

POWERCELL® GDD™ TRUCK SCALE

Assembly and Installation Guide



METTLER TOLEDO



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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 contracting your local METTLER TOLEDO organization or writing, calling, or faxing :

METTLER TOLEDO(Changzhou)

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Phone :86(519)8691-2040

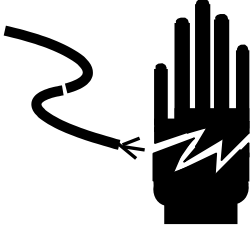

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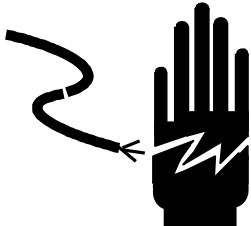

**METTLER TOLEDO RESERVES THE RIGHT TO MAKE REFINEMENTS OR
CHANGES WITHOUT NOTICE.**

Precautions

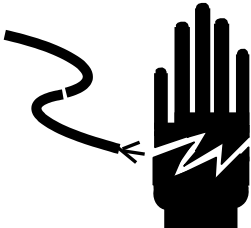

READ this manual BEFORE operating or servicing this equipment.

	 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.

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



SAVE this manual for future reference.

	 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>

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

 WARNING	
<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>	

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

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

CALL METTLER TOLEDO for parts, information, and service.


CAUTION
DANGER OF BODILY HARM OR PROPERTY DAMAGE!

- When a module is being moved, do not place your fingers or other body parts between the module and any other surface.
- If it is necessary to place your hands under a module during installation, make sure that the module is properly blocked so that it cannot move.


CAUTION

FOR SAFTY REASONS DO NOT REPLACE MORE THAN ONE LOAD CELL AT A TIME.


CAUTION
POOR CONTACTS:

- Keep all electrical parts absolutely dry on the inside and as dry as possible on the outside.
- If the cable ends will be exposed to the weather for a long period (not connected to the junction box), apply dielectric compound, cover the cable ends with plastic, and secure the open end with duct tape.


CAUTION
RISK OF COMMUNICATION FAILURES DUE TO EXPOSED STRANDS OF WIRES

- Make sure that no stray conductors are left unsecured. Exposed strands of wires can lead to communication failures if they bridge the connection in the terminal block.



Disposal of Electrical and Electronic Equipment

In conformance with the European Directive 2002/96 EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

If you have any questions, please contact the responsible authority or the distributor from which you purchased this device.

Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

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Introduction

General

The POWERCELL® GDD™ load cells provide accurate weighing for heavy-capacity applications such as truck and rail scales. Digital signal processing provides advanced weighing performance compared to analog load cells. Its weighing performance is kept stable through “in-cell” measurement and correction of errors caused by weather, low voltage, and radio and telephone interference. POWERCELL GDD load cells connect through a junction box in a simple network. Unlike other load cell systems with junction boxes, POWERCELL GDD provides diagnostic capability that makes individual load cell outputs visible from the terminal. This simplifies problem identification and repair.

This manual explains the preferred procedure for installing POWERCELL GDD load cells in a scale.



Figure 1-1: POWERCELL® GDD™ Load Cell

2

Components

Introduction

All POWERCELL GDD load cell components are made of high-quality material and are designed and tested to provide a long service life. They include the following features:

1. Rugged enclosure for protection from the environment (mud, stones, water, ice, etc.).
2. Thick heavy-duty boots to prevent buildup of stones, dirt, snow, and ice.
3. Robust cables to eliminate electromagnetic interference and rodent damage.
4. Large load cell buttons for a long service life.



Figure 2-1: POWERCELL GDD Load Cell Kit

Depending on the region and related logistics, the components will arrive within the scale shipment or as a separate package.

Receiver

The receivers provide the interface between the weighbridge, load cell, and foundation. The design is easy to install and maintain. The upper receiver mounts in a recessed hole in the upper plate. The lower receiver requires three threaded holes (M12 x 1.75) in the base plate for the locating pins. Shims can be added to adjust the height only under the lower receiver or under the base plate.

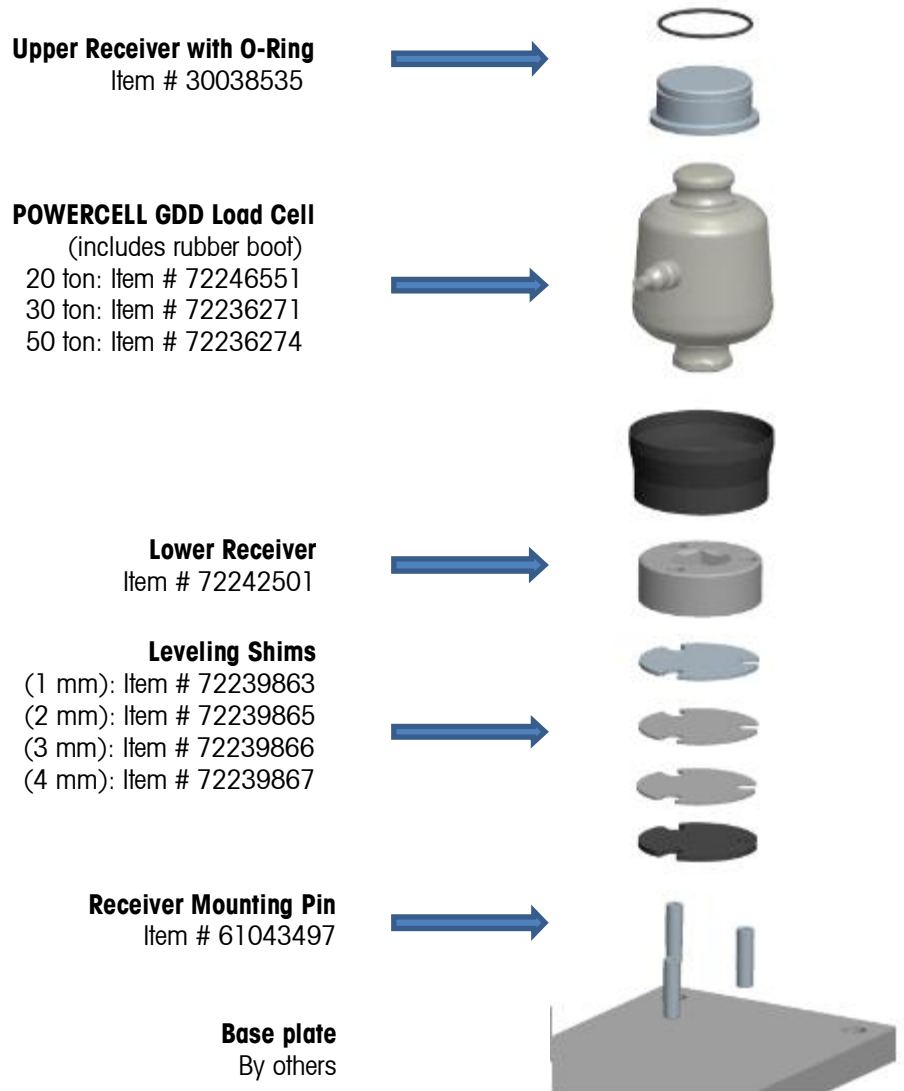


Figure 2-2: Assembly for Load Cell and Receivers

Cables

The POWERCELL GDD cable is 13 meters long. The cable is securely attached to the load cell at the factory. A junction box and home run cable are needed for connecting a terminal with the load cells. A system with more than 8 load cells will require multiple junction boxes with an additional 8 meter long interconnection cable.

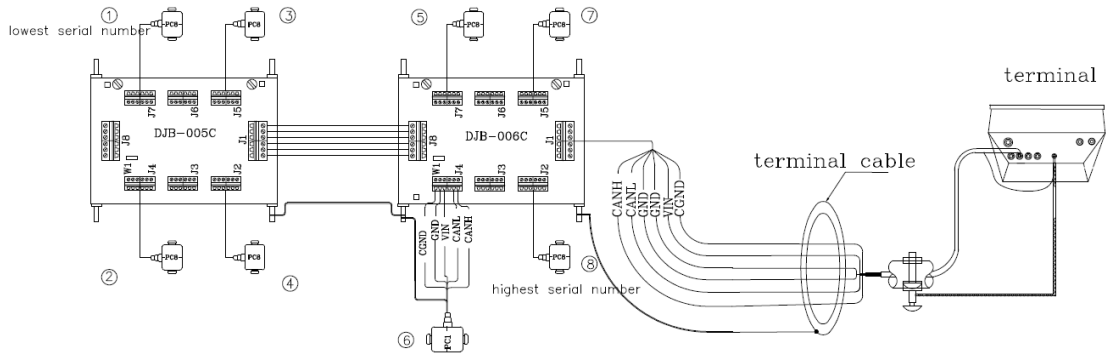


Figure 2-4: POWERCELL GDD Load Cell Network

Junction Box

DJB-C series junction box is used with POWERCELL GDD load cells. It's only function is to connect load cells and distribute power. Unlike analog junction boxes, there is no shift adjustment capability in the junction box. The shift adjustment is done at the terminal.

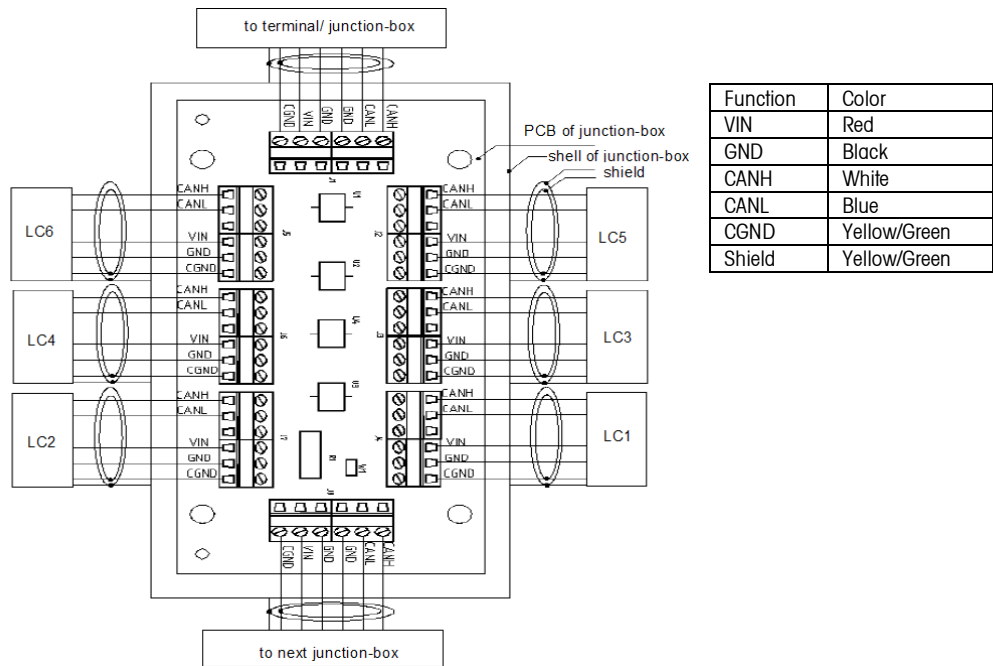


Figure 2-5: Junction Box Detail

A junction box with 5 holes is suitable for 4 load cells systems, and junction box with 7 holes is suitable for 6 load cell systems. If the system includes 8 load cells, then a junction box with 5 holes and one with 6 holes will be required.

3

Installation

Installation Procedure

METTLER TOLEDO recommends the following procedure for installing POWERCELL GDD load cells. Some installation steps can vary slightly depending on the scale design. It is the technician's responsibility to install the load cells correctly.

METTLER TOLEDO has achieved the best results by positioning the entire scale before anchoring the base plates to the foundation. That procedure, which requires using locating tools, is described in this chapter.

1. Foundation Requirements

All base plates for the load cells must be level and in the same plane for accurate and repeatable weighing. Shims can be added under the receivers to level the scale. METTLER TOLEDO recommends that the top of the foundation at the base plate locations be level and in one plane (within ± 3 mm).

Snap a chalk line on the foundation to mark the location of each side of the scale from approach coping to approach coping.

1. These chalk lines will be used to align the modules as they are set in place.
2. Check the distance between the approach copings against the foundation drawing to ensure that there is sufficient room for the scale.
3. Check the diagonal measurements to ensure that the foundation is square. If the foundation is not square, it may interfere with scale installation or cause weighing errors after the scale is installed. Refer foundation problems to the customer or customer's contractor for correction.

2. Positioning Base Plates

Roughly position the base plates on the foundation at the chalk lines. Do not secure the base plates to the foundation yet. Refer to the scale's general layout drawing for the correct position of the load cell axes.

3. Installing Receiver Mounting Pins

Install three locating pins (socket-head pins) in each base plate.

1. Grease the threads of the pins with Loctite[®] 242[®] thread locker.
2. Insert the M12x1.75 threaded ends into the base plate.
3. Firmly tighten the pins with a 6-mm "Allen" or hex-head wrench to 14-20 N-m.

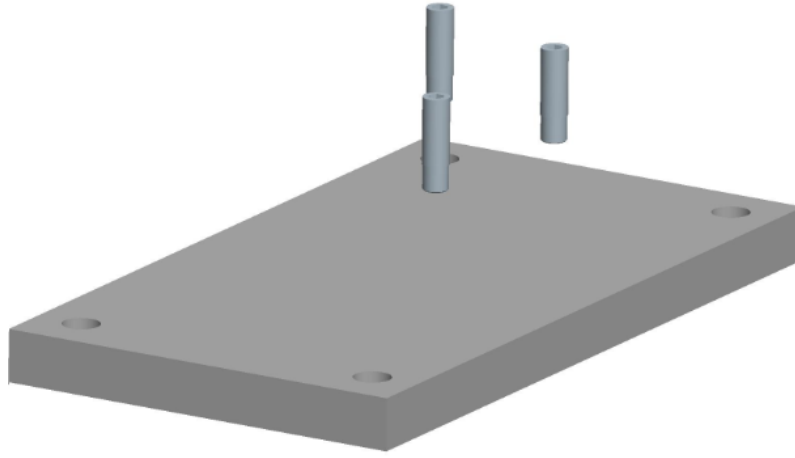


Figure 3-1: Receiver Mounting Pin Installation

4. Installing Lower Receivers

Place one lower receiver on each base plate, aligning the holes with the locating pins.

1. Make sure there are no stones or debris between the receiver and base plate.
2. Use anti-seize compound to grease the underside of each lower receiver.

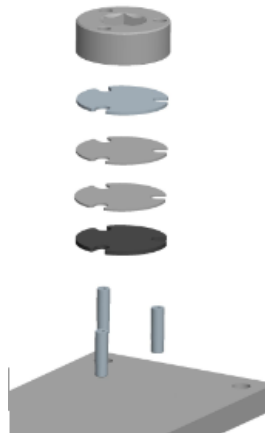


Figure 3-2: Lower Receiver Installation

5. Mechanical Leveling

Shims are used to balance (or equalize) the scale mechanically, removing any inconsistencies in the level of the foundation or scale.

Use a transit to check the elevation of the receiver at each base plate location.

1. Make sure that all receivers are at the same height and the scale will not be above or below the horizontal plane formed by the approaches. To check this accurately, rest the measuring rod on the top surface of the receiver at each base plate location.

2. Use a spirit level to verify that all base plates are level in the longitudinal and transverse planes.
3. If the plates are not level, grind the concrete below the base plate in the locations where the plates are too high and/or add shims until the plates are level in both directions.
4. The total allowable thickness of the shims is 10 mm. If more than 10mm shim height is required, shim between the base plate and foundation. This type of shim must be sourced locally; it is not supplied with the scale.

Tips:

1. When shimming, always ensure that the top of the scale and the approach are in the same plane to ± 4 mm.
2. The scale should be shimmed as closely as possible to the correct height in order to achieve the best repeatability and accuracy. Shimming to within 1 mm saves time during calibration because it ensures that the scale load is well distributed across all the load cells.

6. Installing Upper Receivers

Use anti-seize compound to grease the upper (top) receivers and insert a receiver into each load cell receiver plate on the scale.

1. The large O-ring on the receiver will hold it in place. Make sure the receiver is inserted correctly by verifying that it is not tilted.
2. The receiver should rest firmly on the receiver block. If it does not, make sure that it is not skewed and then gently tap the receiver into place with a block of wood and a hammer.

7. Inserting Locating Tools

METTLER TOLEDO recommends using locating tools because this is the most accurate method of positioning the scale and base plates. It ensures that the load cells are positioned vertically and reduces installation time. Other methods, such as adjusting by sight or by spirit level, generally deliver poor results because they do not guarantee that the load cells will be correct in all axes.

Use one locating tool at each load cell location. One end of the locating tool has a smaller diameter than the other end. Insert the smaller end of the locating tool into each lower receiver.



Figure 3-3: Locating Tools

Note: Locating tools can be used for more than one installation.

8. Installing Scale Modules



CAUTION

DANGER OF BODILY HARM OR PROPERTY DAMAGE!

- 1 When a module is being moved, do not place your fingers or other body parts between the module and any other surface.
- 2 If it is necessary to place your hands under a module during installation, make sure that the module is properly blocked so that it cannot move.

The installation procedure of the scale depends on the scale design. Refer to the scale's installation manual for the recommended method of placing and coupling the scale modules.

1. Slowly lower the module onto the locating tools, lowering the approach end first.
2. Check the module's alignment with the chalk line snapped on the foundation.
3. Inspect the locating tools to make sure they are seated properly. If there is a gap between the shoulder of the locating tool and the receiver, use a large hammer to tap the side of the base plate (on the side with the gap) until the locating tool seats firmly. You will hear a definite "crash" sound when it seats.
4. Test all positions. When you are satisfied that all base plates are aligned properly, anchor the base plates to the foundation.

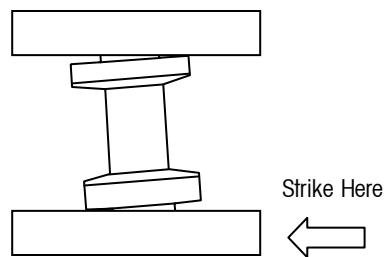


Figure 3-4: Adjusting the Locating Tool

9. Replacing Locating Tools with Load Cells



CAUTION

FOR SAFTY REASONS DO NOT REPLACE MORE THAN ONE LOAD CELL AT A TIME.

METTLER TOLEDO recommends positioning the load cells with the serial numbers in sequence so that the lowest number is installed at the first location and the highest number at the final location (see Figure 3-5). This arrangement will save time during load cell addressing.

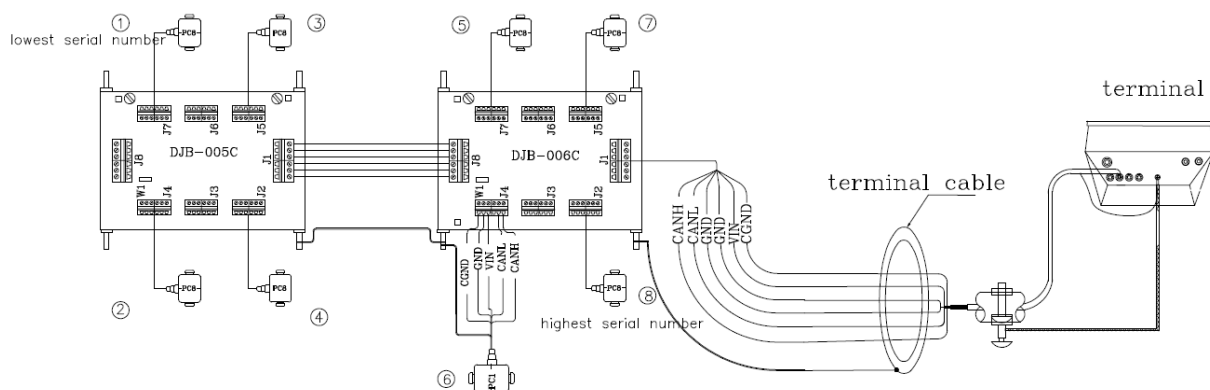


Figure 3-5: Routing for POWERCELL GDD Load Cell Network

Remove a locating tool and replace it with a load cell using the procedure described in the following steps. Repeat the procedure until all load cells have been installed.

1. Jack up the module and remove the locating tool.
2. Apply a small amount of multi-purpose grease to the load surface of the cell buttons at the top and bottom of the POWERCELL GDD load cell (item # 68004326, included with the load cell kit).
3. Orientate the load cell so that the cable does not come into contact with the scale structure.

4. Place the hex end of the load cell into the lower receiver, ensuring that the two hex surfaces mate. The load cell's rubber boot will fit over the lower receiver.
5. Make sure the hex surface of the load cell is aligned properly with the hex surface of the lower receiver. To check alignment, rotate the load cell with your hand. The load cell should rotate freely several degrees.
6. Gently lower the module onto the load cell, ensuring that the top end of the load cell is seated inside the upper receiver socket.

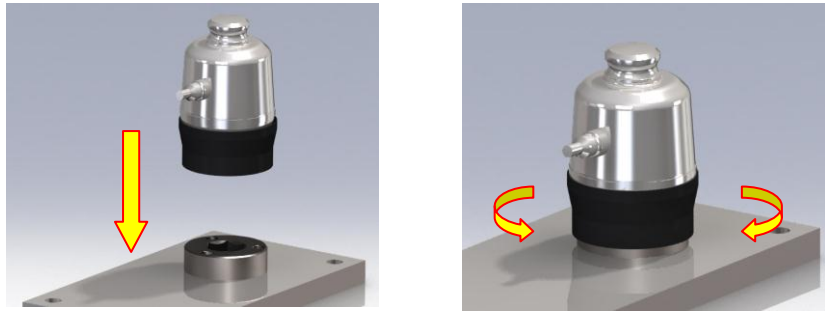


Figure 3-6: Installing the Load Cell

10. Junction Box Installation

Install and connect the junction box using the procedure described in the following steps:

1. Determine the location on the scale where the junction box will be installed. The location should be centrally located among the load cells so all the load cell cables can reach. It is recommended the junction box to be installed off the ground, in a vertical orientation to prevent water accumulation, and in a convenient location for service. Route the load cell cables to the junction box in such a way that they are protected from damage.
2. Remove the top cover of the junction box.
3. Note the junction box has small and large cable glands. The small cable glands are intended for the load cell cable. The large cable glands are intended for the home run cable or junction box interconnection cable.
4. Open the small cable gland nut and thread the load cell cable through it. Pull the cable through until it reaches the cable jacket but not past the shield ground.
5. Connect the load cell cable to the junction box terminal block according to the color code: VIN:Red; GND:Black; CANH:White; CANL:Blue; CGND:Yellow/Green.
6. Connect the load cell cable shield ground (long Yellow/Green with ring terminal) to the exterior ground stud of the junction box. Secure with nut.
7. Tighten the cable gland nut.
8. Repeat steps 4-7 above for each load cell in the system.

9. If multiple junction boxes are necessary, repeat steps 3-8 for each junction box in the system.
10. Connect the home run cable and junction box interconnection cable (if necessary) through the large cable glands in the same manner as described in steps 4-7 above.
11. If any cable glands are not used, insert the supplied plug in the cable gland and tighten the cable gland nut to seal the opening.
12. Re-install the top cover of the junction box. Use an alternating pattern when tightening the screws to ensure the gasket is evenly engaged. Tighten the junction box cover securely. The optimum screw torque is 225 N-cm. Do not over-tighten as this could warp the cover and force the gasket out of place.

11. Terminal Installation

Complete the terminal installation using the procedure described in the following steps:

1. Connect the home run cable to the terminal as described in the terminal's manual. Use only home run cable approved by METTLER TOLEDO. Route the home run cable to the terminal in such a way that it is protected from damage.
2. Apply power to the terminal and let the system warm up for approximately one half hour. This allows the electronics to reach their optimal operating temperature. If the scale has not warmed up sufficiently, you may notice some drift in the weight output.
3. At the terminal, enter the scale type information and address each load cell in accordance with the terminal's manual. Make sure that you know the node address for each load cell location in your scale. Establishing a consistent convention will make troubleshooting easier.
4. Access the terminal's setup mode and select the diagnostic mode to observe the raw counts for each load cell in the scale. Confirm that each load cell in the scale is responding. The POWERCELL GDD load cells will transmit 0.1 kg per count in diagnostic mode.
5. In the terminal, the value of the shift constant for each load cell should be 1 (not adjusted). Failure to make sure that these values are set to 1 will significantly lengthen the calibration time.

12. Load Cell Shimming

The mechanical leveling procedure used during installation should have provided the optimal mechanical installation. Now it is possible to make small corrections by verifying the output of each load cell.

NOTE: Do not electronically shift adjust the scale (load cells) until you are sure the load cells are properly mechanically shimmed.

Each transverse pair of load cells should have the same dead load output. If the output is not the same, shims need to be added to or removed from under the load cell to adjust the vertical position of each load cell. Adjusting a load cell's vertical position will redistribute the load among the load cells supporting the weighbridge. Therefore, adding/removing shims at one load cell will also change the output of the adjacent load cells, making the shimming process iterative. Continue to shim the load cells until the dead load output of all load cells is as close as possible.

NOTE: For scales with more than 4 load cells, the middle transverse load cell pairs will carry double the weight of the transverse pairs at the approach ends.

13. Digital Shift Adjustment

A correctly shift adjusted scale will give the same weight reading no matter where on the platform a test weight is placed. Terminals that are compatible with POWERCELL GDD load cells provide two types of digital shift adjustment: adjustment by individual load cells or adjustment by pairs of load cells. Adjustment by individual load cells ensures a constant reading regardless of where the weight is placed on the scale. Adjustment by pairs of load cells ensures a constant reading regardless of where the load is placed on the long axis of the scale (between pairs of load cells). Adjustment by pairs is less time consuming to perform and typically used in vehicle weighing applications.

Instructions for digital shift adjustment can be found in the terminal's manual.

14. Scale Calibration

Instructions for programming and calibrating the scale can be found in the terminal's manual. Capacity and increment size may vary depending on local law. METTLER TOLEDO highly recommends using test weights whenever possible because they provide the most accurate calibration.

After calibrating the scale, confirm that the terminal's Error Log and Performance Log are enabled (refer to the terminal's manual for instructions). The Error Log tracks error related to the POWERCELL GDD system. The Performance Log provides a summary of the performance and diagnostics data collected for each load cell. These logs can be helpful during troubleshooting.

Note: If you notice a weight difference when driving in one direction then in the other, repeat the shimming procedure and ensure all load cells have a shift constant of 1 (not adjusted).

15. Lightning Protection

When properly installed and equipped with a Lightning Protection Option (LPO) kit, POWERCELL GDD load cells can withstand a lightning strike up to 15,000 Amperes. Lightning can damage a scale by a direct strike at or near the weighbridge, or by a strike on the power mains to the scale. The LPO kit is capable of protecting a scale from both types of strikes. The kit's cabling directs dangerous currents from the scale to a single, well-earthed ground rod. The kit's surge protector diverts dangerous currents from the power mains to the same single, well-earthed ground rod.

The terminal's manual contains instructions for connecting the LPO kit to the terminal.

All grounding and equal potential bonding connections must be made according to local regulations based on the country of installation.

4

Part Numbers

MG Kits with POWERCELL® GDD™ Load Cells

MG kits contain all the necessary components for installation: POWERCELL GDD load cells, upper & lower receivers, receiver mounting pins, junction box, grease, and leveling shims. Home run cable (based on the required length), Lightning Protection Kit, locating tools, and terminal are ordered separately.

MG Kit Part Number	Description	Included GDD Load Cell
30085197	MG Kits 2004	4 of 20t capacity
30085198	MG Kits 2006	6 of 20t capacity
30085199	MG Kits 2008	8 of 20t capacity
30085200	MG Kits 3004	4 of 30t capacity
30085201	MG Kits 3006	6 of 30t capacity
30085202	MG Kits 3008	8 of 30t capacity
30085203	MG Kits 5004	4 of 50t capacity
30085204	MG Kits 5006	6 of 50t capacity
30085205	MG Kits 5008	8 of 50t capacity

MG Kit Accessories

Part Number	Description
72260837	Home Run Cable, 8m, Junction Box to Terminal
72260838	Home Run Cable, 9m, Junction Box to Terminal
72260839	Home Run Cable, 15m, Junction Box to Terminal
72260840	Home Run Cable, 20m, Junction Box to Terminal
72260841	Home Run Cable, 25m, Junction Box to Terminal
72260842	Home Run Cable, 30m, Junction Box to Terminal
72260843	Home Run Cable, 40m, Junction Box to Terminal
72260844	Home Run Cable, 50m, Junction Box to Terminal
72260845	Home Run Cable, 80m, Junction Box to Terminal
72260846	Home Run Cable, 100m, Junction Box to Terminal
72260847	Home Run Cable, 150m, Junction Box to Terminal
30059953	Home Run Cable, 180m, Junction Box to Terminal
30769111	Home Run Cable, 200m, Junction Box to Terminal
30085206	Leveling Shim Kit (1,2,3 & 4mm)
30038533	Locating Tool POWERCELL GDD
68004326	Receiver Grease
61043831	Lightning Protection Kit

MG Kit Spare Parts

Part Number	Description
72246551	POWERCELL GDD Load Cell, 20 ton, C3
72236271	POWERCELL GDD Load Cell, 30 ton, C3
72236274	POWERCELL GDD Load Cell, 50 ton, C3
30027472	Junction Box, DJB-005C
30027473	Junction Box, DJB-006C
30027474	Junction Box, DJB-007C
72242501	Lower Receiver, POWERCELL GDD
30038535	Upper Receiver, POWERCELL GDD
61043497	Receiver Mounting Pin, Hex
72247437	Rubber Skirt, POWERCELL GDD

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