

SWC415 PinMount™ Weigh Module

Installation and Service Manual



SWC415 PinMount™, Size 1



SWC415 PinMount™, Size 2 & 3

SWC415 PinMount™ Weigh Module

METTLER TOLEDO Service

Essential Services for Dependable Performance of Your PinMount™ Weigh Module

Congratulations on choosing the quality and precision of METTLER TOLEDO. Proper use of your new equipment according to this Manual and regular calibration and maintenance by our factory trained service team ensures dependable and accurate operation, protecting your investment. Contact us about a service agreement tailored to your needs and budget. Further information is available at www.mt.com

There are several important ways to ensure you maximize the performance of your investment.

1. **Register your product:** We invite you to register your product at www.mt.com/productregistration so we can contact you about enhancements, updates and important notifications concerning your product.
2. **Contact METTLER TOLEDO for service:** The value of a measurement is proportional to its accuracy – an out of specification scale can diminish quality, reduce profits and increase liability. Timely service from METTLER TOLEDO will ensure accuracy and optimize uptime and equipment life.
 - a) **Installation, Configuration, Integration and Training:** Our service representatives are factory trained, weighing equipment experts. We make certain that your weighing equipment is ready for production in a cost effective and timely fashion and that personnel are trained for success. We also have standard Equipment Qualification solutions.
 - b) **Initial Calibration Documentation:** The installation environment and application requirements are unique for every industrial scale so performance must be tested and certified. Our calibration services and certificates document accuracy to ensure production quality and provide a quality system record of performance.
 - c) **Periodic Calibration Maintenance:** A Calibration Service Agreement provides on going confidence in your weighing process and documentation of compliance with requirements. We offer a variety of service plans that are scheduled to meet your needs and designed to fit your budget.
 - d) **GWP® Verification:** A risk- based approach for managing weighing equipment allows for control and improvement of the entire measuring process, which ensures reproducible product quality and minimizes process costs. GWP (Good Weighing Practice), the science based standard for efficient lift-cycle management of weighing equipment, gives clear answers about how to specify, calibrate and ensure accuracy of weighing equipment, independent of make or brand.

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INTRODUCTION

This publication is provided solely as a guide for individuals who have received Technical Training in servicing the METTLER TOLEDO product.

Information about METTLER TOLEDO Technical Training may be obtained by contacting your local METTLER TOLEDO organization or writing, calling, or faxing:

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STANDARD WARRANTY: Model SWC415 PinMount™ Weigh Modules

Mettler Toledo warrants that the equipment covered by this warranty will be free from defects in workmanship and materials for a period of one year from date of installation or eighteen (18) months from date of shipment to the buyer, whichever comes first. Should any such defects be found and reported during the first thirty (30) days after installation (if installation occurs during the warranty period), METTLER TOLEDO (herein referred to as the "Company"), will, at its option, refund the purchase price or correct such defects furnishing replacement parts and service free of charge to the buyer. For the remainder of the warranty term, the Company will furnish necessary replacement parts and on-site technician's service free of charge, provided the Buyer agrees to pay reasonable technician's travel time, vehicle mileage, and associated travel expenses to and from the nearest authorized Company service location. The following are NOT covered under any of these warranties:

- 1) Initial installation and ongoing scale calibration.
- 2) Damage to scale components by gross abuse, fire, flooding, explosion, water, voltage surges, or civil disturbance.
- 3) Normal maintenance or consumable items.

This warranty covers only Model SWC415 PinMount™ Weigh Modules. Refer to METTLER TOLEDO Standard Product Warranty for coverage of other scale system components including scale instrument, printer, and/or other accessories. THE COMPANY EXPRESSLY WARRANTS THE EQUIPMENT MANUFACTURED BY IT AS SET FORTH HEREIN. THE COMPANY MAKES NO OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED (INCLUDING WITHOUT LIMITATION WARRANTIES AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE). IN ADDITION, THIS DOCUMENT SHALL CONSTITUTE THE SOLE AND EXCLUSIVE REMEDIES OF THE BUYER FOR ANY BREACH BY THE COMPANY OF ITS WARRANTIES HEREIN.

COMPANY LIABILITY UNDER THIS WARRANTY OR ANOTHER WARRANTY WHETHER EXPRESSED OR IMPLIED IN LAW OR FACT SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT OF DEFECTIVE MATERIAL AND WORKMANSHIP, AND IN NO EVENT SHALL IT BE LIABLE FOR CONSEQUENTIAL OR INDIRECT DAMAGES.

This warranty coverage is only applicable to the United States of America. Consult METTLER TOLEDO for Export Warranty Terms and Conditions.

APPLICATION GUIDES

The only warranty of METTLER TOLEDO is for the product it supplies under the Product Warranty Statement listed above. Weighing application guidelines pertain to METTLER TOLEDO products.

Precautions

READ this manual BEFORE operating or servicing this equipment.

	 WARNING
	<p>PERMIT ONLY QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS, AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.</p>

FOLLOW these instructions carefully.

SAVE this manual for future reference.

	 WARNING
	<p>FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD, CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.</p>

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.


	 WARNING
	<p>DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.</p>


ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

 Caution
<p>BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST 30 SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM OR DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.</p>

CALL METTLER TOLEDO for parts, information, and service.

	 Caution
	<p>OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.</p>

 Caution
<p>DO NOT PASS WELDING CURRENT THROUGH THE LOAD CELLS! WHEN WELDING ON A SCALE, ALWAYS GROUND THE WELDING DEVICE AS CLOSE TO THE WORK AS POSSIBLE. NEVER WELD CLOSER THAN WITHIN 4 FEET (1.2 METERS) OF ANY LOAD CELL WITHOUT REMOVING THE LOAD CELL.</p>

 Caution
<p>BE SURE TO BLOCK THE SCALE WHEN IT IS IN THE RAISED POSITION. OBSERVE ALL APPROPRIATE SAFETY PROCEDURES WHEN INSTALLING AND SERVICING THE WEIGH MODULES.</p>

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1. Introduction

1.1. SWC415 PinMount™ Weigh Modules

Model SWC415 PinMount™ weigh modules are used to convert tanks, hoppers, silos and other heavy capacity structures into weighing instruments. Each weigh module consists of a load cell and the mounting plates needed to attach it to a structure.

Model SWC415 PinMount™ weigh modules are available in capacities of 7.5t to 100t (16.5 klb to 220 klb). For complete specifications, refer to the SWC415 PinMount™ data sheet. The SWC415 PinMount™ weigh module dimensions are shown in Figure 1-1.

1.2. Load Cell and Suspension

Each weigh module includes one of the following load cells: model SLC611 and 0782 load cell. Figure 1-2 shows the weigh module assembly with a model SLC611 and 0782 load cell. The load cell acts as a self-aligning rocker column that engages the top and base mounting plates through hardened receivers. The load cell specifications are summarized in the SWC415 PinMount™ data sheet. For complete specifications, refer to the load cell data sheet.

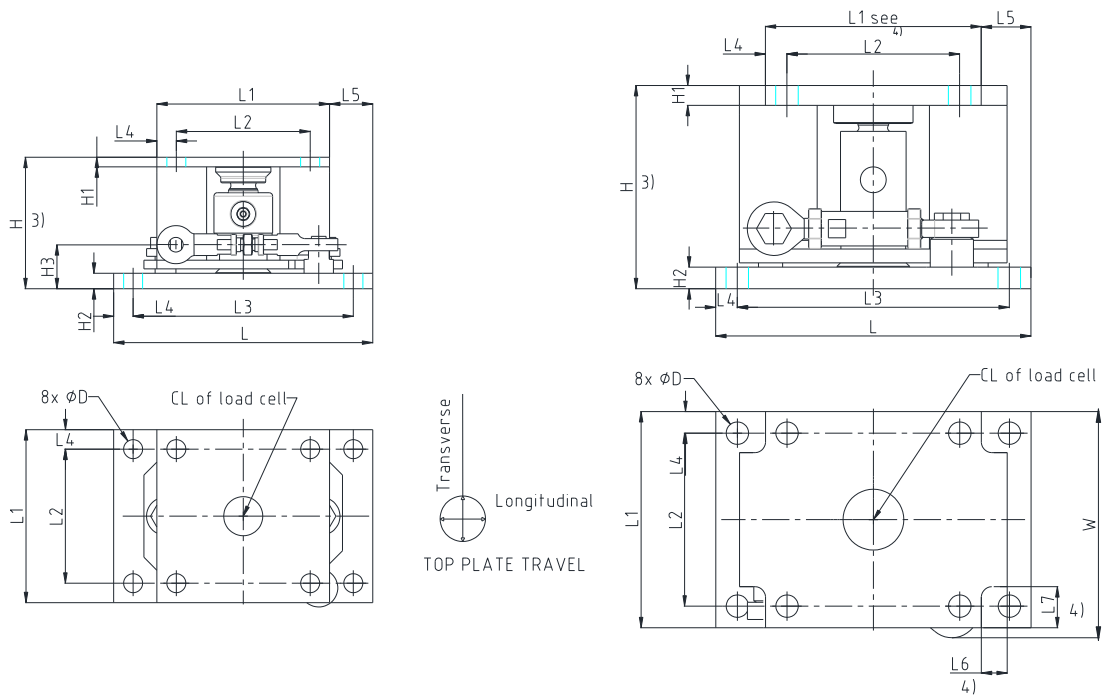


Figure 1-1: General Dimensional Layout for SWC415 PinMount™ 7.5t-100t

Capacity	D	H ₍₃₎	H1	H2	H3	L	L1	L2
7.5-22.5t (16.5-49.6 klb)	22mm 0.87 in.	152mm 5.98 in.	11mm 0.43 in.	18mm 0.71 in.	51mm 2.01 in.	300mm 11.8 in.	200mm 7.87 in.	155mm 6.1 in.
20-50t (44.2-110.2 klb)	26mm 1.02 in.	235mm 9.25 in.	23mm 0.91 in.	25mm 0.98 in.	69.5mm 2.73 in.	365mm 14.37 in.	250mm 9.84 in.	200mm 7.87 in.
100t (220 klb)	32mm 1.26 in.	263mm 10.35 in.	27mm 1.08 in.	28mm 1.1 in.	86.5mm 3.4 in.	440mm 17.32 in.	300mm 11.8 in.	235mm 9.25 in.

Capacity	L3	L4	L5	W	Top Plate Travel (without Stabilizer)		Top Plate Travel (with Stabilizer)	
					Longitudinal	Transverse	Longitudinal	Transverse
7.5-22.5t (16.5-49.6 klb)	255mm 10.04 in.	22.5mm 0.89 in.	50mm 1.97 in.	205mm 8.1 in.	±5mm ±0.2 in.	±5mm ±0.2 in.	0mm 0 in.	±5mm ±0.2 in.
20-50t (44.2-110.2)	315mm 12.4 in.	25mm 0.98 in.	55mm 2.16 in.	261.5mm 10.29 in.	±5mm ±0.2 in.	±5mm ±0.2 in.	0mm 0 in.	±5mm ±0.2 in.
100t (220 klb)	375mm 14.75 in.	32.5mm 1.28 in.	70mm 2.75 in.	313mm 12.3 in.	±5mm ±0.2 in.	±5mm ±0.2 in.	0mm 0 in.	±5mm ±0.2 in.

Note: Dimension H₍₃₎ is 2mm greater in the shipping/installation mode.

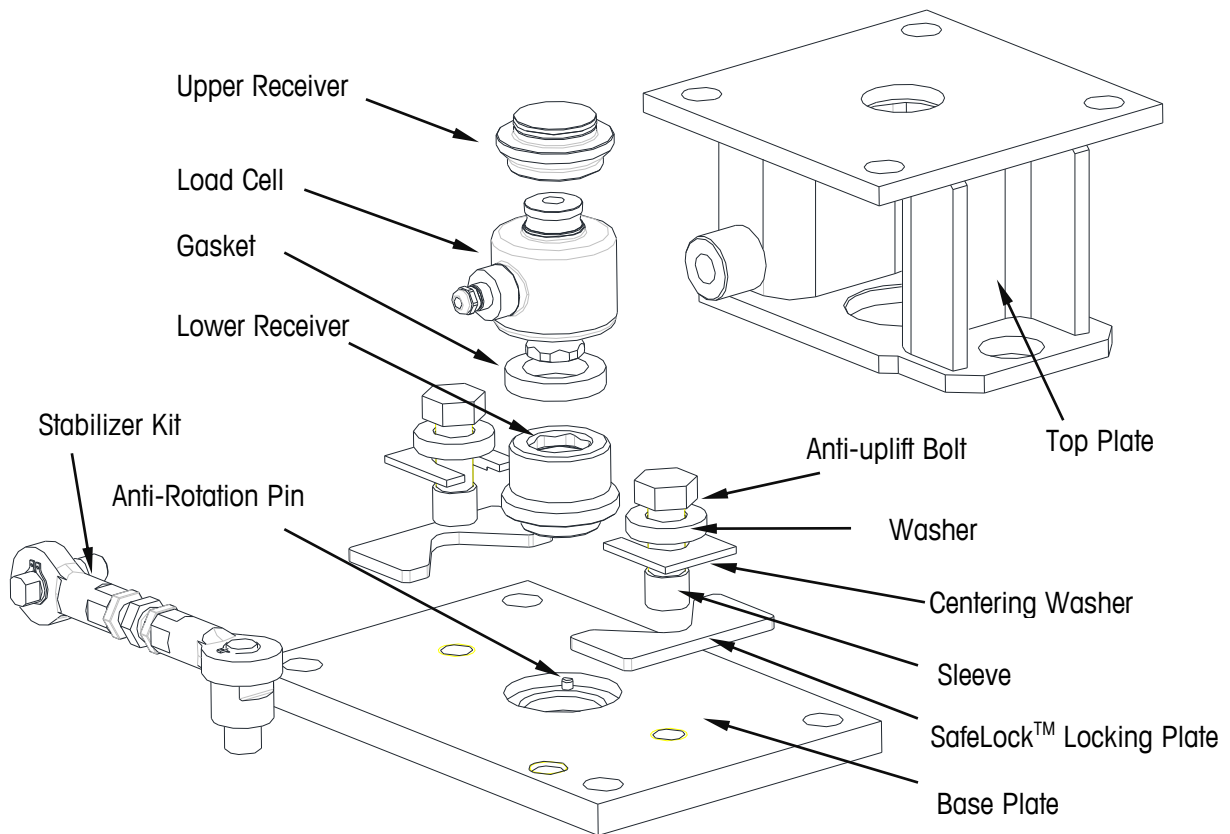


Figure 1-2: Model SWC415 PinMount™ Weigh Module Assembly with SLC611 LC (Capacity 7.5t-22.5t)

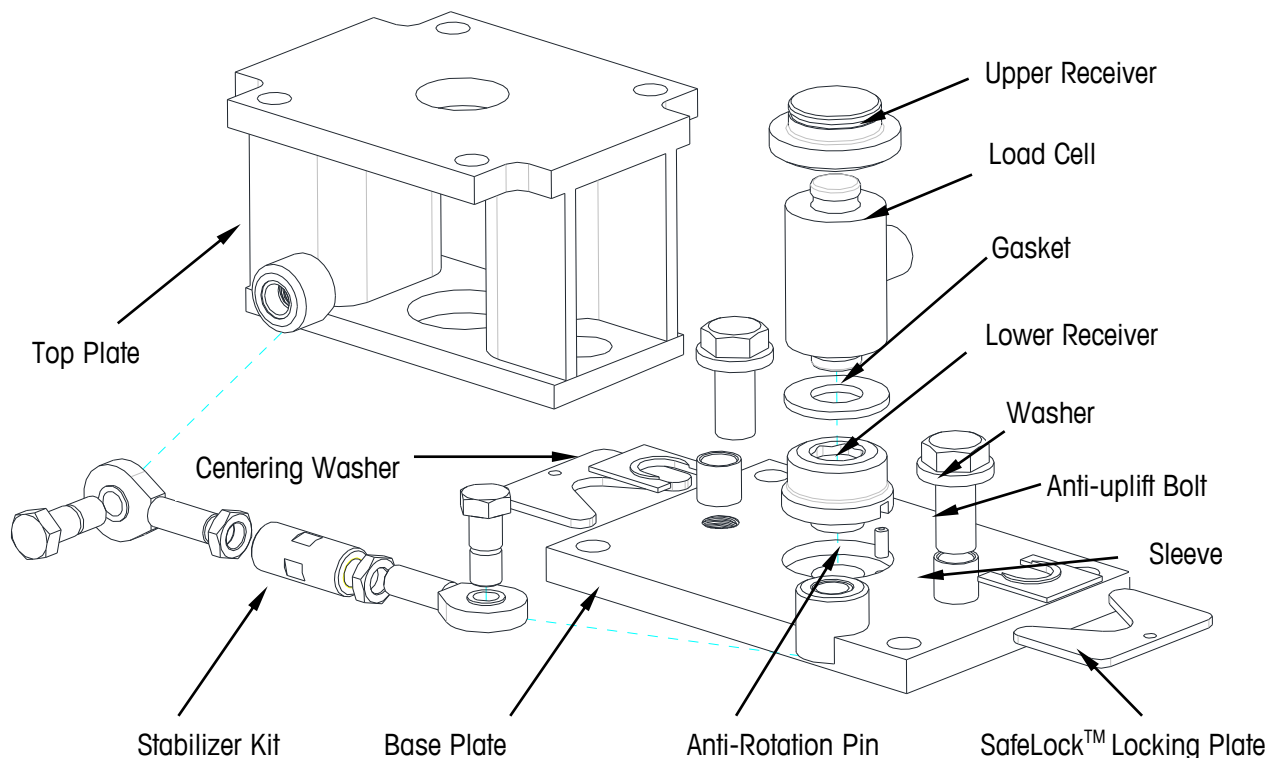


Figure 1-3: Model SWC415 PinMount™ Weigh Module Assembly with 0782 LC (Capacity 30-100t)

1.3. Item Numbers

Refer to the SWC415 PinMount™ data sheet for a complete listing of the item numbers for the various carbon steel and stainless steel weigh modules, along with associated load cells and options.

1.4. Power Supply Requirements

A METTLER TOLEDO digital indicator is used to power the load cells in model SWC415 PinMount™ weigh modules.

Refer to the digital indicator's service manual for the indicator's power requirements.

1.5. Accuracy

Refer to the SWC415 PinMount™ data sheet for a summary of load cell specifications, or refer to the respective load cell data sheet for complete specifications.

Scale accuracy depends on:

1. The design of the support steel for the module and of the scale structure (tank, hopper, conveyor, etc.) mounted on the weigh modules
2. The design and number of dead-to-live connections attached to the scale
3. The total load cell capacity
4. Environmental factors: wind, vibration, temperature variations, etc.

2. Inspection and Site Selection

2.1 Inspection

When you receive the weigh modules, visually inspect the packing containers and modules for freight damage. Inspect:

1. Load cell and suspension assemblies
2. Load cell cables
3. Overall assembly

If you find damage, contact your freight carrier immediately, and inform METTLER TOLEDO

2.2 Site Selection

Problems installing weigh modules are often caused by inappropriate site conditions. Before installing the weigh modules, check the site for:

1. Level surfaces to within 3.2mm (0.125inches), highest to lowest elevation at each support point.
2. Adequate support, where each module meets the floor or structure, throughout the scale's weighing capacity.
3. Uniform deflection of the weigh module supports (top and bottom), maintaining less than one-half degree out of level at gross capacity.
4. Ability to lift the tank enough to service the load cells: 15mm (5/8inch) for SLC611 load cell, 25mm (1inch) for 0782 50t, 30mm for 0782 100t load cell. The optional spacer plate eliminates the need to jack this distance.
5. Proper drainage away from each of the weigh modules.
6. No heavy vibrations or wind currents at or near the scale.
7. Access around each weigh module for installation and service.
8. Locations on the scale to add test weights for calibration.
9. Access for moving test weights to and from the scale.
10. A position near the proposed scale location to mount the junction box. (Do not mount the junction box on the live portion of the scale.).
11. No excessive or unusual loading caused by the site or type of equipment mounted to the weigh modules.
12. Shared foundation: Does the vessel to be weighed have an exclusive, isolated support foundation? Does it share supports with other vessels? Interaction may occur if the vessel is on a shared foundation.
13. If the site is appropriate based on the criteria above, proceed with the installation. Otherwise, make the necessary adjustments before installing the weigh modules.

3. Installation

3.1 Assembly

Weigh Module Assembly Instructions:

The SWC415 PinMount™ weigh module can be installed with or without the load cell in the module. Installing the weigh module without the load cell can help avoid damage to the load cell and its cable. To install the weigh module without the load cell, go directly to the Weigh Module Installation Instructions. Otherwise, use the following assembly instructions to install the load cell in the weigh module and then proceed to the Weigh Module Installation Instructions (refer to Figure 1,-2,-3 for part identification).

1. Loosen the lift-off bolts enough to allow you to lift the top plate 15mm (5/8inch) for SLC611 load cell or 25mm (1 inch) for 0782 20t - 50t load cell, 30mm for 0782 100t load cell. Support the top plate assembly securely at this height.
2. Insert the lower receiver into the hole at the center of the base plate, (Note: the base plate has an anti-rotation pin, and the lower receiver has a corresponding slot. Align the pin into the slot as shown in Figure 3-1). Insert the upper receiver into the hole at the center of the underside of the top plate.

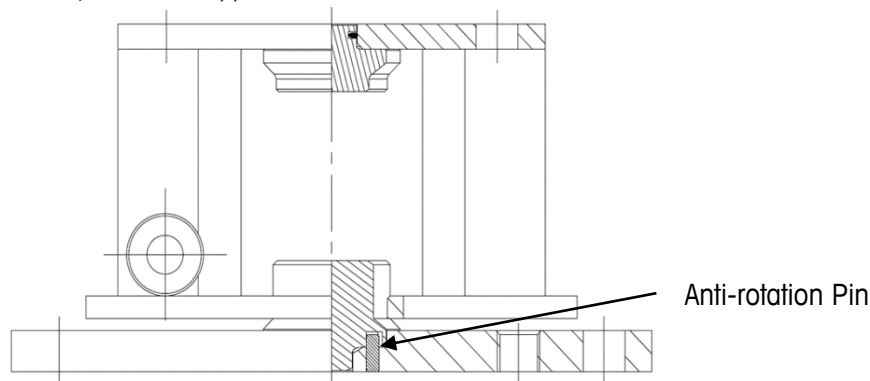


Figure 3-1: Installing receivers (side view)

3. Place the foam gasket over the lower button of the load cell. Note: The lower buttons of the SLC611 and 0782 load cells have a hexagonal shape.
4. Tilt the load cell (with the cable entry facing down) and insert its lower button into the lower receiver (see Figure 3-2). Stand the load cell upright so that it is aligned with the upper receiver.

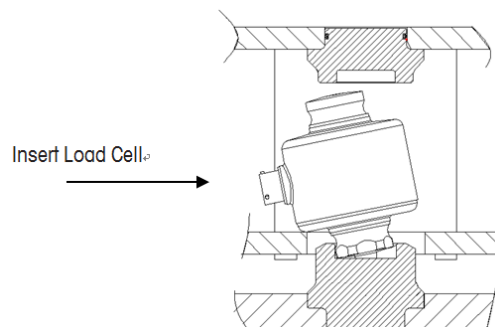


Figure 3-2: Load cell installation (end view)

5. Make sure that the SafeLock™ locking plate is positioned correctly under the top plate assembly and that the load cell and anti-rotation pin are aligned correctly with the lower receiver. Lower the top plate so that it rests on the SafeLock™ locking plate.
6. Reinstall the two SafeLock™ centering washers and tighten down the lift-off bolts. Make sure that the SafeLock™ centering washer's seat correctly in the hole for the lift (see Figure 3-3). This will ensure that the top plate is aligned correctly with the base plate. Make sure that the top plate assembly is supported by the SafeLock™ locking plate, not the load cell.

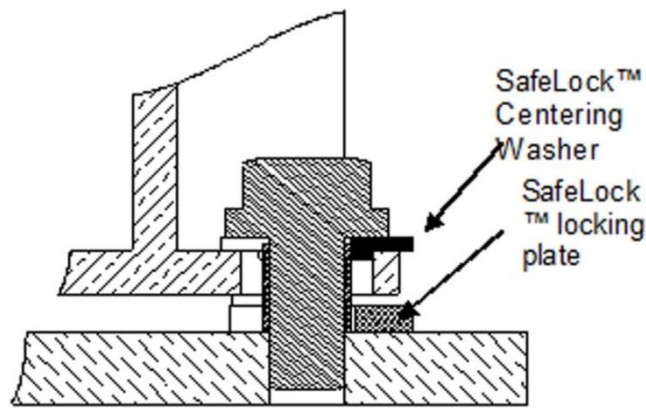


Figure 3-3: Shipping Configuration

7. The weigh module is now ready for shipping or installation.

3.2

Installation

Weigh Module Installation Instructions:

Refer to Figure 1-1 for mounting dimensions.

1. METTLER TOLEDO recommends installing an optional spacer plate above each weigh module's top plate to simplify future load cell removal. Removing the spacer plates will allow you to lift the weigh module top plates enough to remove the load cells without having to jack up the tank. This is especially important for tanks with many attached pipes. The tank will stay in place, and the weigh module top plate will move upward, taking the space of the spacer plate.
2. If you are installing weigh modules without load cells, insert the lower receiver into the base plate hole as shown in Figure 3-1. Make sure that the top plate is properly aligned and locked to the base plate (see Figure 3-3).
3. Position a weigh module under each of the support points for the tank or scale structure. Each weigh module should support an equal portion of the total load and should be oriented as shown in Figure 3-5 (for weigh modules without stabilizers) or Figure 3-6 (for weigh modules with optional stabilizers). Stabilizers are used to stabilize a tank, for example when a mixer will cause the tank to oscillate. If there is a possibility of needing stabilizers in the future, install the weigh modules as shown in Figure 3-4.
4. Level each weigh module's base plate within $\pm 1/2$ degree in both longitudinal and transverse directions (see Figure 3-4). This equals an upward or downward slope of 1mm (1/32inch) per 100mm (4inches). Shim the base plates as necessary to level them. As long as the top plate is properly aligned and locked to the base plate, leveling the base plate should also level the top plate.

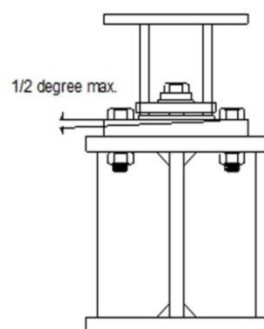


Figure 3-4: Level the Base Plate

5. Slowly lower the scale structure onto the weigh modules. Add shims as needed between the scale structure and top plates to fill any gaps. Do not fix misalignment problems between the

scale structure and top plates by adjusting the alignment of the weigh modules; the top and base plates must remain locked together during this phase of the installation.

6. Make sure that the top and base plates make full contact with their mating surfaces and that each base plate is level within 1/2 degree.


 <h2 style="margin: 0;">Warning</h2>
<p>THE WEIGH MODULE'S TOP AND BOTTOM PLATES MUST BE SUPPORTED SUFFICIENTLY TO AVOID ANY DEFORMATION OF THESE PLATES UNDER LOAD. YOU CAN FULLY SUPPORT THE BASE PLATE BY GROUTING UNDER IT OR BY SHIMMING AT MULTIPLE LOCATIONS. IT IS PARTICULARLY IMPORTANT TO SUPPORT THE TOP AND BASE PLATES AT THE CENTER IN ORDER TO SUPPORT THE RECEIVERS.</p>

7. Fasten the top and base plates by bolting or welding (before proceeding, make sure that each weigh module is supporting approximately an equal portion of the load):
 - Bolting: Bolt details are given in Table 3-1 (bolts are not supplied by METTLER TOLEDO).

SWC415 PinMount™ Material	Top/Base Plate Bolts Metric (Imperial)		Torque	Grade
Mild Steel	7.5-22.5t	M20 (3/4inch)	376 Nm / 277.3 Ft.lb	8.8 (Grade 5)
	20-50t	M24 (15/16inch)	652 Nm / 480.9 Ft.lb	
	100t	M30 (1-1/4inch)	1315 Nm / 969.9 Ft.lb	
Stainless Steel	7.5-22.5t	M20 (3/4inch)	360 Nm / 265.5 Ft.lb	A2-70 (Grade 304, 18-8)
	20-50t	M24 (15/16inch)	610 Nm / 449.9 Ft.lb	
	100t	M30 (1-1/4inch)	805 Nm / 593.7 Ft.lb	

Table 3-1: PinMount™ Mounting Bolt Size and Grade

- Welding for 7.5-22.5t weigh modules: the weld should be a 6mm (0.24inch) fillet, 25mm (1inch) long, and 75mm (3inch) pitch with 50mm (2inches) between welds on all four sides.
- Welding for 20-50t weigh modules: the weld should be an 8mm (0.32inch) fillet, 25mm (1inch) long, and 75mm (3inch) pitch with 50mm (2inches) between welds on all four sides.
- Welding for 100t weigh modules: the weld should be a 12mm (0.47inch) fillet, 25mm (1inch) long, and 75mm (3inch) pitch with 50mm (2inches) between welds on all four sides.

 <h2 style="margin: 0;">Caution</h2>
<p>DO NOT PASS WELDING CURRENT THROUGH THE LOAD CELLS! WHEN WELDING ON A SCALE, ALWAYS GROUND THE WELDING DEVICE AS CLOSE TO THE WORK AS POSSIBLE. NEVER WELD WITHIN 4 FEET (1.2 METERS) OF ANY LOAD CELL WITHOUT REMOVING THE LOAD CELL.</p>

8. If the load cell is already installed in the weigh module, skip to step 9 below. If not, use the following procedure to install the load cell:
 - Loosen the lift-off bolts enough to allow you to lift the top plate 15mm (5/8inch) for an SLC611 load cell or 25mm (1 inch) for a 0782 load cell, 30 mm for 0782 100t load cell. Support the top plate assembly securely at this height.
 - Insert the lower receiver into the hole at the center of the base plate (Note: The base plate has an anti-rotation pin, and the lower receiver has a corresponding slot. Align the pin into the slot as shown in Figure 3-1) Insert the upper receiver into the hole at the center of the underside of the top plate.
 - Place the foam gasket over the lower button of the load cell. Note: The lower buttons of the SLC611 and 0782 load cells have a hexagonal shape.
 - Tilt the load cell (with the cable entry facing down) and insert its lower button into the lower receiver (see Figure 3-2). Stand the load cell upright so that it is aligned with the upper receiver
 - Make sure that the SafeLock™ locking plates are positioned correctly under the top plate assembly and that the load cell and anti-rotation washer are aligned correctly with the upper receiver. Lower the top plate so that it rests on the SafeLock™ locking plate.
9. Loosen the lift-off bolts and lift the top plate slightly. Remove the two SafeLock™ locking plate from the top plate assembly. Lower the top plate onto the load cell. Remove the two SafeLock™ centering washers.
10. Tighten down the lift-off bolts screws until they lock against the sleeves



Warning

THE LIFT-OFF BOLTS MUST BE LOCKED IN POSITION AS DESCRIBED FOR THE LIFT-OFF FUNCTION TO OPERATE CORRECTLY. FAILURE TO DO SO MAY RESULT IN BODILY HARM OR DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

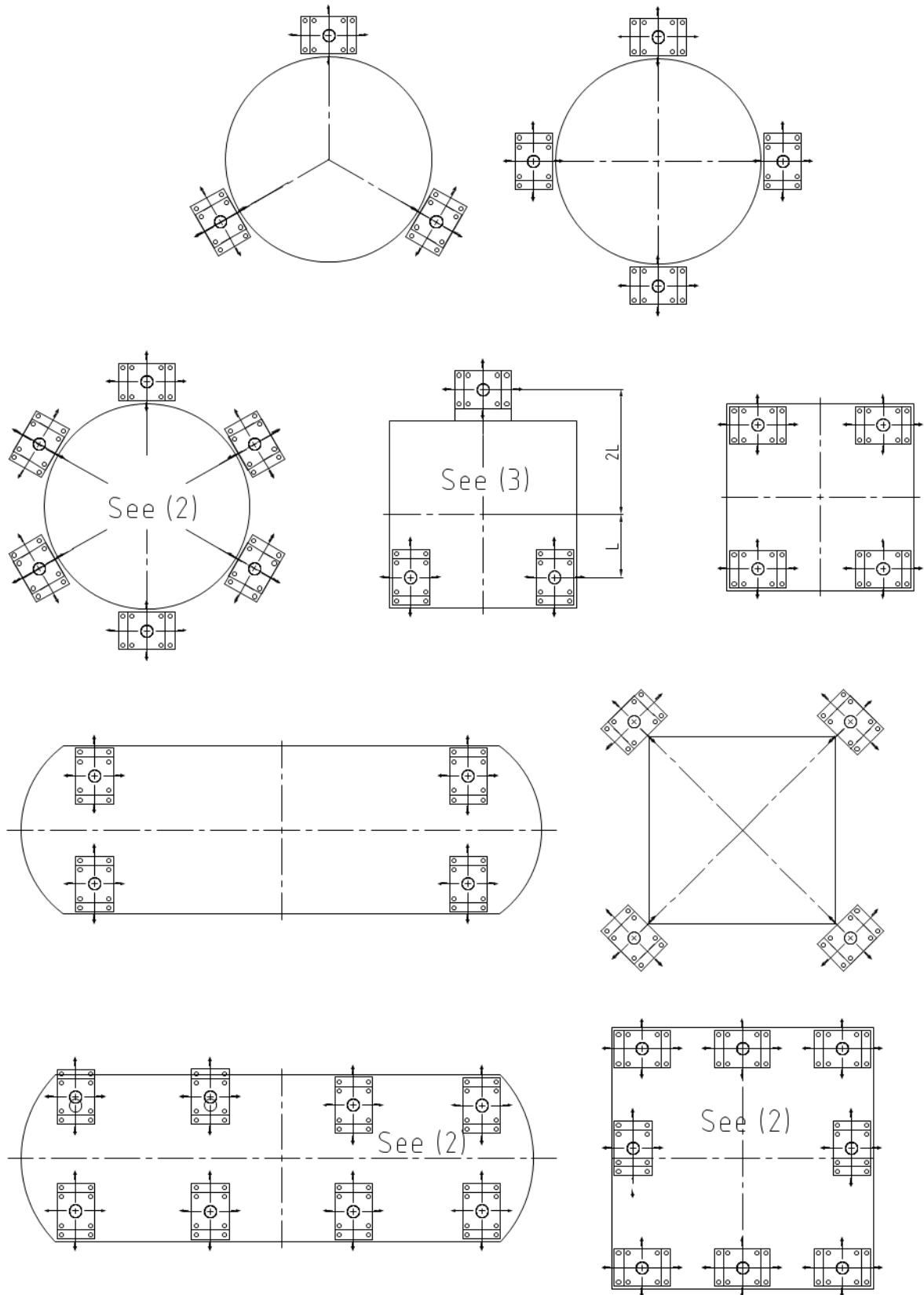


Figure 3-5: Plan View of Mounting Arrangements without Stabilizers

Notes:

- 1) All weigh modules may be rotated 1 to 359 degrees about their vertical axis from the orientation shown.
- 2) It is best to use 3 or 4 weigh modules. Equal load distribution is increasingly difficult to achieve as the number increases beyond 3.
- 3) Provide equal load distribution, but overall stability of this arrangement must be assured.

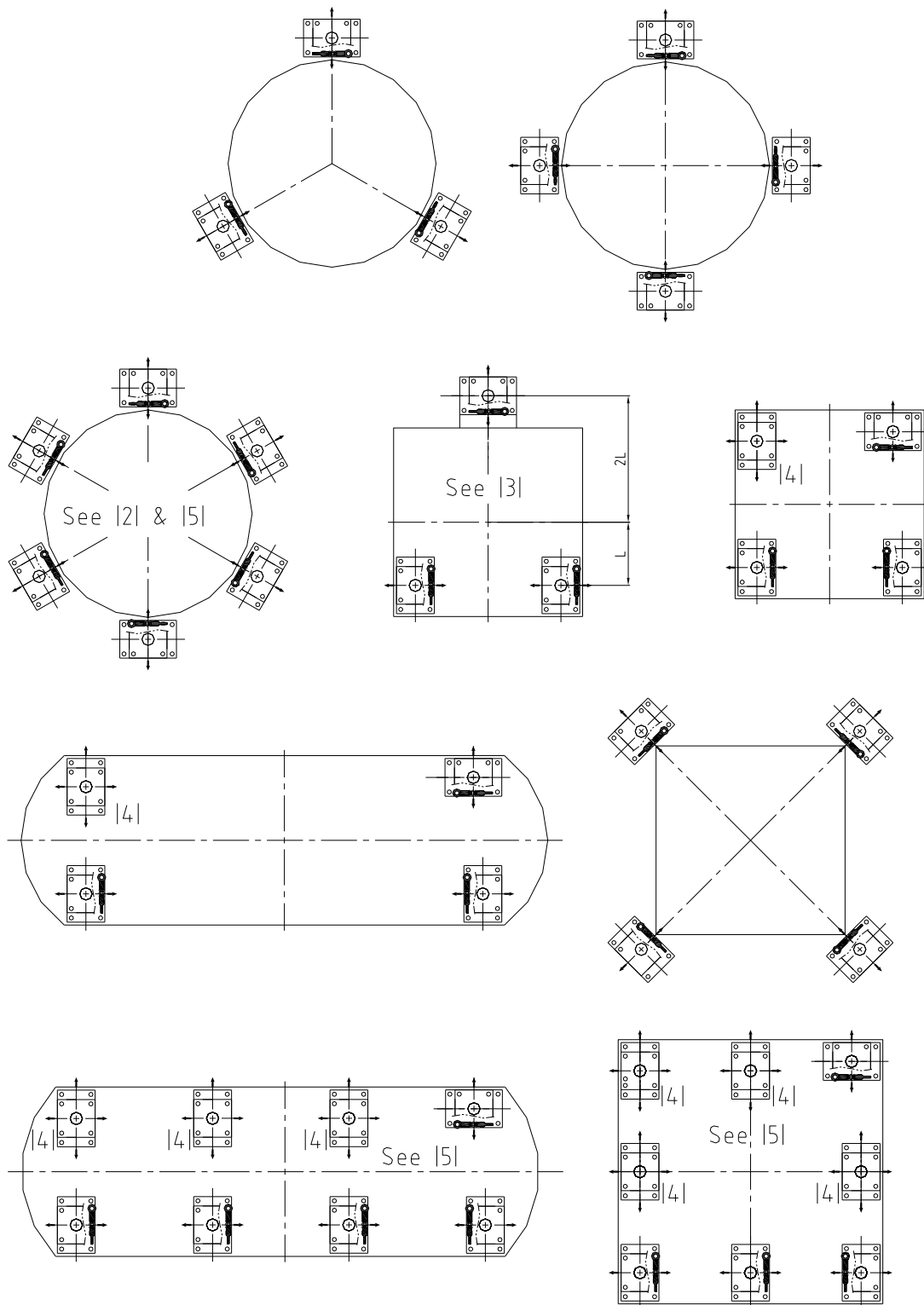


Figure 3-6: Plan View of Mounting Arrangements with Stabilizers

Notes:

- (1) Just one Stabilizer option for SWC415 weigh module
- (2) Any number of weigh modules (≥ 3) may be used on a circular tank with stabilizers tangential as shown in this 6-leg example.
- (3) Provide equal load distribution, but overall stability of this arrangement must be assured.
- (4) This weigh module must not have stabilizers to prevent binding; it may be rotated 1 to 359 degrees about its vertical axis from the orientation shown.
- (5) It is best to use 3 or 4 weigh modules. Equal load distribution is increasingly difficult to achieve as the number increases beyond 3

11. Make sure that each weigh module supports approximately an equal portion of the load. This is especially important for scales with a rigid frame and/or four or more weigh modules. It may be necessary to measure the signal from each load cell to confirm this. Shim the lighter positions as necessary to redistribute the load.
12. Assembly of stabilizer option (see Figure 1-2, 1-3, 1-4)
 - The optional stabilizer can be fitted to the weigh module before or after the weigh module is installed. The stabilizer need to be fitted to side of the weigh module is most convenient. Note that the weigh modules must be arranged according to Figure 3-6 to avoid binding the scale.
 - Remove the plastic plug from the hole in the base plate, apply a coat of thread locker to the threads of the base stud, and screw the stud into the hole. Tighten it with a wrench.
 - Remove the plastic plug from the boss on the top plate assembly, apply a coat of thread locker to the threads of the top stud, and screw the stud into the boss. Tighten it with a wrench.
 - Make sure that the top plate is aligned correctly with the base plate. Place the stabilizer assembly on the studs. If necessary, adjust the length of the stabilizer assembly by rotating the double-ended bolt.
 - Place the retaining rings in the grooves on the studs to secure the stabilizer assembly in place. Make sure that the retaining rings sit securely in the grooves.
 - Make any final adjustments to the length of the stabilizer assembly and lock the two jam nuts against the rod-ends while preventing the double-ended bolt from rotating.
13. Assembly of heat conduction and anti-vibration pads option:
 - Anti-vibration pad and heat conduction pad (made out of PEI) pads are shipped as a kit along with the SafeLock™ locking plate.
 - Install a pad between the SafeLock™ locking plate and the tank's foot plate (see Figure 3-7). Note: Do not install the pad between the SafeLock™ locking plate and the weigh module's top plate.
14. Mount the junction box in a location where the load cell cables can be properly terminated in the junction box. **Do not mount the junction box on the scale.**
15. Connect the load cell cables to the junction box and terminate the wires according to the color code marked on each load cell.
16. Connect the home run cable from the scale indicator to the junction box.
17. Confirm that all live-to-dead connections (pipes, conduit, etc.) are flexible and securely anchored at both the scale and the dead connection point.

Note:

Consider calibrating the scale before connecting any piping or conduit to the scale. Rechecking the calibration after installing piping or conduit will confirm if they have been installed correctly.

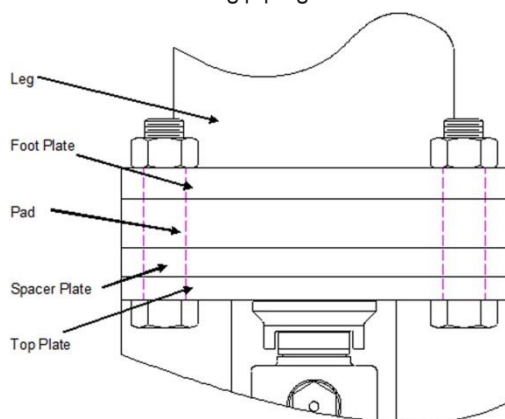
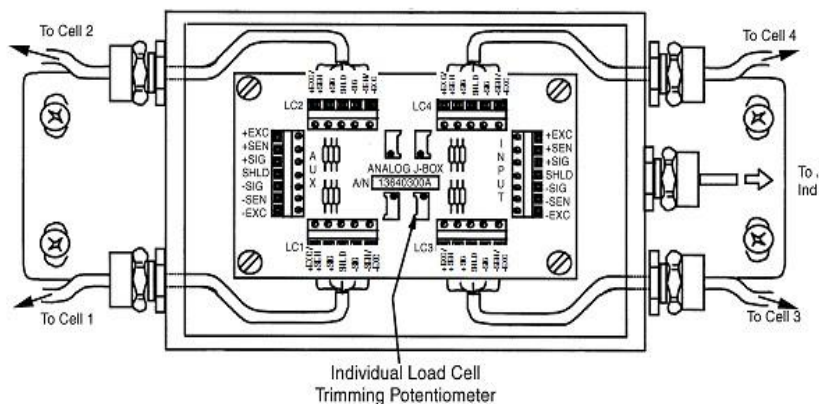


Figure 3-7: Isolation Pad Installation

3.3 Modes of Operation

SWC415 PinMount™ weigh modules with SLC611 or 0782 load cells can be used with an analog junction box for summing the load cell outputs. Only analog-compatible indicators work with an analog junction box. See Figure 3-8 and Table 3-2 for cable connections.



Note: See chapter Calibration for adjusting junction boxes

Figure 3-8: Analog Junction Box Detail

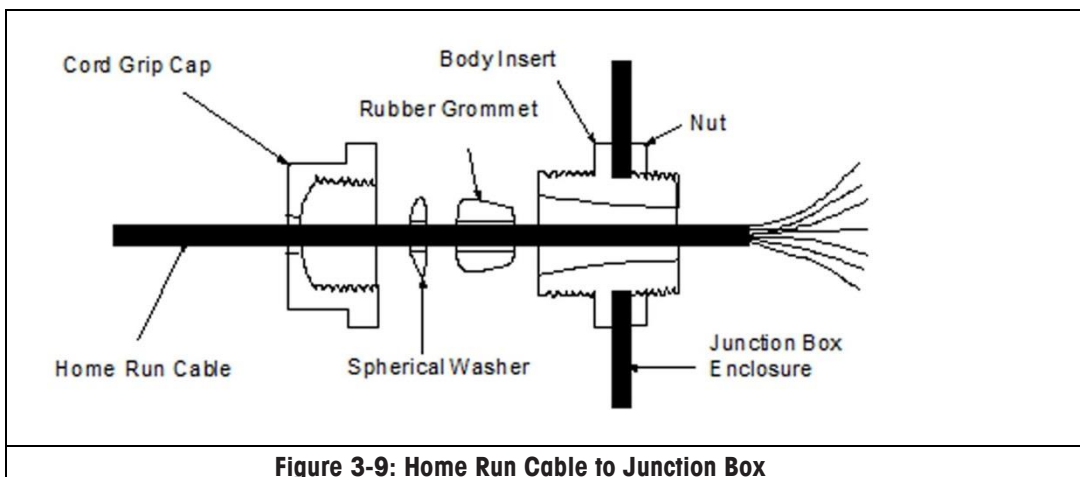


Figure 3-9: Home Run Cable to Junction Box

Load Cells and HomeRun Cable Connection Procedure:

1. Thread the load cells and HomeRun cable through the junction box cable gland ensuring that the diameter of the grommet securely engages the cable.
2. Wire the load cells and home run cable to the PCB accordingly.
3. Place the desiccant bag inside the junction box.
4. Reinstall the junction box lid. Ensure that the rubber gasket is clean and correctly positioned so that it contacts the enclosure edges to prevent water ingress.
5. Hand-tighten all screws and cord grip caps

Load Cell Wiring			Instrument Cable Wiring	
Function	Wire Color (SLC611)	Wire Color (0782)	Function	Color
+ Excitation	Green	Green	+ Excitation	White
+ Sense	-	Yellow	+ Sense	Yellow
+ Signal	White	White	+ Signal	Green
Shield	Yellow	Yellow (long)	Shield	Orange
- Signal	Red	Red	- Signal	Black
- Sense	-	Blue	- Sense	Red
- Excitation	Black	Black	- Excitation	Blue

Table 3-2: Analog Junction Box Wiring Codes

6-wire cell	4-wire
Load cell cable	Load cell terminal junction box
Excitation + (Sleeve)	Excitation +
Sense + (Sleeve)	
Excitation - (Sleeve)	Excitation -
Sense - (Sleeve)	
Signal +	Signal +
Signal -	Signal -
Shield	Shield

Table 3-3 – Connection of 6-wire load cells to 4-wire terminal boxes

Notes:

- Water collecting on a cable will travel along the cable to its lowest point before reaching connectors or seals.
- It is important that the load cell cable allows the load cell to move freely. The drip connection should behave like a spring.
- A straight connection (no drip loop) could cause premature cable failure by putting excessive pulling-stress on the cable end.

4. Calibration

Proper calibration of a scale in industrial applications is highly dependent on the application of the scale and on local legal regulations, industry norms and internal requirements. The procedures, test loads and frequency for calibration and the documentation produced should be carefully considered to ensure compliance with regulations and to achieve and sustain performance that meets the requirement of your process, products and customers. Mettler Toledo has resources globally who can provide the expertise, skills and tools to confirm that your scale is performing as required. Periodic calibration by a trained technician also provides an opportunity for inspection and preventive maintenance to ensure safe and reliable performance.

4.1 Shift Adjust

Calibration adjustments should be made only after checking all mechanical parts and after proving that the scale activity is repeatable. To check repeat-ability, repeatedly place a test weight in the same position on the scale to make sure that the scale gives the same weight reading each time.

Then perform a shift adjustment to make the weight reading at or near each weigh module the same for the same test weight.

The amount of test weight used for the shift test should equal 10 percent of the rated scale capacity. Test weights should be concentrated directly (or as close as possible) over the weigh modules.

Analog Junction Box Shift Adjustment

Perform a shift adjust using the load cell trim potentiometers mounted on the junction box PCB.

1. Turn all potentiometers fully clockwise before applying test weights.
2. Successively place the test weight at each of the designated locations (at or near the weigh modules). Record the displayed weight readings.
3. Determine the location with the lowest weight reading.
4. Proceeding clockwise, place the test weight at each designated location.
If necessary, adjust the trim potentiometer corresponding to that location to obtain the weight reading recorded in Step 2.
5. Repeat this procedure until all weight readings at the designated locations are the same or within the tolerances specified by the local weights and measures authority.
6. Make sure all cable connectors and cord grip caps are tight, place the desiccant bag in the box, and reinstall the junction box lid.

Precision Junction Box Shift Adjustment AJB5xx, AJB6xx, AJB8xx

Perform a shift adjust using the load cell rotary switches mounted on the junction box PCB.

1. Turn switches for each cell to "80" ($\times 16 = 8$, $\times 1 = 0$) before applying test weights;
2. Successively place the test weight at each of the designated locations (at or near the weigh modules). Record the displayed weight readings.
3. Calculate the average of those and use for reference reading;
4. Proceeding clockwise, place the test weight at each designated location. If necessary, adjust the switches corresponding to that location to obtain the weight reading calculated in Step 3;
5. Repeat this procedure step 2-4 until all weight readings at the designated locations are the same or within the tolerances specified by the local weights and measures authority.
6. Make sure all cable connectors and cord grip caps are tight, place the desiccant bag in the box, and reinstall the junction box lid.



4.2 Scale Calibration (Span)

Calibration with Test Weights

The most accurate, reliable way to calibrate a scale is to use test weights. Calibrate the scale using test weights equal to the scale capacity. With the proper test weight, continue calibrating the weighing system according to the instructions provided in your digital indicator manual.

Options for Calibration

Calibration with Test Weights and Material Substitution

The substitution method is recommended for larger installations where it is physically impossible to hang test weights equal to the tank's maximum capacity. When performed correctly, this method provides weight readings for plotting a reliable performance graph.

1. For example, you might hang 1,000 kg of test weights, take a weight reading, and then remove the test weights.
2. Add enough water to the tank to equal the weight reading obtained with the test weights.
3. Leave the water in the tank. Hang the same test weights again, take a second weight reading, and then remove the test weights.
4. Add enough additional water to the tank to equal the second test weight reading.
5. Repeat this procedure until the tank is full.

Calibration with Material Transfer

When calibrating with material transfer, weigh a material (usually water) on an existing scale and transfer it to the tank scale being calibrated. Do this in a single transfer or in stages until you reach the tank's maximum capacity. This method provides only a rough calibration. It is only as accurate as the existing scale and the transfer process. Even under the best circumstances, you cannot tell if allowable errors are cumulative or compensating.

Electronic Calibration

When using the electronic calibration method, replace the load cell cables with leads from a load cell simulator. The simulator sends out a signal equal to the signal the load cells should produce. Electronic calibration is noted for its speed and simplicity; however, it calibrates only the electronics. It does not verify the scale performance because it assumes that the tank and all mechanical connections are in perfect working order.

1. With the simulator adjusted to zero output, set the indicator to zero.
2. Adjust the simulator to full output, a signal that all the load cells should produce at their rated capacity.
3. Adjust the indicator to show the total capacity of all load cells in the system.
4. Attach the load cell input to the indicator.
5. "Zero off" the empty weight of the tank.

CalFree™ Calibration with Analog Load Cells

CalFree™ is a method to calibrate a scale without using test weights; available when connected to METTLER TOLEDO Industrial Terminals with this software feature. This is based on manual entry of capacity and performance data from the load cell or load cell platform. This method of calibration can be

used for initial check-out and testing of systems or when a large structure is used as the weighing vessel and it is not possible to apply test weights to the structure. CalFree™ calibration is a mathematical calibration using load cell production data. It cannot compensate for mechanical influences like attached piping etc. Scale needs to be empty for zero calibration.

This method requires using low impact junction boxes like Precision Junction Boxes. Calculate the average mV/V sensitivity of the system by averaging the individual load cell outputs published on their respective Calibration Certificates (shipped with each weigh module) the following steps are a basic outline of the CalFree™ procedure; follow the respective Terminals manual for complete instructions:

1. Access the Terminal's Cal Menu;
2. Perform Capture Zero first;
3. Access CalFree™.
4. Enter full load cell full capacity;
5. Enter average load cell output.

5. Routine Care and Maintenance

5.1 General

Once you have installed your weighing equipment, you should have an authorized METTLER TOLEDO representative periodically inspect and calibrate it. If the scale is used for legal-for-trade purposes, consult the local weights and measures authorities for minimum inspection requirements. Contact your local authorized METTLER TOLEDO service representative for information on periodic inspection and calibration services.

5.2 Site Inspection

Make sure that the scale site remains in good condition. Check for alterations in the dead-to-live connections, alterations in support for the weigh modules, overloading and excessive vibration conditions, and debris or material build-up under or around the scale that could inhibit freedom of movement.

5.3 Weigh Module and Junction Box Inspection

During periodic inspections of the weigh modules, check:

1. Load cells and assemblies for signs of unusual wear
2. Clearance between the hold-down bolt and the mounting plate.
3. Floor drain for adequate drainage away from the weigh modules
4. Junction box lid: Is it properly sealed? Are all cord grips tight?
5. Moisture or foreign material present around or inside the junction box assembly
6. Instrument cable: Is it damaged? Does it bind the scale?
7. Repeatability and shift of the scale



6. Troubleshooting


6.1 General

If a scale is not working properly, find out as much about the problem as possible. Try to determine whether the problem is constant or intermittent. Mechanical and electrical influences can cause malfunctions.

When troubleshooting SWC415 PinMount™ weigh modules, check the instrument cable for damage and check all connections for any loose/ incorrect wiring. Examine the physical location of the scale, checking for the following:

1. Proper clearance between live and dead portions of weigh module
2. Water
3. Corrosive materials
4. Unleveled floors
5. High vibrations
6. Air currents
7. Physical damage to the scale platform or frame

	 <b style="font-size: 1.2em;">WARNING
PERMIT ONLY QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS, AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.	

 <b style="font-size: 1.2em;">Caution
BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST 30 SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM OR DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

6.2 Isolate the Problem

To determine whether the problem is in the scale or the digital indicator: Remove power from the system.

1. Disconnect the digital indicator from the scale, and connect the indicator to a load cell simulator (analog load cell simulators are available from METTLER TOLEDO).
2. Reapply power. If the problem persists, consult the digital indicator manual for further troubleshooting assistance.
3. If the problem is NOT present with the load cell simulator attached to the indicator, remove power. Disconnect the simulator and reconnect the scale. If the problem persists, continue troubleshooting the scale.

6.3 Check Wiring

The wiring color codes for analog load cells are shown in Table 6-1.

Load Cell Wiring			Instrument Cable Wiring	
Function	Wire Color (SLC611)	Wire Color (0782)	Function	Color
+ Excitation	Green	Green	+ Excitation	White
+ Sense	-	Yellow	+ Sense	Yellow
+ Signal	White	White	+ Signal	Green
Shield	Yellow	Yellow (long)	Shield	Orange
- Signal	Red	Red	- Signal	Black
- Sense	-	Blue	- Sense	Red
- Excitation	Black	Black	- Excitation	Blue

Table 6-1: Load Cell Wiring Color Codes

1. Remove power from the system.
2. Remove the lid from the junction box and check the interior for moisture and foreign material.
3. Make sure that all wiring connections are tight and that no insulation material is touching the terminal contacts.
4. Check all cable connections for correct wiring. Check all cable connectors and cord grip caps on the junction box. Tighten any loose connectors

6.4 Analog Load Cells

Remove the load cell leads from the terminal strip and check each load cell for proper bridge resistances.

Measuring Points	Resistance	
	SLC611	0782
Any lead to shield or ground	Infinity	Infinity
+Exc to -Exc	1150 ± 50 ohms	1160 ± 10 ohms
+Sig to -Sig	1000 ± 2 ohms	1000 ± 3 ohms

Table 6-2: Load Cell Measuring Points

If bridge resistances are within specification, perform a shorted-signal symmetry check.

Short the signal leads together and place one multimeter lead on the shorted signal and one lead on the +Excitation wire.

1. Note the resistance value.
2. Remove the lead from the +Excitation wire and place it on the -Excitation wire. Both resistance values should be approximately equal.
If the cells pass the above test:
 1. Reapply power to the scale platform.
 2. Confirm that proper excitation voltage is reaching the load cells by placing multimeter leads on the excitation positions of each load cell terminal. Excitation voltage can vary from 5 VDC to 15 VDC, depending on the application and digital indicator.
 3. If proper excitation voltage is reaching the load cells, check the output signal from each cell.
 4. If one cell has a particularly high or low dead-load output, it is suspect. The maximum output from any cell is 30 mV at 15 VDC excitation and loaded to gross capacity.
 5. If any cell has an unusual signal, remove all load from that cell by raising the platform.
 6. With the power still on, measure the output from the suspect load cell. The "no-load" zero output should be ±1% for SLC611 and 0782. For example, if the excitation voltage is 15 VDC, then the full scale output is 30 mV and the load zero output should be within ±0.3mV for SLC611 and 0782.
 7. If the load cell is out of specification, replace it.
 8. If a load cell fails any of the above tests, replace it

6.5 Check Mechanical Components

Because the SWC415 PinMount™ weigh module design is so simple, only a few mechanical components require troubleshooting.

Make sure that the scale can move freely. Check new or modified dead-to-live connections on the scale. Also, check the following:

1. Is the scale rocking? If so, shimming may be required.
2. Are the ends of the load cell worn? Replace unevenly worn load cells or load cells with flattened bearing surfaces. Also check the upper and lower receivers for excessive wear.
3. Does rigid piping or poor structural support result in mechanical binds?

6.6 Load Cell Replacement Procedure

Note: When replacing a load cell, make sure that the new load cell is the same model and capacity as the other load cells in the weigh module system. Do not mix load cells within a system.

1. Remove power from the digital indicator and disconnect the instrument cable.
2. Remove the junction box cover and locate the defective load cell terminal.
3. Disconnect the defective load cell cable from its terminal on the summing PCB.
4. Loosen the watertight cable connector on the junction box and remove the cable from the enclosure.
5. Loosen the lift-off bolts enough to allow the top plate to move upward approximately 15mm (5/8inch) for SLC611 load cells and 25mm (1 inch) for 0782 load cells.
6. Using a hydraulic jack, carefully raise the empty tank off the load cell; raise the tank by the amount listed in step 5. If the scale is equipped with optional spacer plate, raise the tank just enough to remove optional spacer plate.



Caution

BE SURE TO BLOCK THE SCALE WHEN IT IS IN THE RAISED POSITION. OBSERVE ALL APPROPRIATE SAFETY PROCEDURES WHEN INSTALLING AND SERVICING THE WEIGH MODULES.

7. If the load cell cable runs through a conduit, attach a string to the end of the defective load cell cable. The string should be both strong enough and long enough to pull the new load cell cable through the conduit.
8. Tilt the defective load cell until it can be lifted out of the lower receiver.
9. Carefully pull the defective load cell cable through the conduit while feeding the string through the junction box opening. Once the string is at the load cell location, detach it from the load cell cable. Attach the new load cell cable to the pulling string and carefully thread it through the conduit into the junction box opening.
10. Place the foam gasket over the lower button of the new load cell. Tilt the load cell and insert the lower button into the lower receiver.
11. Stand the load cell upright so that its upper button fits into the upper receiver.
12. Lower the top plate into position. Ensure that the load cell seats correctly in the upper receiver, lowering the tank, then install the lift-off bolts and tighten them.
13. Reattach the instrument cable and power-up the indicator. Perform a shift adjust if required, and recalibrate the scale.

7. Service Parts

7.1 Model SWC415 PinMount™ 7.5t-100t

Refer to the following drawings and tables when ordering spare parts for model SWC415 PinMount™ weigh modules.

1. All load cells (analog SLC611, 0782) are available as spare parts
2. Load Intro Kit SWC415 PinMount™: included upper / lower receivers and gasket (S1/S2/S3)
3. SafeLock™ Kit SWC415 PinMount™: included SafeLock™ shipping spacer and SafeLock™ centering washer
4. Lift off kit SWC415 PinMount™: included lift off bolt, sleeve and washer;

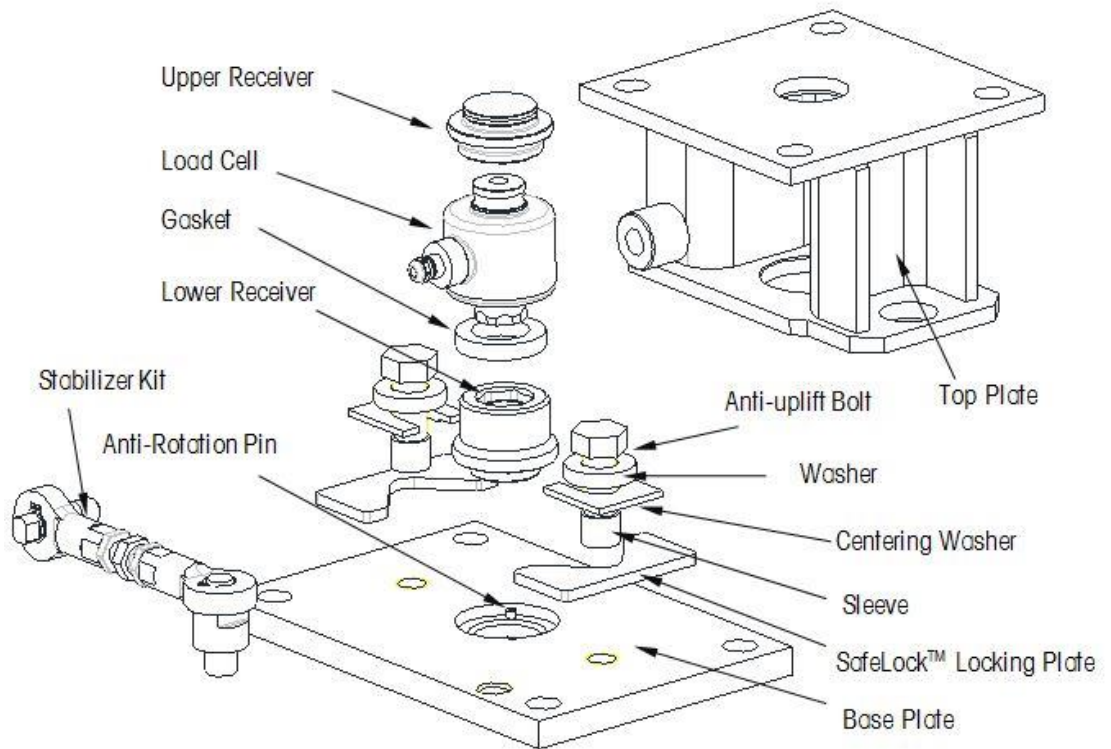


Figure 7-1: SWC415 PinMount™ Weigh Module Assembly with SLC611 LC (Capacity 7.5t-22.5t)

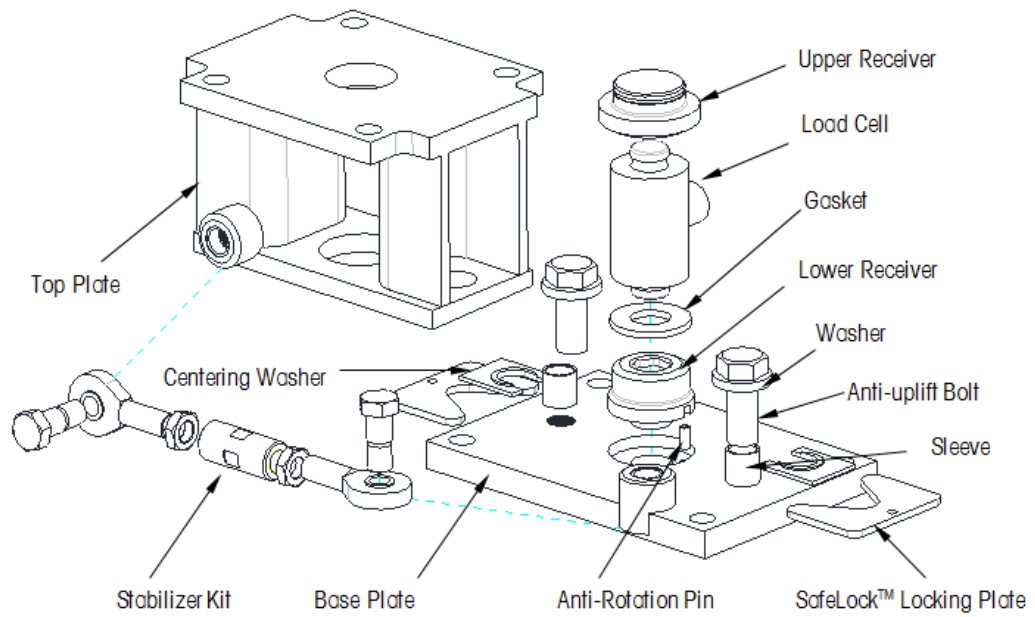


Figure 7-2: SWC415 PinMount™ Weigh Module Assembly with 0782 LC (Capacity 30t-100t)

Part No.	Description	Including	Qty.
30058060	Analog Load Cell, 7.5t SLC611	Load Cell	1
30058061	Analog Load Cell, 15t SLC611	Load Cell	1
30058062	Analog Load Cell, 22.5t SLC611	Load Cell	1
30256407	Lift-off Kit SWC415 PM S1 Single	Lift-off bolt	1
		Washer	1
		Sleeve	1
30057248	SafeLock™ Kit SWC515 PM S1 Single	Spacer	1
		Centering washer	1
30256409	Load Intro Kit SWC415 PM S1 SLC611	Upper Receiver	1
		Lower Receiver	1
		Gasket	1
71201708	Analog Load Cell, 20t 0782	Load Cell	1
71201709	Analog Load Cell, 30t 0782	Load Cell	1
71201710	Analog Load Cell, 50t 0782	Load Cell	1
71201711	Analog Load Cell, 100t 0782	Load Cell	1
30295786	Lift-off Kit SWC415 PM S2 Single	Lift-off bolt	1
		Washer	1
		Sleeve	1
30265383	SafeLock™ Kit SWC415 PM S2 Single	Spacer	1
		Centering Washer	1
30265455	Load Intro Kit SWC415 PM S2 0782	Upper Receiver	1
		Lower Receiver	1
		Gasket	1
30069604	Lift-off Kit SWC415 PM S3 Single (same as for SWC515 S3)	Lift-off bolt	1
		Washer	1
		Sleeve	1
30396066	SafeLock™ Kit SWC415 PM S3 Single	Spacer	1
		Centering Washer	1
30396067	Load Intro Kit SWC415 PM S3 0782	Upper Receiver	1
		Lower Receiver	1
		Gasket	1

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