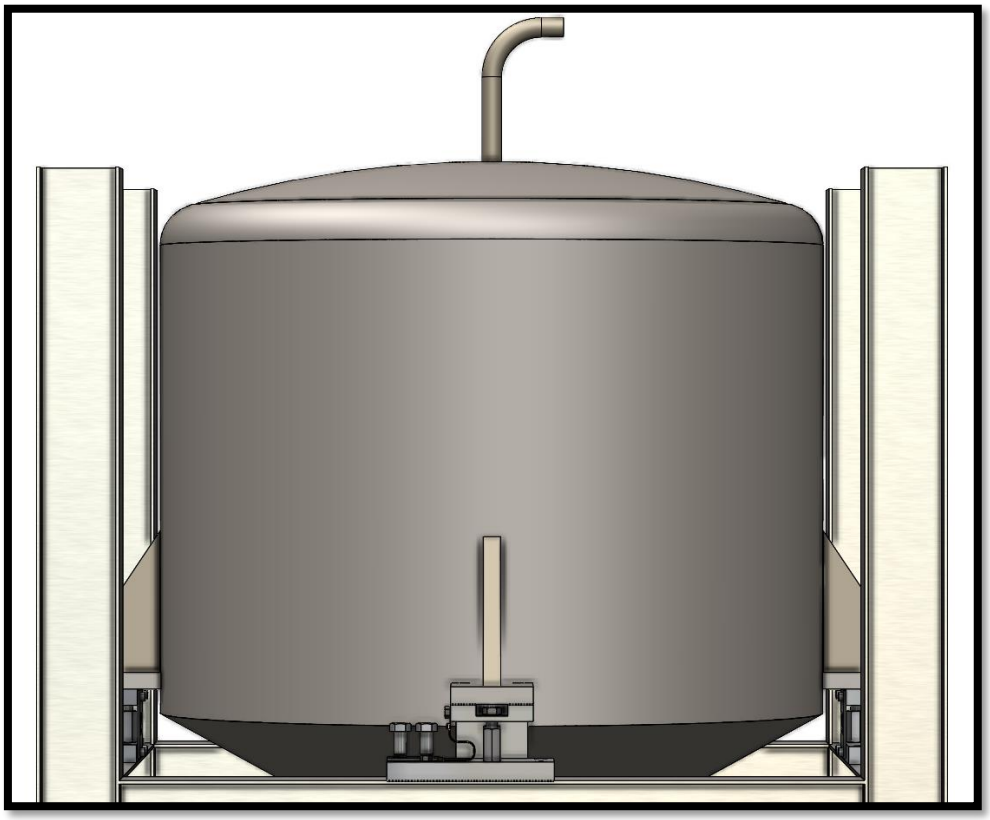


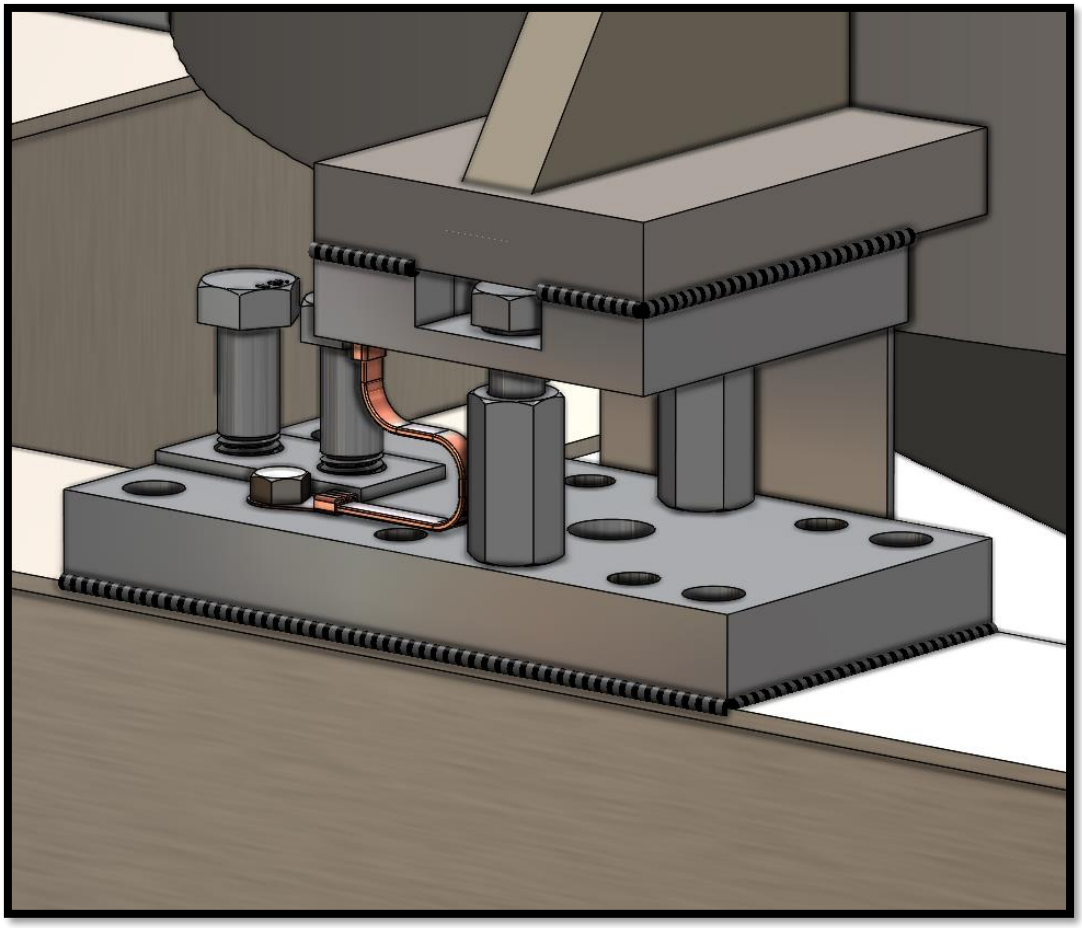
Installation method 2

In this method the load cell is not assembled to the weigh module when the tank is assembled to the weighing system. Re-adjust the alignment plate of the weigh module so that the tops of the lift-off protection bolts are in the same plan as the top surface of the top plate. This allows two bolts bare the vertical load of the empty tank during the installation. This method can be used for the weigh module installation with both welding and bolting.

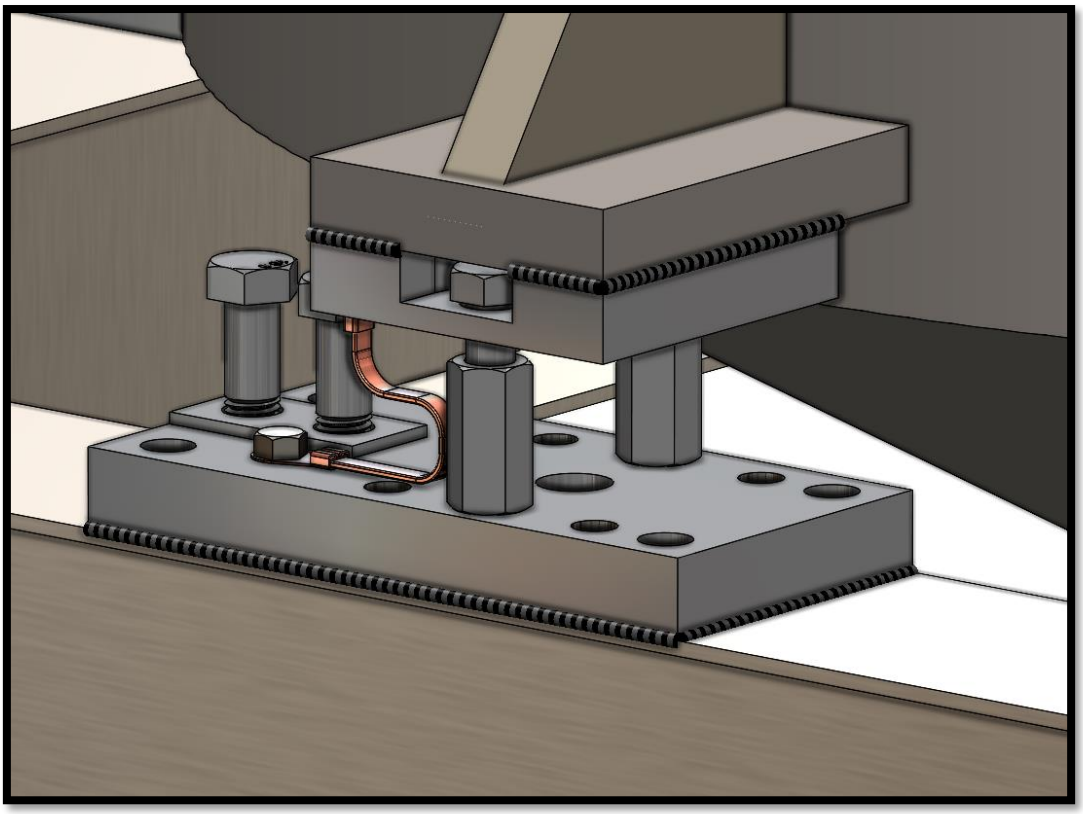


Lower the tank on to the weigh modules and weld/fix the bolts.

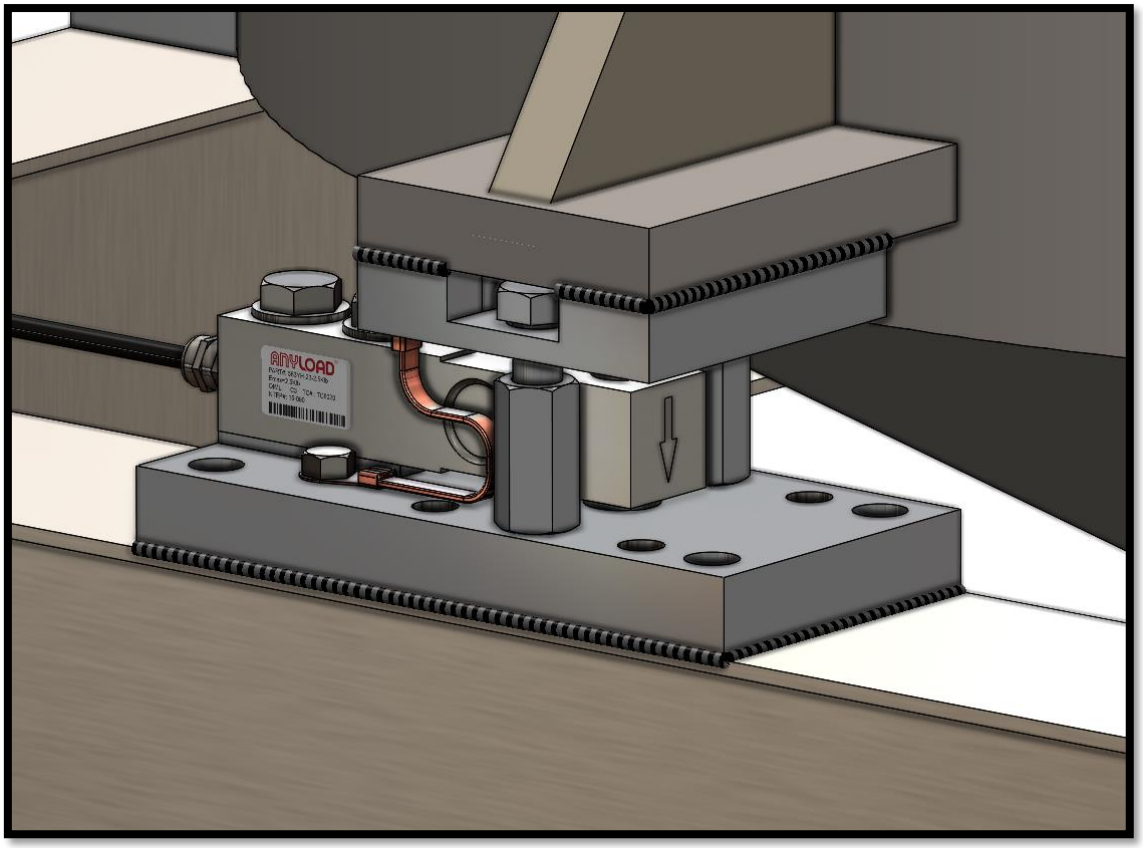




Remove the alignment plates after proper alignment and installation of the tank.



Lift the top plates/tank and install the load cells. DO NOT REMOVE/ADJUST TWO LIFT-OFF BOLTS AT ANY TIME DURING THIS INSTALLATION PROCESS.



Electrical installation

563YH/563YH-23 load cells are available with different cable length options as 6m or 10m depending on the application requirement. It's not recommended to cut or attach cable to match the application as it will void the warranty or lower the accuracy of the weighing system. Multiple load cells are needed to be connected through a junction box before connecting to an indicator or PLC. Load cell cable must be protected by conduit if it's installed in a vulnerable area such as rodents are appeared. Suitable conduits are recommended in outdoor installations, as well as installations where cleaning by washdown is used.

Load cell wiring color code

Exc+	**Red**
Exc-	**Black**
Sig+	**Green**
Sig-	**White**
Shield	**Bare**

7. CALIBRATION

Tank/Silo weighing system with 563YHM4-02 weigh modules need to be calibrated after the mechanical and electrical installation to get proper weight reading. Anyload recommends calibrating the weighing system using certified test weights equal to the full-scale capacity. The weighing system calibration is done through the indicator and specific instructions for the procedure can be found in the technical manual for the digital indicator that is to be used in the system. Because of the design or size of the weighing system it may not be feasible to use test weights equal to the full-scale capacity of the system and Anyload recommends using any other alternative method as listed below in such situations.

1. Calibration with test weights
2. Material transfer
3. Material substitution
4. Flow meter
5. Hydraulic calibration
6. Weightless calibration

Load Cell Specifications

MODEL		**563YH / 563YH-23**	
CAPACITIES		**lb**	**250/500/750/1K/1.5K/2K/2.5K/4K/5K/10k/15k/20k**
FULL SCALE OUTPUT (FSO)		**mV/V**	**3.0±0.25%**
ZERO BALANCE		**mV/V**	**≤±0.02**
NON-LINEARITY		**%FS**	**≤±0.03, CAP≤750lb**
			≤±0.02, CAP>750lb
HYSTERISIS		**%FS**	**≤±0.03, CAP≤750lb**
			≤±0.02, CAP>750lb
REPEATABILITY		**%FS**	**≤±0.02**
CREEP @30MIN		**%FS**	**≤±0.025**
TEMPERATURE RANGE			
	OPERATING	**~C**	**-20 to +70**
	COMPENSATED	**~C**	**-10 to +50**
TEMPERATURE EFFECT			
TERMINAL RESISTANCE			
	INPUT RESISTANCE	**Ω**	**350±7**
	OUTPUT RESISTANCE	**Ω**	**350±3**
EXCITATION VOLTAGE		**VDC**	**5 - 15**
INSULATION RESISTANCE		**GΩ**	**2 [50VDC]**
SAFE OVERLOAD LIMIT		**%FS**	**150**
ULTIMATE LOAD LIMIT		**%FS**	**300**
CABLE LENGTH (L)		**m**	**6 or 10**
SEAL TYPE		**IP67**	
ELEMENT MATERIAL		**NICKEL PLATED ALLOY STEEL**	

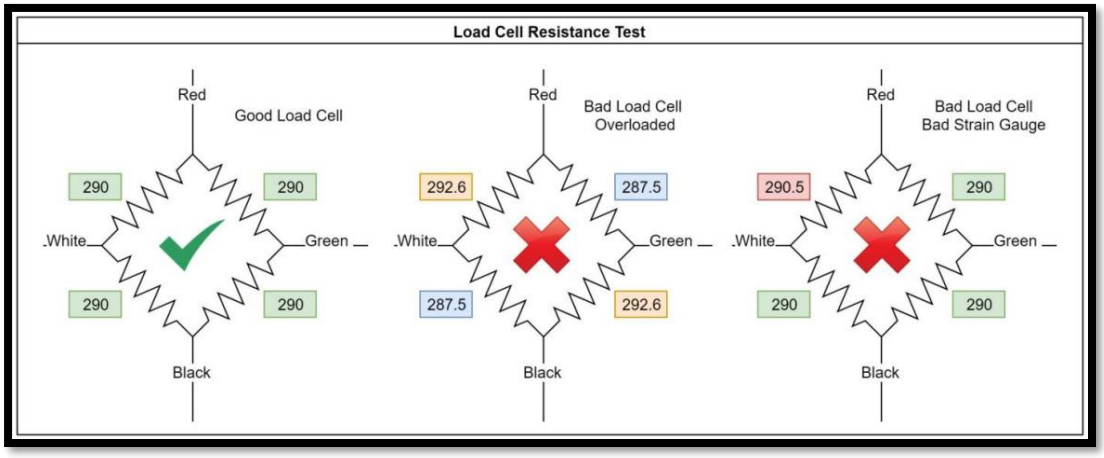
8. TROUBLESHOOTING

Electrical trouble shooting

1. Check the power to the instrument.
2. Check the ADC count on the instrument (indicator) and check whether it's sensitive to the weighing system.
3. If The ADC count is not sensitive to the weighing system, then, check the excitation voltage at the instrument, junction box and load cells.
4. If the instrument shows over-range error, then, check the individual load cells whether they have been overloaded. Check the zero balance of individual load cell to identify whether they have been overloaded. And also, check the load cells physically to see any overloaded signs.

   Load cell troubleshooting

   a. Check if the load cell cable has any obvious signs of damage. Any cuts, crimps, excessive aberration or exposed wires is a sign of damage.
   b. Check load cell element for any dents, deformation, cracks, rippling of metal, corrosion, and significant wear in the area of loading. Load cell contain sensitive components and any shocks caused by dropping or being hit can damage the electronics inside.
   c. Do visual check for flatness (for single point and double ended load cells). Use a straightedge and flashlight technique for correct visual inspection. Make sure there is no bending and bucking marks on the load cell. Even a very small deflection can have adverse effect on the load cell.
   d. Check for zero balance. Position the load cell with no load attached. Connect the input to a stable, low noise power supply. With a multi-meter measure the output voltage in mV and divide it by the input voltage in V to get mV/V. Refer to the calibration certificate of the load cell to see if this mV/V value is within the tolerance of load cell specification.
   e. Check for zero return. Connect the load cell to a stable power supply and measure the mV/V output like the step before. Make sure it is within the allowed tolerance. Load the load cell between 50% to 100% of its capacity for 5 seconds. Remove the load and check if the mV/V output returns to the allowed tolerance.
   f. Check insulation. Use a multi-meter to check insulation of wire leads to the metal body of the load cell. If the resistance is below 2 Giga Ω, then the insulation is bad. Ideally the insulation resistance should be more than 5 Giga Ω.
   g. Check input and output resistance with a multi-meter (resistance accuracy of 0.025 Ω or better) to make sure it is within the allowed tolerance of the product. Refer to the calibration certificate. A different of more than 0.1 Ω signifies a bad load cell.
   h. Check resistance of strain gauges one by one. See diagram below for testing resistances. The numbers are examples only.
   i. Check input and output resistances. If these are more than 3 kΩ, then it is bad load cell and most likely due to electrical surges or lightening. Check calibration sheet for correct resistances.



Mechanical troubleshooting

It is important to identify any mechanical problem such as leveling issues, vibrations, shifting, etc to get accurate measurement from the weighing system. Anyload recommends checking the whole mechanical structure thoroughly to identify such issues if there are some errors such as non-repeatability, instability, non-linearity or zero shift, etc on the weighing indicator reading. Thoroughly check the weighing system structure to identify any of weld cracks, breaks, blockages, etc. Check all the weigh modules to see any mechanical interference, mechanical hitting, etc and correct them as needed.

Please Contact our Authorized Dealer for Technical Assistance:

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