METTLER TOLEDO

VLM2

Value Line Weigh Modules

Installation and Service Manual

15751600A
(6/99)

INTRODUCTION

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

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240
Phone: (614) 438-4511
Fax: (614) 438-4958
www.mt.com

Declaration of conformity
Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
Conformiteitsverklaring
Dichiarazione di conformitá

We/Wir/Nous/Wij/Noi: **Mettler-Toledo, Inc.**
1150 Dearborn Drive
Worthington, Ohio 43085
USA

declare under our sole responsibility that the product,
erklären, in alleiniger Verantwortung, daß dieses Produkt,
déclarons sous notre seule responsabilité que le produit,
declaramos, bajo nuestra sola responsabilidad, que el producto,
verklaren onder onze verantwoordelijkheid, dat het product,
dichiariamo sotto nostra unica responsabilitá, che il prodotto,

Type: Analog Load Cell
Model: 713

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
auf das sich diese Erklärung bezieht, mitder/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.
Auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
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Waarnaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.
A cui si riferisce questa dichiarazione è conforme alla/e sequente/i norma/e o documento/i normativo/i.

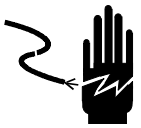
CE Conformity / CE-Konformität / Conformité CE
90/384/EU Nonautomatic Balances and Scales / Nichteselbsttätige Waagen / Balances à Functionnement non automatique
Article 1.2.b.

Other Directives and Standards / Andere Richtlinien und Normen / Autres documents **corresponding to local requirements** / entsprechend lokalen Anforderungen / correspondant aux exigences locales

Darrell Flocken, Manager - Weights & Measures
Office of Weights and Measures
Worthington, Ohio USA
June, 1999

according to EN45014

Precautions



⚠ 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.

- Read this manual before installing or servicing this equipment.
- Follow these instructions carefully.
- Save this manual for future reference.
- Do not allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.
- Always disconnect this equipment from the power source before cleaning or performing maintenance.
- Call METTLER TOLEDO for parts, information, and service.

CONTENTS

1 Introduction

Value Line Weigh Modules

Value Line weigh modules are economical assemblies for converting tanks, conveyors, and other structures into scales. These compression-mount weigh modules are available in capacities ranging from 250 to 2,500 pounds.

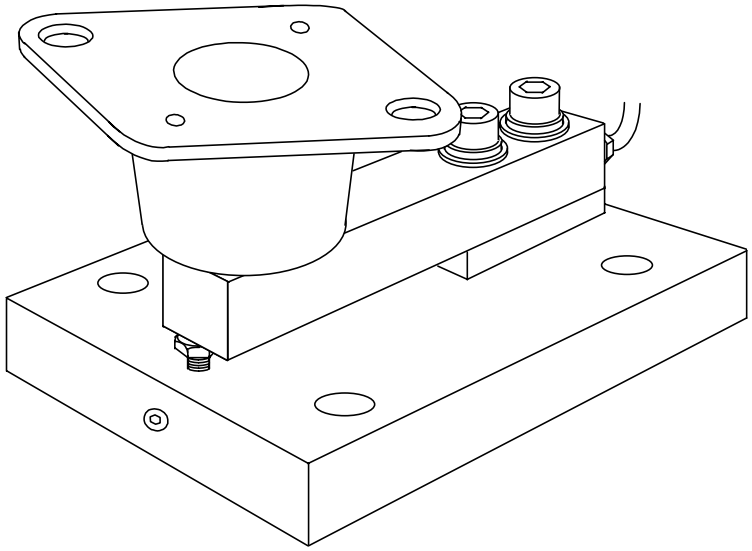


Figure 1-1: Value Line Weigh Module (500-lb capacity)

Model Numbers

The model numbers used for Value Line weigh modules indicate the material they are made of, the number of weigh modules (load cells), and the capacity of the load cells. Use Table 1-1 to determine the correct model number to order for an application.

Value Line Model Numbering Scheme			
XXXX	**X**	**X**	**XX**
Model	**Material**	**No. of Load Cells**	**Capacity**
VLM2	C = Carbon Steel	1 to 8	02 = 250 lb 05 = 500 lb 10 = 1,000 lb 20 = 2,000 lb 25 = 2,500 lb

Table 1-1: Value Line Model Numbering Scheme

For example, Model VLM2C410 is a set of four 1,000-lb carbon steel Value Line weigh modules.

Load Cell Specifications

Model Number: 713
Capacities: 250, 500, 1,000, 2,000, 2,500 lb
Rated Output: 3 mV/V
Excitation Voltage: 15 VDC maximum
Sealing: Environmentally protected (potted)
Material: 17-4 PH stainless steel
Cable Length: 20 feet (6.1 meters) long, four-conductor cables
Input Terminal Resistance: 350 ohms
Output Terminal Resistance: 350 ± 3 ohms
Temperature Range (compensated): -10ºC to +40ºC
Safe Overload: 150% RC
Safe Side Overload: 150% RC
Combined Error (linearity and hysteresis): 0.04% RC
Nonrepeatability: 0.01% RC
Creep in 20 minutes: 0.03% RC
Zero Balance: 2.0% RC

Approvals

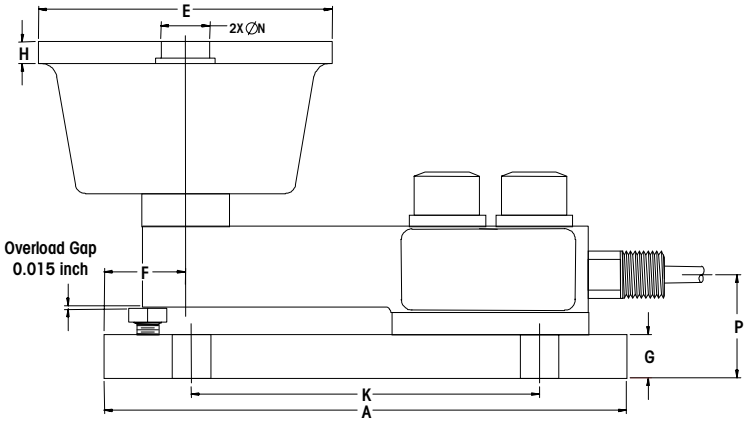
NTEP Certification

NIST H-44 Class III 5,000d multiple cell (except 250 lb).

Hazardous Area Approval

VLM2 weigh modules are FM approved for hazardous areas.

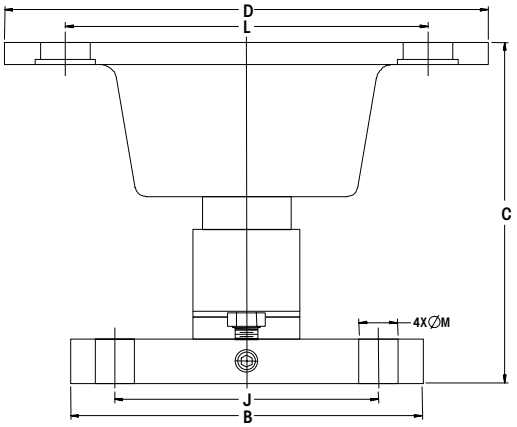
Dimensions



Side View of Weigh Module

Capacity (LB)	A	B	C	D	E	F	G
250	6.00 (152.4)	4.00 (101.6)	3.12 (79.2)	3.88 (98.6)	2.38 (60.5)	0.93 (23.6)	0.50 (12.7)
500	6.00 (152.4)	4.00 (101.6)	3.88 (98.6)	5.50 (139.7)	3.38 (85.9)	0.93 (23.6)	0.50 (12.7)
1,000	6.00 (152.4)	4.00 (101.6)	4.00 (101.6)	5.12 (130)	3.00 (76.2)	0.93 (23.6)	0.50 (12.7)
2,000 2,500	6.00 (152.4)	4.00 (101.6)	4.00 (101.6)	6.25 (158.8)	4.62 (117.3)	0.93 (23.6)	0.50 (12.7)

Note: Dimensions are given in inches and (mm).



End View of Weigh Module

Capacity (LB)	H	J	K	L	M Dia.	N Dia.	P
250	0.22 (5.6)	3.00 (76.2)	4.00 (101.6)	3.00 (76.2)	0.44 (11.2)	0.34 (8.6)	1.19 (30.2)
500	0.25 (6.4)	3.00 (76.2)	4.00 (101.6)	4.12 (104.6)	0.44 (11.2)	0.56 (14.2)	1.19 (30.2)
1,000	0.25 (6.4)	3.00 (76.2)	4.00 (101.6)	4.12 (104.6)	0.44 (11.2)	0.44 (11.2)	1.38 (35.1)
2,000 2,500	0.38 (9.7)	3.00 (76.2)	4.00 (101.6)	5.06 (128.6)	0.44 (11.2)	0.56 (14.2)	1.38 (35.1)

Note: Dimensions are given in inches and (mm).

2 Installation

General Installation Guidelines

Each application has its own unique requirements and should be planned by a qualified structural engineer. This manual is meant to serve only as a general guideline for installation.

Select an Appropriate Site

- The floor or other surface on which the weigh modules will be mounted must be able to support the weight of the scale at full capacity.
- There should be no strong vibrations or wind currents near the scale.

Use the Right Number of Weigh Modules

A typical system uses either three or four weigh modules. The exact number is usually determined by the structure that they will support. Each weigh module in a system should support the same amount of weight (within 20%). We do not recommend using more than eight weigh modules in a system. With more than eight modules, the structure's weight will not be distributed evenly at the support points.

Connect Piping Properly

Piping connected to a tank can affect weighing accuracy by exerting unwanted forces on the scale. Keep piping connections to a minimum and make sure they are flexible enough to allow the tank to deflect freely as weight is added.

Protect Load Cells from Damage

- Load cells can be damaged if too much weight is placed on them. To protect against damage, make sure that the overload stop bolt on each weigh module is properly adjusted.
- Do not pass welding current through the load cells.

Weigh Module Orientation

Before installing the weigh modules, decide how they will be arranged. Space the weigh modules evenly so that each one supports approximately the same amount of weight.

In most applications, three or four weigh modules are used to support the structure. Figure 2-1 shows recommended mounting arrangements.

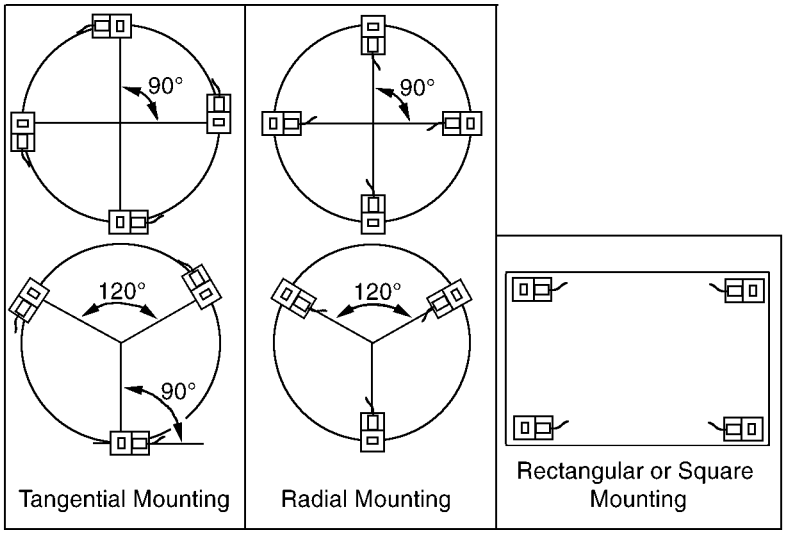


Figure 2-1: Plan View of Mounting Arrangements

Installation Procedure

The installation procedure will depend on the specific requirements of an application. One of the first things to consider is the foundation on which the scale will be placed. This is usually a concrete floor or steel beams. Whichever you are using, you will need to make sure that the foundation is level and strong enough to remain rigid under the weight of the full scale.

1. Position a weigh module under each of the structure's support points, and carefully lower the structure onto the weigh modules.
2. Make sure that each support point rests securely on a module's mounting pad and that all mounting pads are level. Otherwise, add shims until the mounting pads are level and there are no gaps between them and the support points.
3. Bolt the mounting pad of each weigh module to the support point of the structure that is resting on it.
4. Position the structure on the foundation (concrete slab or steel beam). Mark the position of each base plate's mounting holes on the foundation.
5. Raise the structure out of the way and drill the appropriate size holes in the foundation.
6. Reposition the structure, and anchor the base plates to the foundation. All base plates must be parallel to the upper mounting pads and level.

Electrical Wiring

Each load cell is supplied with a standard length of cable. Do not lengthen or shorten load cell cables in the field. Changing the length of a load cell cable will affect the output signal from the load cell. If a cable is too long, simply coil the excess cable and place it in or near the junction box.

1. Mount the junction box in a location where the load cell cables can be properly connected to the junction box. Do not mount the junction box on the scale.
2. Connect the load cell cables to the terminals inside the junction box according to the wiring code shown in Table 2-1.

Load Cell Wire Color	Function
Red	+ Excitation
Black	- Excitation
Green	+ Signal
White	- Signal
Yellow	Shield

Table 2-1: Load Cell Wiring Code

3. Form a drip loop in each cable so that water will not run down the cable onto the load cell or junction box.
4. Connect the home run cable from the junction box to the scale terminal.

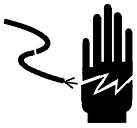
Calibration

Once the scale has been completely installed and wired, calibrate it according to the instructions in the manual for the scale terminal.

3 Troubleshooting

General

Scales should be inspected and recalibrated periodically by an authorized METTLER TOLEDO service representative. If a scale is not working properly, try to find out the source of the problem before replacing any load cells or other components.



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Check the Scale Terminal

Determine whether the problem is in the scale or the scale terminal.

1. Remove power from the system, and then disconnect the scale from the scale terminal.
2. Connect the scale terminal to a load cell simulator.
3. Reapply power and test the scale terminal. If the problem persists, its source is probably in the terminal. Consult the terminal's manual for further troubleshooting assistance.

Check the Wiring

1. Remove power from the system.
2. Check the load cell cables and home run cable for damage.
3. Open the junction box and check for moisture or foreign material inside the box.
4. Make sure that all wiring connections are tight and that no insulation material is touching the terminal contacts.
5. Make sure that all wires are connected to the correct terminals.

Check the Mechanical Components

1. Check for debris that could restrict the movement of the scale or load cells.
2. Make sure that each weigh module is able to move freely. Examine all piping and other dead-to-live connections for possible mechanical binding.
3. Check for any structural deflection that could cause mechanical binding.
4. Is the scale rocking or out of level? If so, it might need to be reshimmed.
5. Make sure all overload stop bolts are adjusted so that there is a 0.015-inch gap between the bolt and the load cell.

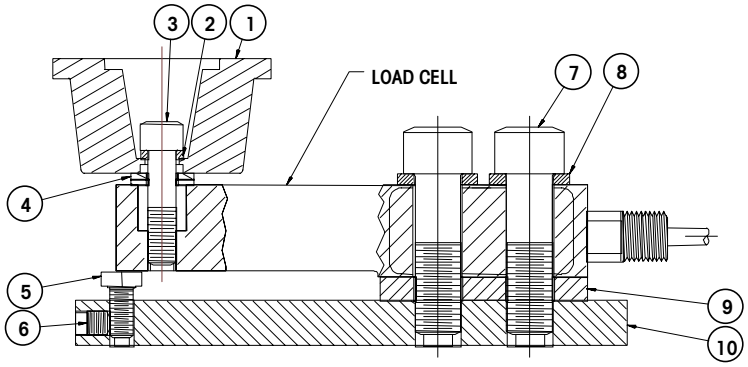
Check the Load Cells

1. Remove power from the system. Check each load cell for proper input/output resistances.
2. If resistance is within specification, perform a shorted-signal symmetry test.
   - Short the signal leads together and place one multimeter lead on the shorted signals and one lead on the +Excitation wire. Note the resistance value.
   - Remove the lead from the +Excitation wire and place it on the –Excitation wire. The two resistance values should be approximately equal.

3. If the load cells pass the shorted-signal test, reapply power to the scale. Confirm that the proper excitation voltage is reaching the load cells by placing multimeter leads on the excitation positions of each load cell terminal.
4. If proper excitation voltage is reaching the load cells, check the output signal from each cell. If one cell has a particularly high or low dead-load output, it is suspect. The maximum output possible from any cell is 45 mV at 15 VDC excitation and loaded to gross capacity.
5. If any load cell has an unusual signal, remove all load from that cell.
   - With the power on, measure the output from the suspect load cell. The no-load zero output should be ± 2% of the full scale output. For example, if the excitation voltage is 15 VDC, then the full scale output would be 45 mV and the no-load zero output should be within ± 0.9 mV.
6. If a load cell fails any of the above tests, replace it. Be sure to regap the overload stop bolt to 0.015 inch.

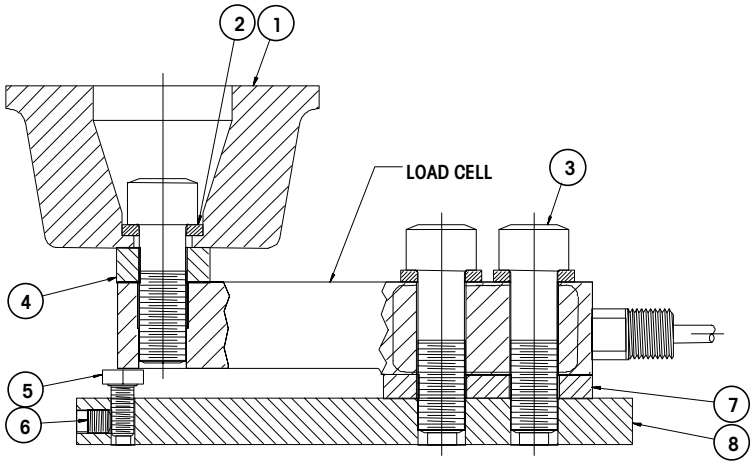
4 Value Line Parts

250-lb Weigh Module



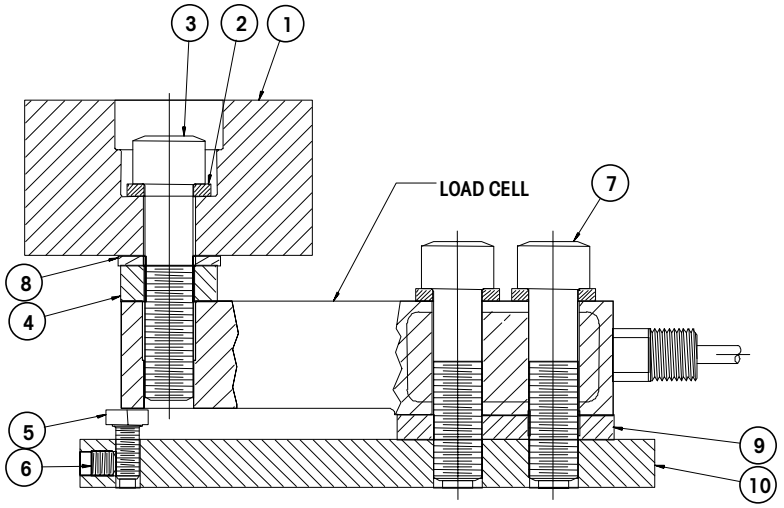
Ref. No.	Part Number	Description	Qty.
1	TN600834	Compression Mount, 250 lb	1
2	MZ0901030097	Lock Washer, 5/16 inch	1
3	MZ0901010526	Socket Head Cap Screw, 5/16-24	1
4	MZ0901030112	Plain Washer, 5/16 inch	2
5	MZ0901010518	Hex Head Cap Screw, 1/4-20	1
6	MZ0901010519	Set Screw, 1/4-20	1
7	MZ0901010520	Socket Head Cap Screw, 1/2-20	2
8	MZ0901030113	Lock Washer, 1/2 inch	2
9	TN600839-ZN	Load Cell Spacer, 1/4 inch	1
10	TN600838-ZN	Base Plate, 1/2 inch	1
*	TB600829	Load Cell, 250 lb	1

500-lb Weigh Module



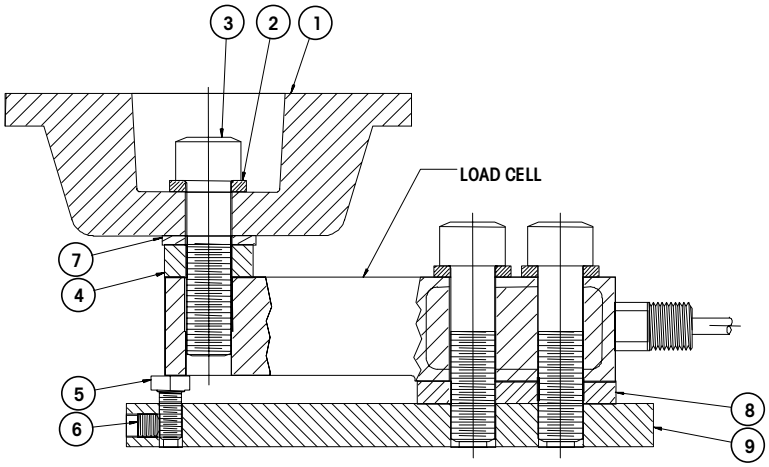
Ref. No.	Part Number	Description	Qty.
1	TA600835	Compression Mount, 500 lb	1
2	MZ0901030113	Lock Washer, 1/2 inch	3
3	MZ0901010520	Socket Head Cap Screw, 1/2-20	3
4	TN600840-ZN	Spacer, 3/8 inch	1
5	MZ0901010518	Hex Head Cap Screw, 1/4-20	1
6	MZ0901010519	Set Screw, 1/4-20	1
7	TN600839-ZN	Load Cell Spacer, 1/4 inch	1
8	TN600838-ZN	Base Plate, 1/2 inch	1
*	TB600830	Load Cell, 500 lb	1

1,000-lb
Weigh Module



Ref. No.	Part Number	Description	Qty.
1	TA600836	Compression Mount, 1,000 lb	1
2	MZ0901030113	Lock Washer, 1/2 inch	3
3	MZ0901010292	Socket Head Cap Screw, 1/2-20	1
4	TN600840-ZN	Spacer, 3/8 inch	1
5	MZ0901010518	Hex Head Cap Screw, 1/4-20	1
6	MZ0901010519	Set Screw, 1/4-20	1
7	MZ0901010523	Socket Head Cap Screw, 1/2-20	2
8	MZ0901030114	Plain Washer, 1/2 inch	1
9	TN600839-ZN	Load Cell Spacer, 1/4 inch	1
10	TN600838-ZN	Base Plate, 1/2 inch	1
*	TB600831	Load Cell, 1,000 lb	1

2,000-lb and 2,500-lb Weigh Modules



Ref. No.	Part Number	Description	Qty.
1	TA600837	Compression Mount, 2-2.5K lb	1
2	MZ0901030113	Lock Washer, 1/2 inch	3
3	MZ0901010523	Socket Head Cap Screw, 1/2-20	3
4	TN600840-ZN	Spacer, 3/8 inch	1
5	MZ0901010518	Hex Head Cap Screw, 1/4-20	1
6	MZ0901010519	Set Screw, 1/4-20	1
7	MZ0901030114	Plain Washer, 1/2 inch	1
8	TN600839-ZN	Load Cell Spacer, 1/4 inch	1
9	TN600838-ZN	Base Plate, 1/2 inch	1
*	TB600832 TB600833	Load Cell, 2,000 lb Load Cell, 2,500 lb	1

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240

P/N: 15751600A

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