

Shackle Pin LOAD*CELL™

LOAD SENSING

USER MANUAL

Shackle Pin
Load*Cell **3250 kg**
A-17-003-0006

Shackle Pin
Load*Cell **4750 kg**
A-17-003-0007



This load sensing device is intended for professional use only
Read this entire document before installing, operating or using
the load sensing device

■ ORIGINAL INSTRUCTIONS

Copyright 2017 © Motion Laboratories Inc.

All right reserved.

Part Number: 15MLI01-1 Rev H

Release: May 2017



Original Instructions
Shackle Load*Cells™
Rev H
Released 2017-05

The reproduction, transmission or use of this document, or its contents is not permitted unless authorized in writing.

Offenders will be liable for damages.

All rights including rights created by patent grant or registration of a utility model or design are reserved.

Other functions not described in this document may be available. However, this fact shall not constitute an obligation to supply such functions with a new product or when servicing.

We have checked that the contents of this document correspond to the device described.

There may be discrepancies nevertheless, and no guarantee can be given that they are completely identical.

The information contained in this document is reviewed regularly and any necessary changes will be included in the next edition.

We welcome suggestions for improvement.

Motion Laboratories Inc. intends this document, whether printed or electronic, to be provided in its entirety.



1.800.227.6784 FOR MORE INFORMATION
www.motionlabs.com

520 Furnace Dock Road . Cortlandt Manor, New York 10567 . Phone: (914)788-8877 Fax: (914)788-8877

Shackle Pin Load*Cells™ - User Manual

Page 2 of 20



■ USER DOCUMENTATION



WARNING

Before installing and using Shackle Pin Load*Cell™, you must read all safety instructions and warnings carefully including all the warning labels attached to the equipment. Make sure that the warning labels are kept in a legible condition and replace missing or damaged labels.

■ REGIONAL CONTACTS

Motion Laboratories Inc.

520 Furnace Dock Road,
Cortlandt Manor,
NY 10567
USA

Tel: 1.800.227.6784

Tel: +1 (914) 788-8877

Fax: +1 (914) 788-8866

www.motionlabs.com

Info@motionlabs.com

■ CENTRAL TECHNICAL SUPPORT

Motion Laboratories Inc.

520 Furnace Dock Road,
Cortlandt Manor,
NY 10567
USA

Tel: 800.227.6784

Tel: +1 (914) 788-8877

Fax: +1 (914) 788-8866

www.motionlabs.com

Info@motionlabs.com

■ USE FOR INTENDED PURPOSE ONLY

The equipment may be used only for the application stated in the manual and only in conjunction with devices and components recommended and authorized by Motion Laboratories Inc.

■ IDENTIFICATION

This user manual pertains to the following Shackle Load*Cells™ models:

Shackle Pin Load*Cell 3250 kg - code A-17-003-0006

Shackle Pin Load*Cell 4750 kg - code A-17-003-0007



1.800.227.6784

FOR MORE INFORMATION
www.motionlabs.com

520 Furnace Dock Road . Cortlandt Manor, New York 10567 . Phone: (914)788-8877 Fax: (914)788-8866

TABLE OF CONTENTS



FOREWORD	3
<i>USER DOCUMENTATION</i>	3
<i>REGIONAL CONTACTS</i>	3
<i>CENTRAL TECHNICAL SUPPORT</i>	3
<i>USE FOR INTENDED PURPOSE ONLY</i>	3
<i>IDENTIFICATION</i>	3
TABLE OF CONTENTS	4
WARNINGS	5
<i>SYMBOLS</i>	5
<i>DON'Ts</i>	5
SAFETY INSTRUCTIONS	6
<i>GENERAL SAFETY INFORMATION</i>	6
<i>SELECTION CRITERIA</i>	6
<i>NONPERMISSIBLE CONDITIONS</i>	6
<i>SHACKLE's ORIENTATION</i>	7
<i>TO DISASSEMBLE A SHACKLE PIN LOAD CELL</i>	8
<i>TO ASSEMBLE A SHACKLE PIN LOAD CELL</i>	9
<i>GLOSSARY</i>	11
OVERVIEW	12
<i>PRODUCT DEFINITION</i>	12
<i>MEASUREMENTS</i>	13
TECHNICAL INFORMATION	14
<i>LOAD CAPACITY</i>	14
<i>ELECTRICAL SPECIFICATIONS</i>	14
<i>PHYSICAL SPECIFICATIONS</i>	14
<i>DATA SPECIFICATIONS</i>	14
<i>ENVIRONMENTAL</i>	14
INSTALLATION	15
<i>PRELIMINARY INSPECTIONS</i>	15
<i>CALIBRATION LABEL</i>	15
<i>USE INSTRUCTIONS</i>	15
LOAD*CELL SYSTEM.....	16
<i>LOAD*CELL</i>	16
<i>CELL*MATE</i>	16
<i>THE WARDEN</i>	16
<i>LOAD CELL DATA LOGGER</i>	16
MAINTENANCE AND INSPECTIONS.....	17
<i>INSPECTIONS</i>	17
SPARE PARTS AND DISPOSAL	18
<i>SPARE PARTS</i>	18
<i>DISPOSAL</i>	18
<i>NOTES</i>	18
DECLARATION OF CONFORMITY.....	19



1.800.227.6784

FOR MORE INFORMATION
www.motionlabs.com

520 Furnace Dock Road . Cortlandt Manor, New York 10567 . Phone: (914)788-8877 Fax: (914)788-88

Shackle Pin Load*Cells™ - User Manual - Table of contents

Page 4 of 20



■ SYMBOLS



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Used with the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Used without safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

■ DON'Ts

Do NOT allow lifting operations unless carried out by a competent person.

Do NOT exceed the Shackle Pin Load*Cell™ WLL.

Do NOT replace shackle pin with other than original equipment.

Do NOT shock load.

Do NOT side load – center line of load must coincide with the center line of the shackle. Shackles are designed and rated for in-line applied tension.

You can attach multiple slings in the body of a shackle without reducing the capacity provided that the shackle is symmetrically loaded and the included angle does not exceed 120 degrees.

Do NOT connect the Shackle Pin Load*Cell™ to any apparatus which does not match its specifications in terms of size, temperature, hook-up point and shape.

Do NOT lift the load while subjecting the accessory to impulsive strain.

Do NOT let the load swing while handling it.

Do NOT use Shackle Pin Load*Cell™ to pull restrained loads.

Do NOT stretch any Shackle Pin Load*Cell™ that may change its chemical and physical state.

Do NOT use Shackle Pin Load*Cell™ in areas where any explosion/spark-proof parts are required or in the presence of strong magnetic fields.

Do NOT weld any metal parts to the accessory; do not use any filling welds; do not use the accessory as mass for any welder.

Do NOT use any spare parts other than those supplied or authorized by Motion Laboratories Inc.

Do NOT attempt to modify or repair Shackle Pin Load*Cell™ unless authorized by Motion Laboratories Inc.

Do NOT use Shackle Pin Load*Cell™ to suspend people or performers unless WLL is derated accordingly.



■ GENERAL SAFETY INFORMATION

The manual must be kept by a person in charge in a suitable place and readily available for consultation, in optimal conditions. Should it be lost or damaged, the manual can easily be retrieved on the manufacturer's web site: www.motionlabs.com

The manufacturer retains all material and intellectual rights on the manual, and restricts its duplication, even partial, for any commercial use.



CAUTION

The marking data should not be removed by grinding or abrasion (whether accidental or not – any shackles that do not carry any identification references should be made unusable and scrapped).

■ SELECTION CRITERIA

Connecting parts

Make sure that the connecting part suits the load capacity of the shackle, is thick enough, has an adequate mechanical resistance to traction forces or it is a CE marked lifting accessory.

Operating temperatures

The permissible operating temperature should range between 0° C and +55° C.

Shackle Pin Load*Cell™ performance will not be guaranteed outside this range.



DANGER

The weight of the load to lift should be lower than or equal to the working load limit (WLL) recommended for the Shackle Pin Load*Cell™ being considered.

■ NONPERMISSIBLE CONDITIONS

The following loads should not be handled:

- any load exceeding the working load limit in weight;
- any load whose frame/structure is not resistant enough to traction forces;
- any load whose temperature does not lie within the permissible range;
- any load classified as hazardous (e.g. melted metal, flammable, corrosive, fissile, explosive materials etc.);
- any load that may change its chemical and physical state;
- any load immersed in acid solutions or exposed to acid vapours.

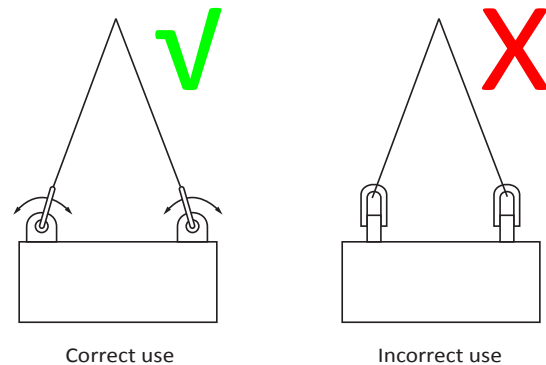


Figure 0 – Correct and incorrect use of shackles



CAUTION

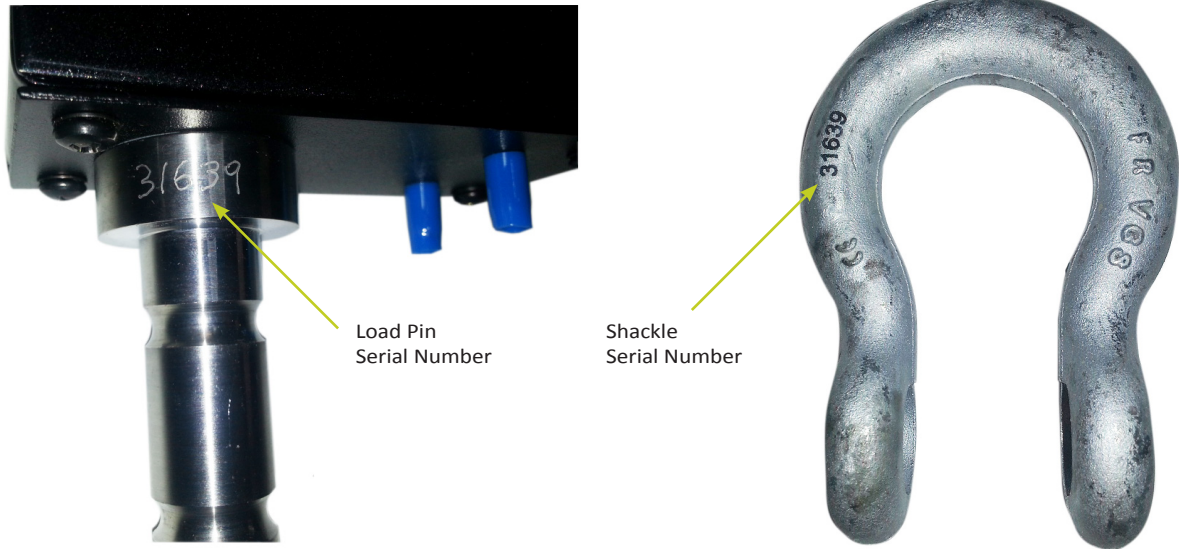
Improper use or care of shackles can result in bodily injury or property damage. Always observe the following guidelines when using Shackle Pin Load*Cell™.



■ SHACKLE'S ORIENTATION

Shackle pin load cells are comprised of a mated combination of shackle and load pin that must remain paired and in the proper orientation when assembled.

Each load pin and shackle are engraved with matching serial numbers to assist in identification. The position of the serial number on the shackle also serves to indicate the installed position.



CAUTION

Never mix shackles and load pins that do not have matching serial numbers.

During manufacturing a shackle pin load cell is calibrated with a specific orientation. The picture below shows a properly assembled shackle pin load cell with the electronics enclosure on the right and the shackle serial number facing you on the outside from the electronics enclosure. Failure to assemble the load cell with the shackle correctly oriented as in the picture may affect accuracy.





■ TO DISASSEMBLE A SHACKLE PIN LOAD CELL

- Remove retaining clip by pulling it by the ring.
- Remove retaining nut by turning counter clockwise. It should be relatively loose and you should be able to remove it with just your fingers without any tools.
- Slide shackle and bobbin off the pin.

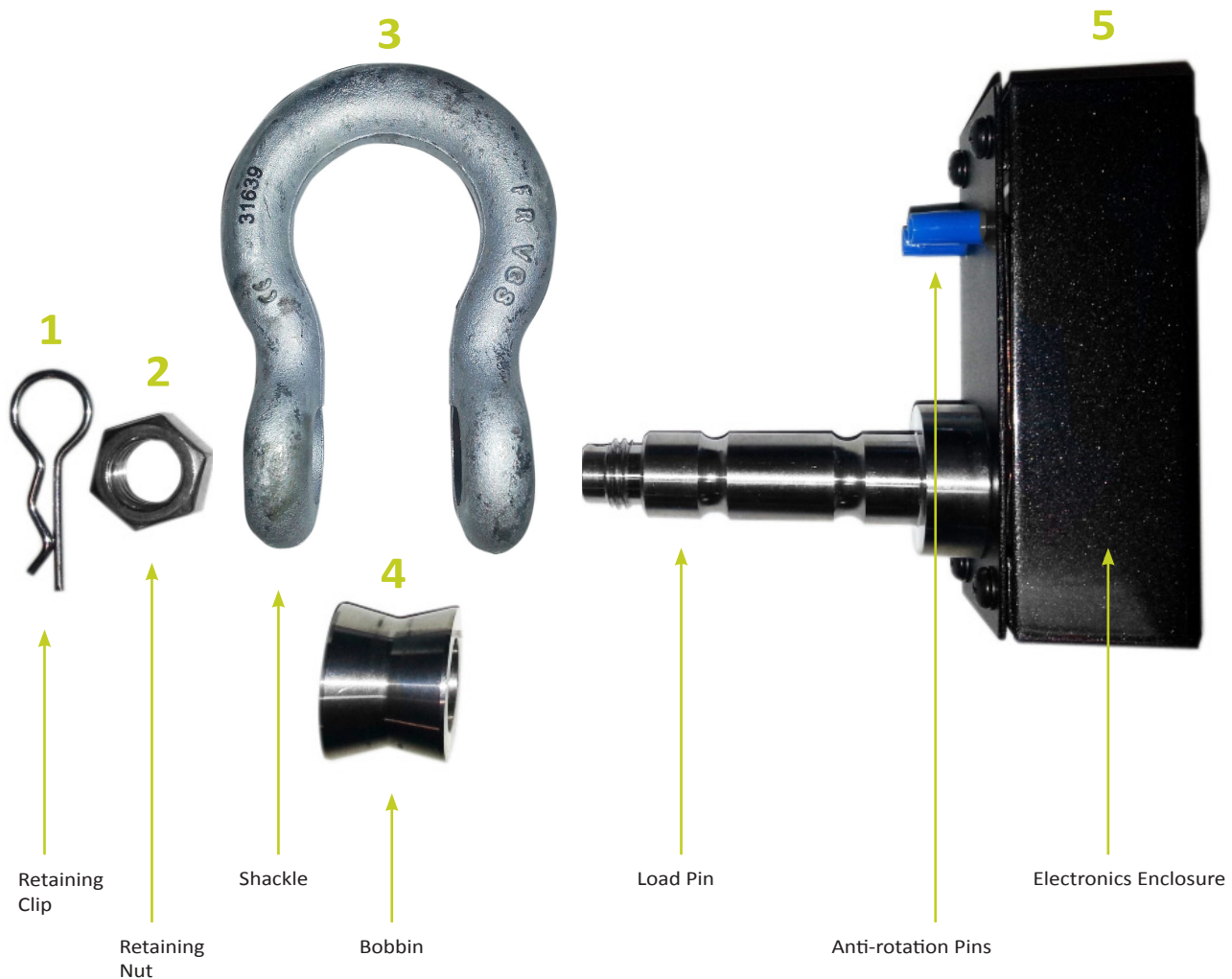


CAUTION

Be aware bobbin may fall once it is clear of the load pin.

The Shackle pin load cell disassembles into 5 parts.

1. Retaining clip
2. Retaining nut
3. Shackle
4. Bobbin
5. Load pin with electronics enclosure





■ TO ASSEMBLE A SHACKLE PIN LOAD CELL

- Hold bobbin centered in the shackle.
- Noting orientation of serial number, insert shackle pin through shackle and bobbin. The bow of the shackle must rest between the anti-rotation pins on the electronics enclosure.

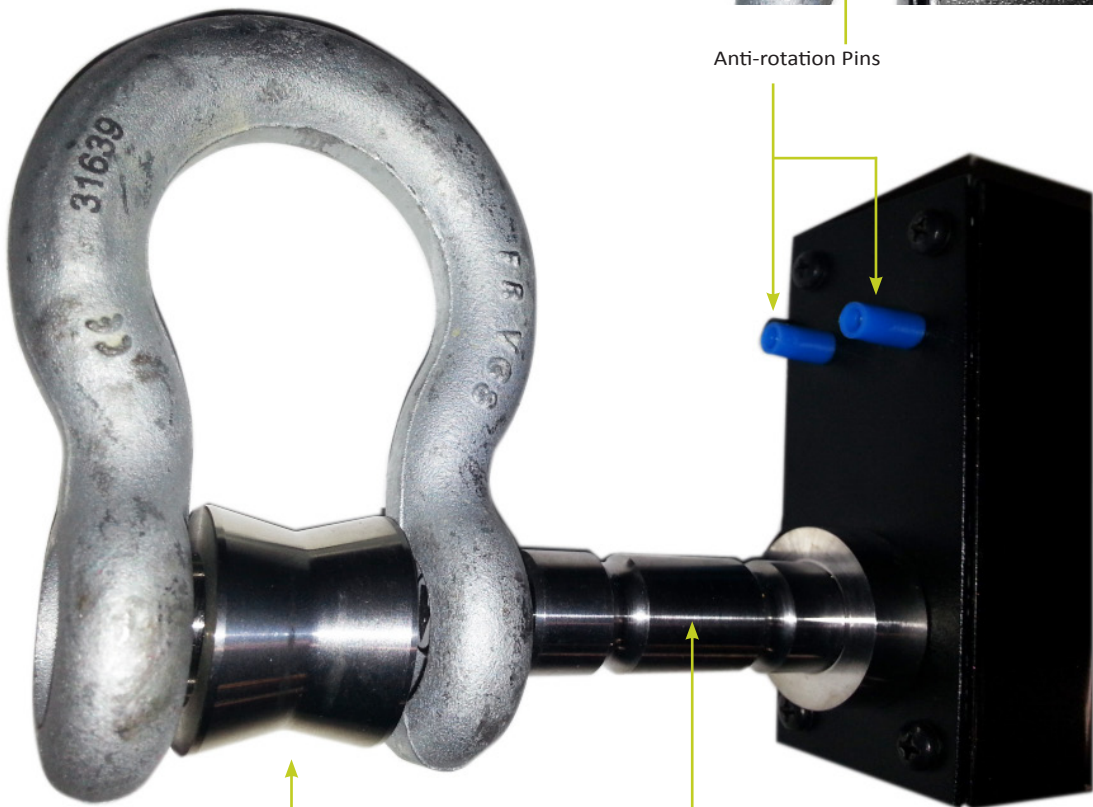


DANGER

The bow of the shackle must rest between the anti-rotation pins on the electronics enclosure.



Anti-rotation Pins



Noting orientation of serial number, insert shackle pin through shackle and bobbin. The bow of the shackle must rest between the anti-rotation pins on the electronics enclosure

Hold bobbin centered in the shackle





- Thread retaining nut on the end of the shackle pin.
- The nut should loosely contact the end of the shackle. Overtightening will apply force longitudinally on the pin affecting accuracy.



DANGER

The nut should be turned clockwise with fingers only, never with tools.

- Insert retaining clip as shown. The retaining clip prevents the retaining nut from coming off.



CAUTION

Load pin direction Arrow must be point in direction force will be applied to load pin

Load Pin Direction Arrow





Side Loading

When side loading a shackle with a single sling, the rated WLL will be reduced in accordance with the manufacturer's recommendation.

WLL reduction	
0° to 10°	0%
11° to 20°	15%
21° to 30°	25%
31° to 45°	30%
46° to 55°	40%
56° to 70°	45%
71° to 90°	50%

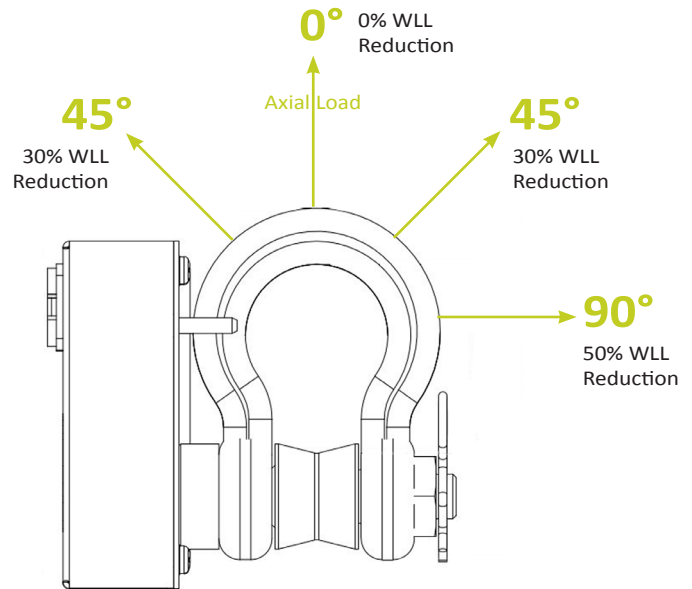


Figure 1 — Shackle side loading

■ GLOSSARY

- **Accurate examination** - visual inspection performed by a trained competent person, supported, if need be, by any other instruments, including non-destructive testing, to check for damage or wear which may affect the use of the part
- **Axial load** - force in line with axis.
- **Characteristic load** - load to be considered by the manufacturer when designing a load bearing element for normal use. Characteristic load is the sum of the system load and the dynamic forces occurring during operation.
- **Competent Person** - Person who has such practical and theoretical knowledge and such experience as is necessary to carry out the work and is aware of the limits of his/her own competence, expertise and knowledge.
- **Inspection** - visual testing of the state of the shackle, to check for clear damage or wear which may affect its use.
- **Load capacity** - amount of force sustainable by design.
- **Load bearing element** - element between the load and the point of attachment, within the machinery installation.
- **Safe Working Load (SWL)** - useful load which is borne by the load carrying or securing device, or directly by the load bearing equipment.
- **Test Load** - load used when testing a lifting device, load bearing equipment, or load carrying or securing devices.
- **Working Load Limit (WLL)** - maximum permitted mass that equipment is designed to lift, as specified by the equipment manufacturer.





■ PRODUCT DEFINITION

The Motion Laboratories Shackle Pin Load*Cell™ is the primary load bearing component of the Motion Laboratories V3 Cell*Mate System. The Shackle Load*Cell™ is working in unison with the Cell*Mate Hub and Cell*Mate Touch Screen Display to monitor both dynamic and static loads. Shackle Pin Load*Cell™ is part of the A-17-003 Series.

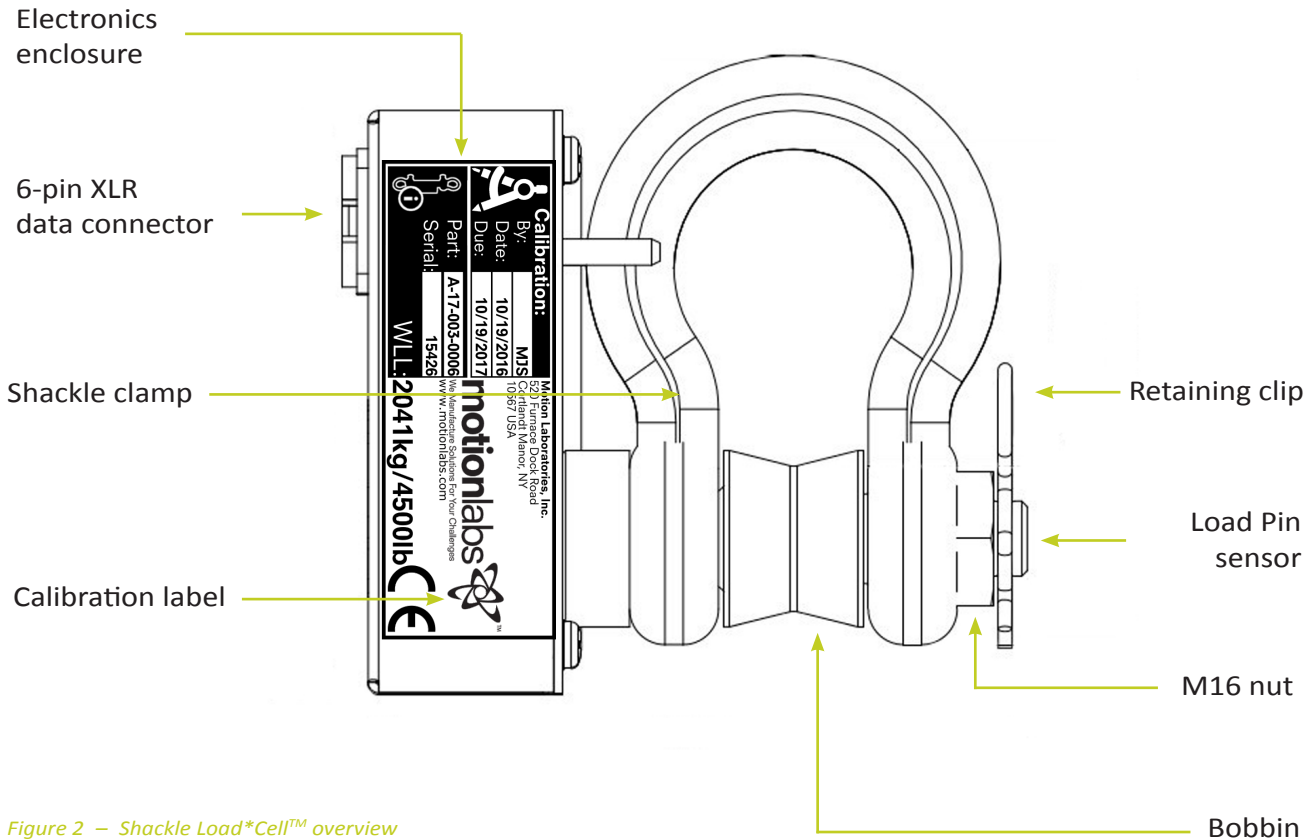
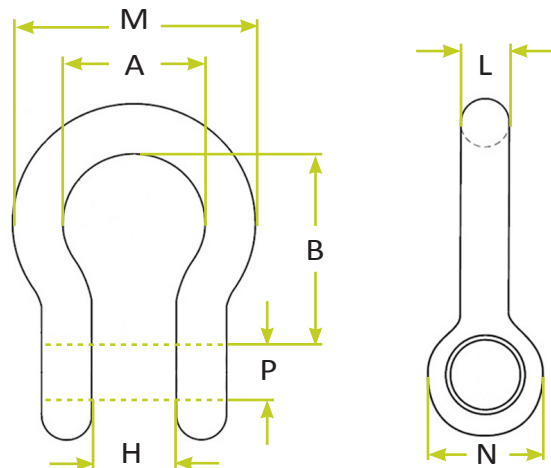


Figure 2 – Shackle Load*Cell™ overview

TABLE A - SHACKLE DIMENSIONS

5/8 in - 3.25t shackle 3/4 in - 4.75t shackle
Shackle Load*Cell 3250 kg Shackle Load*Cell 4750 kg

A	42.90 mm	1.69 in	51.00 mm	2.01 in
B	61.38 mm	2.42 in	66.30 mm	2.61 in
H	27.00 mm	1.07 in	31.80 mm	1.26 in
L	16.00 mm	0.63 in	19.01 mm	0.76 in
M	74.50 mm	2.94 in	89.00 mm	3.51 in
N	38.10 mm	1.50 in	46.00 mm	1.82 in
P	19.10 mm	0.76 in	22.40 mm	0.89 in



■ MEASUREMENTS

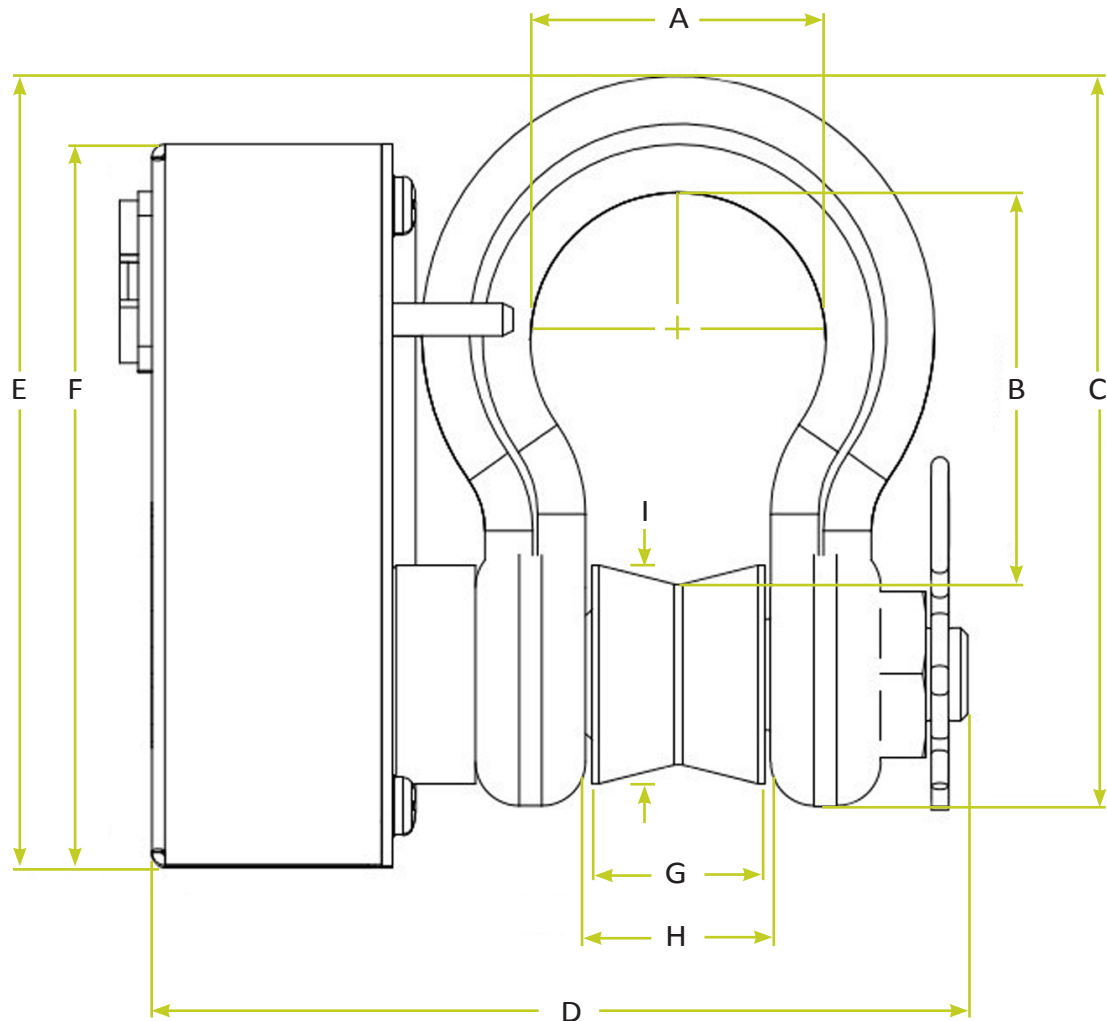


Figure 3 – Front view

TABLE B Shackle Pin Load*Cell 3250 kg
code A-17-003-0006

Shackle Pin Load*Cell 4750 kg
code A-17-003-0007

A	42.90 mm	1.69 in	51.00 mm	2.01 in
B	61.38 mm	2.42 in	66.30 mm	2.61 in
C	105.95 mm	4.17 in	126.00 mm	4.96 in
D	127.69 mm	4.66 in	130.05 mm	5.12 in
E	124.13 mm	4.53 in	130.81 mm	5.15 in
F	117.58 mm	4.14 in	108.77 mm	4.12 in
G	25.00 mm	0.99 in	30.00 mm	1.99 in
H	27.00 mm	1.07 in	31.80 mm	1.26 in
I	31.70 mm	1.25 in	38.00 mm	1.50 in



■ LOAD CAPACITY

Shackle Pin Load*Cell 3250 kg	3,250 kg (7,165 lbs) as per EN 13889
Shackle Pin Load*Cell 4750 kg	4,750 kg (10,472 lbs) as per EN 13889

■ ELECTRICAL SPECIFICATIONS

Power supply voltage - min	8 VDC
Power supply voltage - typical	12 VDC
Power supply voltage - max	12 VDC
Rated output Shackle Pin Load*Cell 3,250 kg	2.2 mV/V
Rated output Shackle Pin Load*Cell 4,750 kg	2.2 mV/V
Strain Gauge Excitation System:	4 Wire
Strain Gauge Drive Capability:	1000 Ohms
Insulation resistance:	>500 MOhms @ 500 VDC
Recommended excitation voltage:	5 V
Maximum excitation voltage:	5 V
Temperature effect on zero:	<±0.050% of Rated Load / °C
Maximum cable length	304 m (1,000 ft)
Cable specifications	22AWG 3 Tw Pair Shielded
Output connector	6-pin XLR

■ PHYSICAL SPECIFICATIONS

Load sensor material	17-4PH Stainless Steel
Shackle type	Crosby G2130 3.25Te and 4.75Te
Shackle Pin Load*Cell 3,250 kg - weight	0.95 kg (2.1 lbs)
Shackle Pin Load*Cell 4,750 kg - weight	1.45 kg (3.2 lbs)

■ DATA SPECIFICATIONS

Data communication protocol	RS485
Transmission increment	0.45 kg (1 lb)
Reading capacity	1,200 times per second
Measuring accuracy	2%

■ ENVIRONMENTAL

IP rating	IP40
Operating temperature range	0°C to 55°C



■ PRELIMINARY INSPECTIONS

Before Shackle Pin Load*Cell™ are operated and/or assembled, it should be tested by a suitably competent person.

- Check the state of the device; in particular make sure that it is free from cuts, bends, indentations, abrasions, cracks, irregular threads, corrosions, sharp burrs, wear or defects resulting from improper storage.
- Check the state of all part markings such as the bow and the load pin to ensure that the serial numbers match; in particular make sure that the capacity and material degree requirements are met so that the accessory can be accurately identified according to the working load.
- Make sure that the clamp and pin and the threads fit.
- Make sure connectors and cables are not damaged.

■ CALIBRATION LABEL

Each Shackle Pin Load*Cell™ is calibrated and thoroughly tested by Motion Laboratories Inc. before it leaves the facility. Calibration dates are documented on each Load*Cell.

It is mandatory to schedule the annual re-calibration with Motion Laboratories Inc. or other authorized persons, for all Shackle Pin Load*Cell™.

Check the Calibration label and ensure that dates are valid.

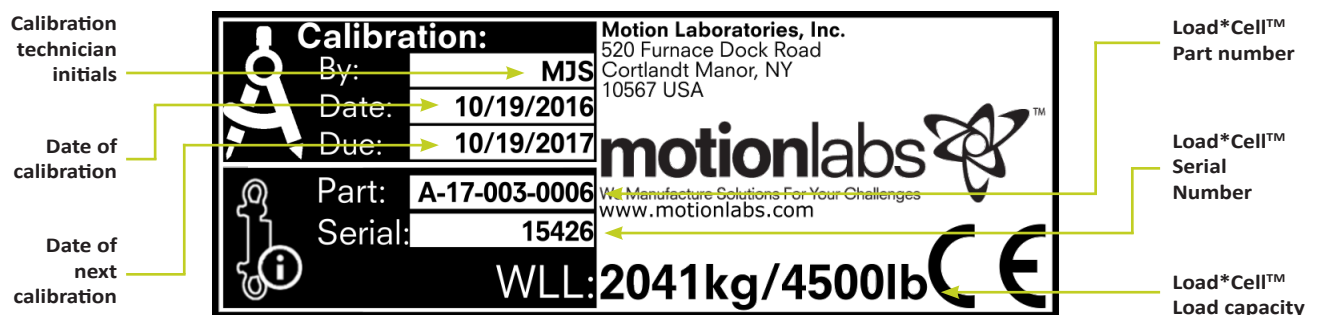


Figure 4 – Calibration label

■ USE INSTRUCTIONS

- Disassemble the shackle pin load cell as instructed on page 8 and connect the shackle to the part to be lifted.
- Reassemble shackle pin load cell as instructed on page 9-10.



WARNING

The nut that holds the bow and load pin together should always be fully engaged but finger tight and secured with the retaining clip.

- Apply the load only to the curved part of the shackle, possibly avoiding side loading.
- Connect the extension 6-pin XLR female connector to the 6-pin XLR Shackle Pin Load*Cell™ male panel connector.
- Connect the extension 6-pin XLR male connector to a Motion Laboratories Inc. reading device. (further instructions available in: www.motionlabs.com)



1.800.227.6784 FOR MORE INFORMATION
www.motionlabs.com

520 Furnace Dock Road, Cortlandt Manor, New York 10567, Phone: (914)788-8877 Fax: (914)788-8866



■ LOAD*CELL

The Shackle Pin Load*Cell™ is the primary component in the Motion Laboratories manufactured weight monitoring systems.

Each Load*Cell™ transmits inline force measurements to the weight monitoring systems via a 6 Pin XLR cable.

The Shackle Pin Load*Cell™ works with the following weight monitoring systems:



CAUTION

Access to Shackle Pin Load*Cell™ settings and advanced settings can be done only by using one of Motion Laboratories manufactured weight monitoring systems. Do not connect Load*Cell™ to other control apparatus.

■ CELL*MATE

The Cell*Mate is an 8-channel weight measurement system utilizing Load*Cells™ that measure in-line force. A complete system consists of 8 individual Load*Cells™, a Cell*Mate Hub and a Cell*Mate Display unit. Multiple display units may be used in an 8-channel system.

The Cell*Mate Digital Display shall be universal to all V3 system components.

The Cell*Mate Digital Display shall have five LCD displays, The last display on the right is a touch screen device for menu control

The Cell*Mate Digital Display shall display weight in pounds or kilograms.

The Cell*Mate Digital Display shall display weight in one pound increments.

The Cell*Mate Digital Display shall have user selectable Load*Cell LCD numbering for flexibility with larger systems.

The Cell*Mate Digital Display shall have user selectable Upper and Lower Limits.

The Cell*Mate Digital Display shall have user selectable Tare settings.

The Cell*Mate Digital Display shall have a Peak Hold function, that allows the user to view Peak weight measurements on all channels.

■ THE WARDEN

The Motion Labs Warden Control™ was designed to bring a level of load cell integration into the control circuit for electric chain hoist control systems.

By monitoring each load cell independently and linking that data to the run command for that channel of hoist controller, you can effectively control each hoist based on weight limits entered into the system.

This can be expanded upon to shut down the entire controller and alert you to the overweight or underweight condition.

■ LOAD CELL DATA LOGGER

The Motion Labs Load*Cell™ Data Logger is a hardware/software package that is designed to display and record data from any Cell*Mate™ load cell system.

The hardware portion of the system is a 19" rack mount 2RU device that receives data from any Cell*Mate™ hub or display.

This device communicates to a PC through an Ethernet IP protocol.

Connection can be to any a network via an Ethernet connection or a Motion Labs wireless bridge access point.



■ INSPECTIONS

Inspections and maintenance jobs should be carried out by competent personnel, who should perform accurate tests during operation.

Aside from annual re-calibration and general safe handling techniques, shackle Pin Load*Cells™ require very little maintenance.

Below is a list of tests to perform at such intervals as stated in **Table C**, Maintenance tasks and inspections.

Defects have to be reported immediately to the manufacturer and no repairs can be carried out unless authorized in writing by the manufacturer.

- **VISUAL TEST:** making sure that the accessory is free from surface defects, including cracks, indentations, cuts, fissures and abrasions.
- **THREAD TEST:** making sure that the thread is free from wear, deformation and dents, that its fit is accurate and stable, and that there is not too much clearance.
- **DEFORMATION TEST:** making sure that the accessory has not been deformed, using a gauge to measure such critical dimensions as shown in **Table A**. NO DEFORMATIONS will be tolerated compared to the measurements made when the accessory was first put into operation.
- **WEAR TEST:** making sure that the points of contact are not worn, using a gauge to measure such critical dimensions as shown in **Table A**.
- **PRESERVATION TEST:** making sure that the device is free from oxidation and corrosion, especially in case of outdoor use; using suitable methods (e.g. liquid penetrants) to make sure that it is free from cracks.

The results of the above-mentioned tests should be recorded.



WARNING

If the Shackle Pin Load*Cell™ has been used for heavy-duty jobs, both wear and the state of preservation should be tested for more frequently.

TABLE C

MAINTENANCE TASKS AND INSPECTIONS			
TYPE OF INSPECTION	prior to use	every month	every year
General visual inspection	✓		
Load Pin state	✓		
Deformation	✓		
Wear		✓	
Enclosure and connector state	✓		
Re-calibration			✓



In case of necessity, please contact:

www.motionlabs.com | Info@motionlabs.com

With regard to metal elements and components, all materials shall be separated by type such as ferrous materials or aluminum and shipped for recycling.



EC DECLARATION OF CONFORMITY

We Motion Laboratories Inc.

520 Furnace Dock Road, Cortlandt Manor, NY 10567, USA

Hereby declare under sole responsibility that the following lifting equipment:

Product name: **Applicable Product(s) name**
Model: **Applicable Model(s)**
Manufacturing date:
Serial Number:

Complies with the essential Health & Safety requirements as applied to it:

EC Machinery Directive 2006/42/EC,

Applied harmonized standards (parts/clauses thereof), in particular:

EN ISO 12100:2010 Safety of machinery - General principle for design - Risk Assessment and risk reduction

EN 13889:2003+A1:2008 Forged steel shackles for general lifting purposes. Dee shackles and bow shackles. Grade 6. Safety

Applied national and international standards and technical specifications (or parts/clauses thereof), in particular:

DIN 56950-1:2012 Entertainment technology - Machinery installations - Part 1: Safety requirements and inspection.

CWA 15902-1:2008 Lifting and load-bearing equipment for stages and other production areas with in the entertainment industry - Part 1: General requirements (excluding aluminum and steel trusses and towers).

As stipulated by Annex VII of the EC Machinery Directive:

CE symbols affixed to the lifting equipments

Technical documentation is held by Eurolink (Europe) Ltd.

Shrivenham, United Kingdom

Place of issue

5th May 2017

Date of issue

Eurolink (Europe) Ltd

Milestone House, Longcot Road - Shrivenham -
Oxon - SN6 8AL - UK

Name and address of authorised representative

Signature of authorised representative





Motion Laboratories Inc.

520 Furnace Dock Road,
Cortlandt Manor,
NY 10567
USA

Tel: 1.800.227.6784

Tel: +1 (914) 788-8877

Fax: +1 (914) 788-8866

www.motionlabs.com

Info@motionlabs.com

motionlabs
We Manufacture Solutions For Your Challenges

This load sensing device is intended for professional use only
Read this entire document before installing, operating or using
the load sensing device
ORIGINAL INSTRUCTIONS

Copyright 2017 © Motion Laboratories Inc.

All right reserved.

Part Number: 15MLI01-1 Rev H

Release: May 2017