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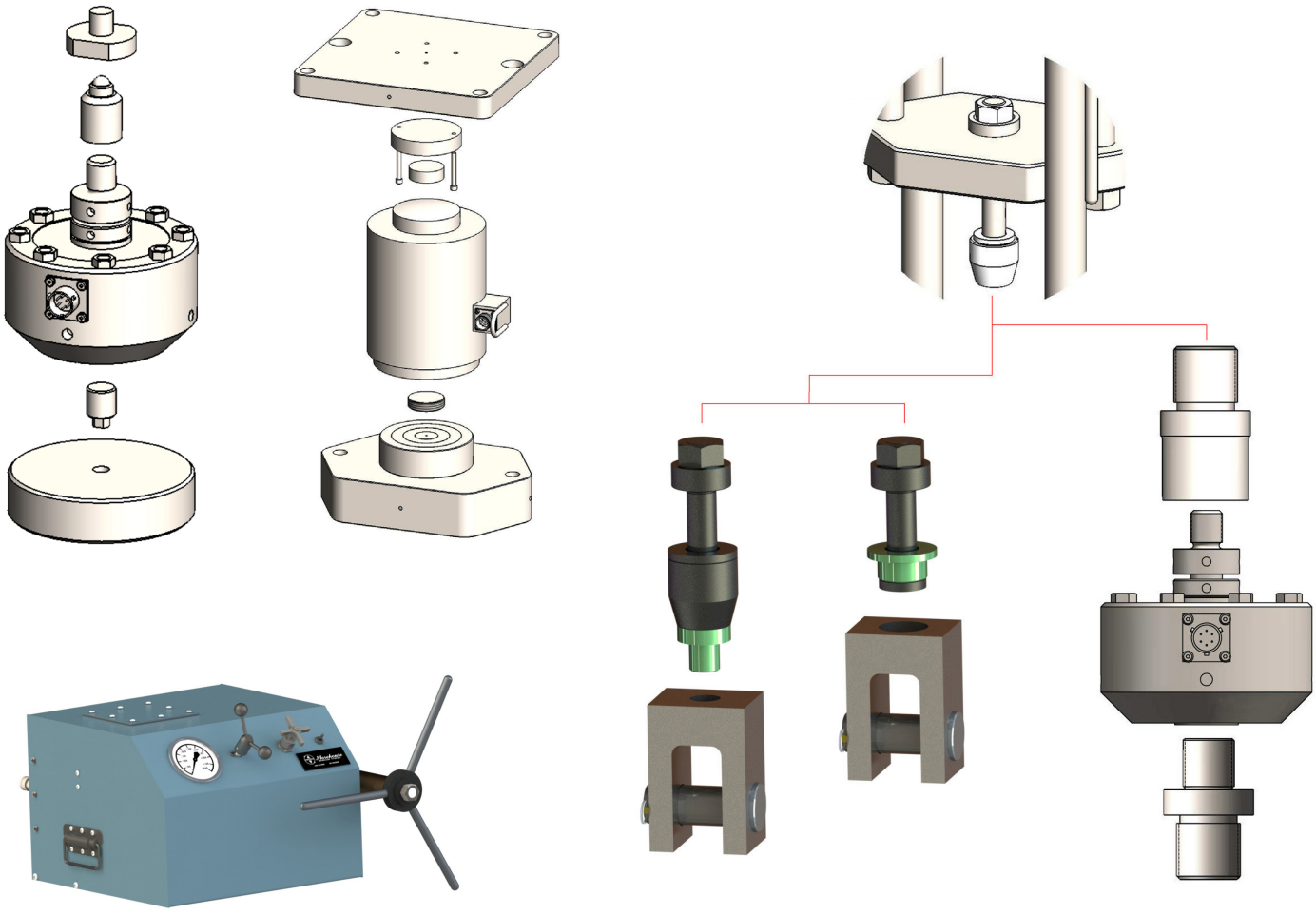
ISO/IEC 17025 / ANSI/NCSLI Z540.3 Accredited

Product Guide

Universal Calibrating Machine Adapters and Accessories



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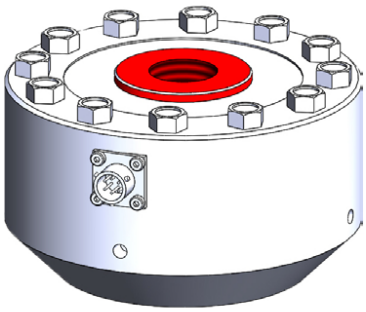
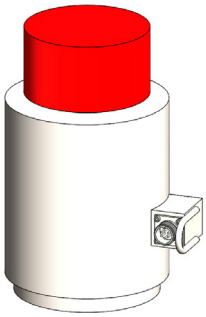
Adapters Deliver Better Calibration Results

Morehouse has created multiple adapters and accessories for the Universal Calibrating Machine to meet specific customer application requirements. These have been designed to provide proper loading, alignment, and measurement accuracy.

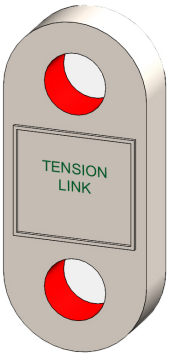
Sources of measurement error



Incorrect loading condition



Varying hardness and flatness of top block adapters



Improper pin size

The output of a force-measuring device can be significantly impacted by adapters, which poses serious safety concerns and can impact measurement uncertainty. Risk considerations include:

- Lifespan of old adapters
- Eccentric force and side loading
- Calibration setups that do not replicate the application
- Permanent material deformation
- Not using ISO 376 recommendations for tension loading
- Introducing unwanted bending or torsion

Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Force calibration can be complex because the mechanical interactions of not using the proper adapters can produce significant errors. We welcome the opportunity to help reduce these errors by answering your questions or concerns.

For more information read:
Recommended Compression and Tension Adapters for Force Calibration
Common Measurement Errors

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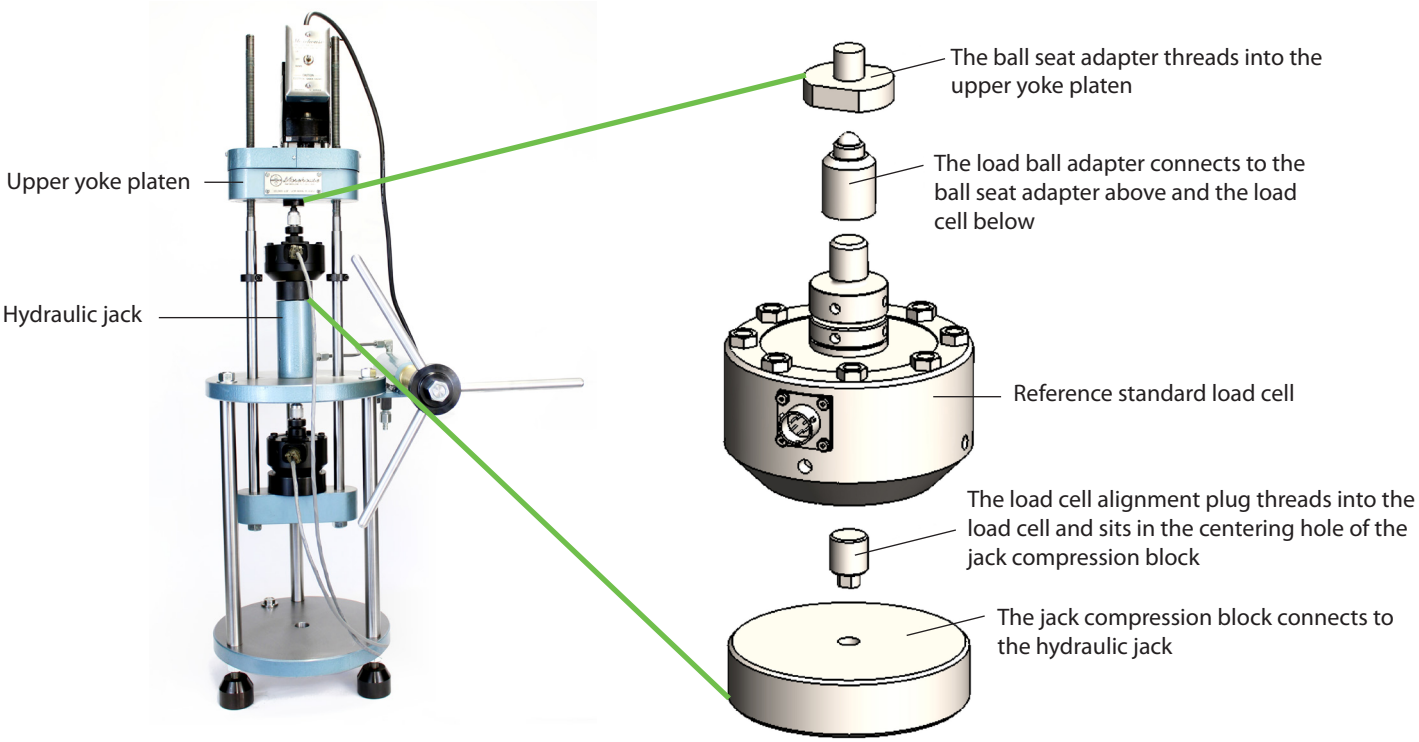
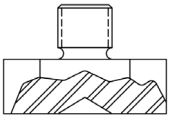
Reference Standard Mounting Example

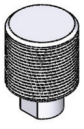
Morehouse has designed mounting kits with special adapters that align the reference standard on the center of the hydraulic jack ram and ensures balanced placement of the moveable yoke on the reference standard. This mounting kit provides uniform stress over the cross-section of the force instrument, improving accuracy and measurement uncertainty. The mounting kit is offered in two configurations for different capacities.



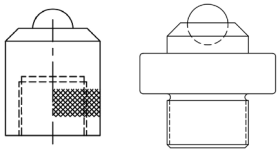
Mounting Kit for Capacities up to 150,000 lbf (700 kN)



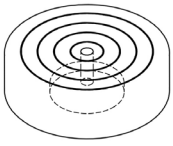
Ball seat adapter



Load cell alignment plug



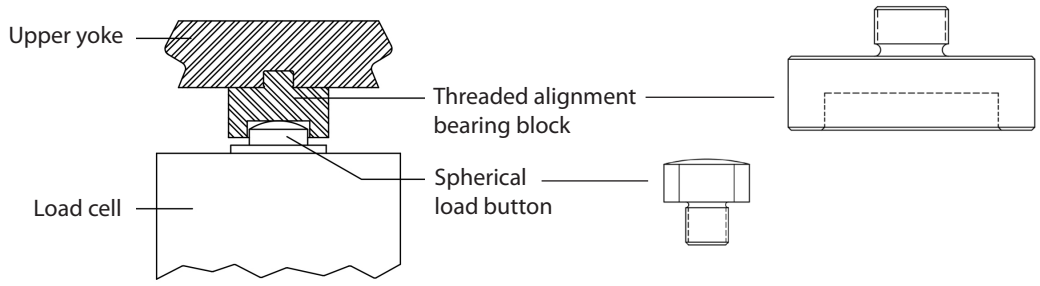
Load ball adapter



Jack Compression Block

Reference Standard Mounting Example (cont.)

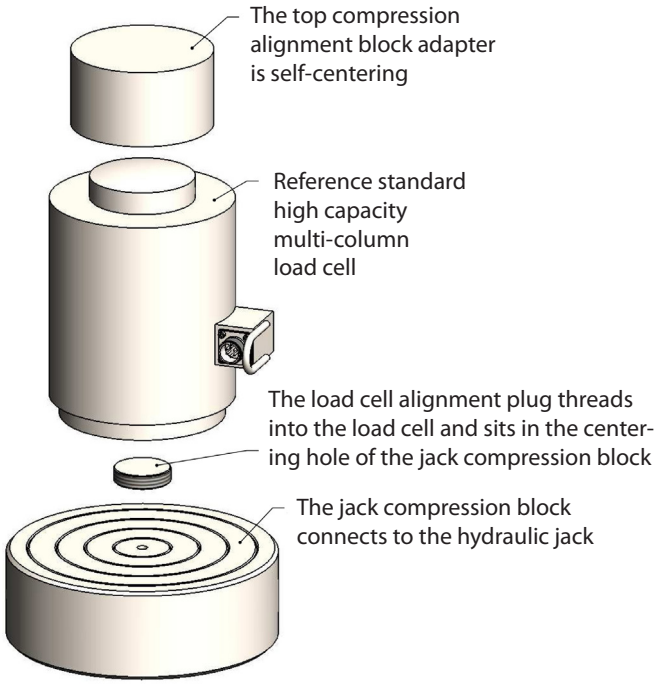
When a load ball can not be used, a sperical load button and threaded alignment bearing block are used to align the reference standard. If the load cell will be loaded through its body, then the spherical load button is fully screwed into the load cell so its shoulder is tight against the load cell body. If the load cell will be loaded through its threads, then the spherical load button is loosened one full turn so it does not touch the load cell body.



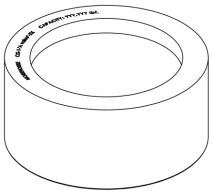
Setup with load button

Reference Standard Mounting Example (cont.)

For capacities 200,000 lbf (900 kN) and higher if the load cell will be loaded through its body, then the top block compression adapter and load cell alignment plug are screwed into the load cell so the shoulders are tight against the load cell body. If the load cell will be loaded through its threads, then the top block compression adapter and load cell alignment plug are loosened one full turn so they do not touch the load cell body.

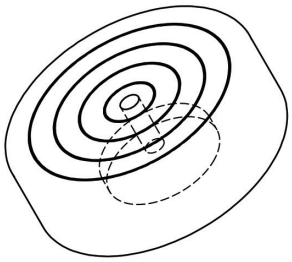


Mounting Kit for Capacities 200,000 lbf (900 kN) and Higher



Top compression alignment block

Load cell alignment plug

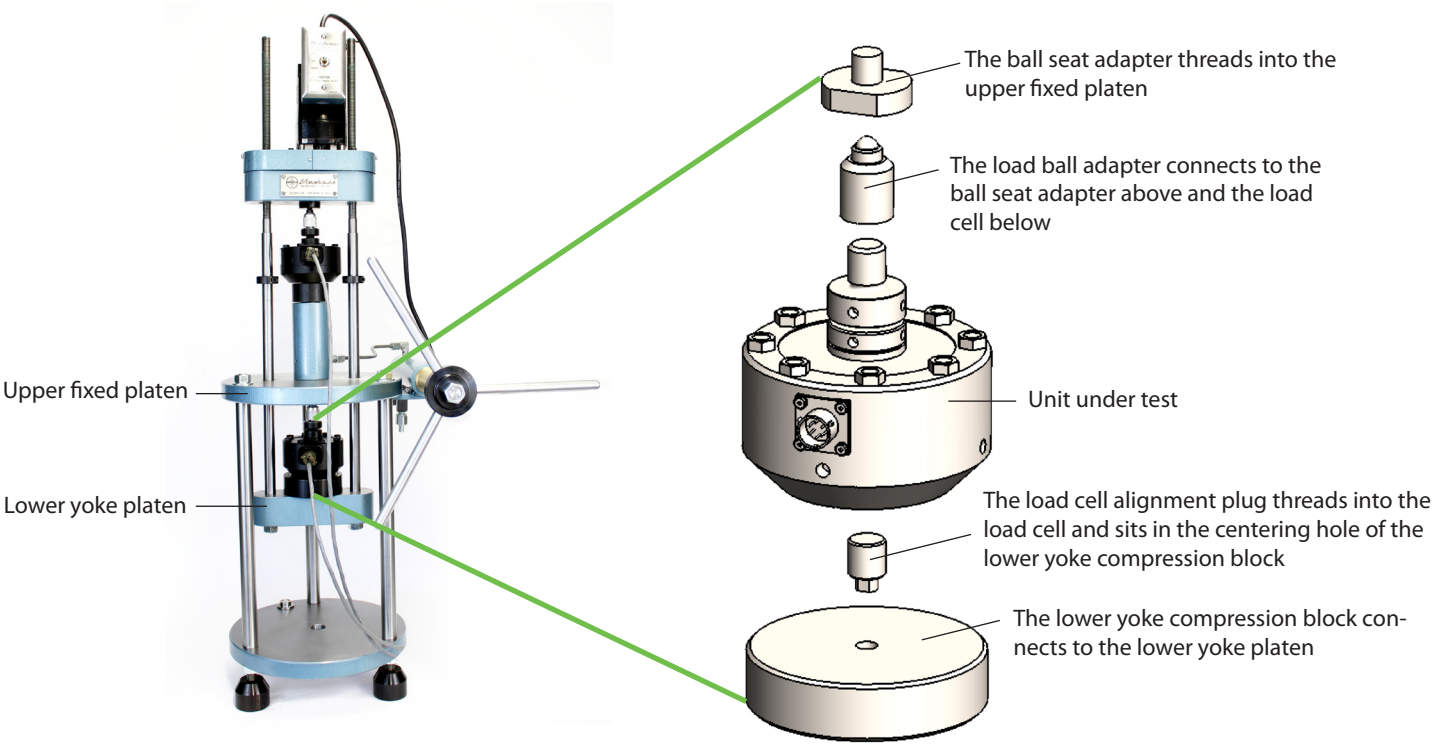


Jack compression block

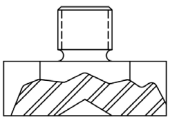
Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Compresion Adapter System

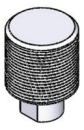
Centering a load cell is critical to obtaining the correct line of force and reducing calibration errors. Misalignment errors can be a magnitude of ten times what is expected. Morehouse has designed special adapters that align the unit under test to the machine and load line applied to the reference standard. This provides uniform stress over the cross-section of the force instrument, improving accuracy and decreasing errors. The load ball compression adapter system is one of the most commonly used systems.



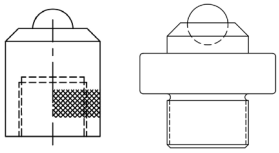
Load Ball Compression Adapter System



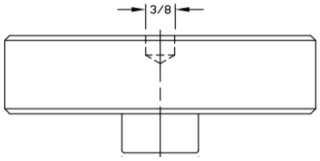
Ball seat adapter



Load cell alignment plug



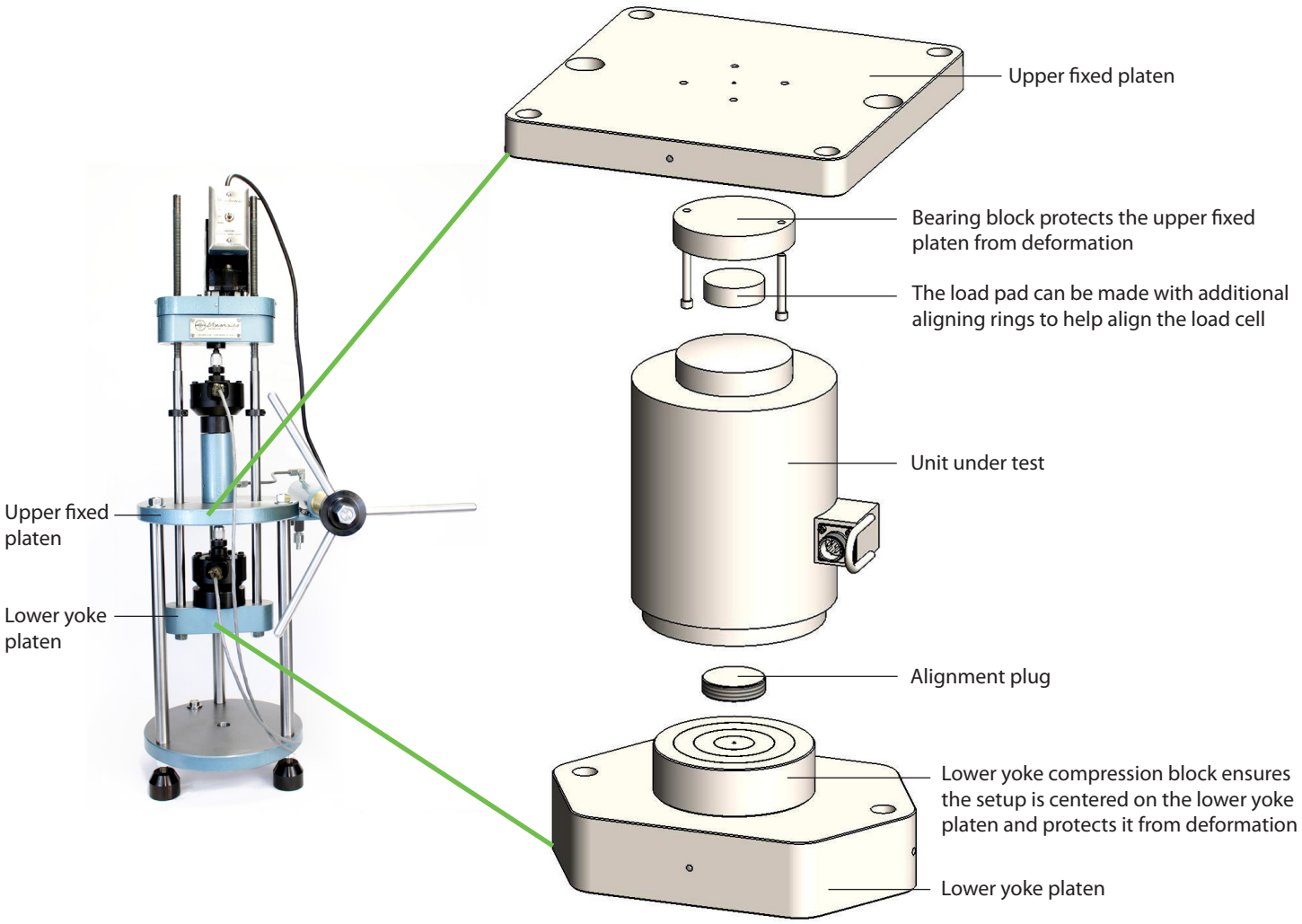
Load ball adapter



Lower Yoke Compression Block

Compresion Adapter System (cont.)

The compression load pad system is used with higher capacity load cells, which are typically made with a spherical top section.

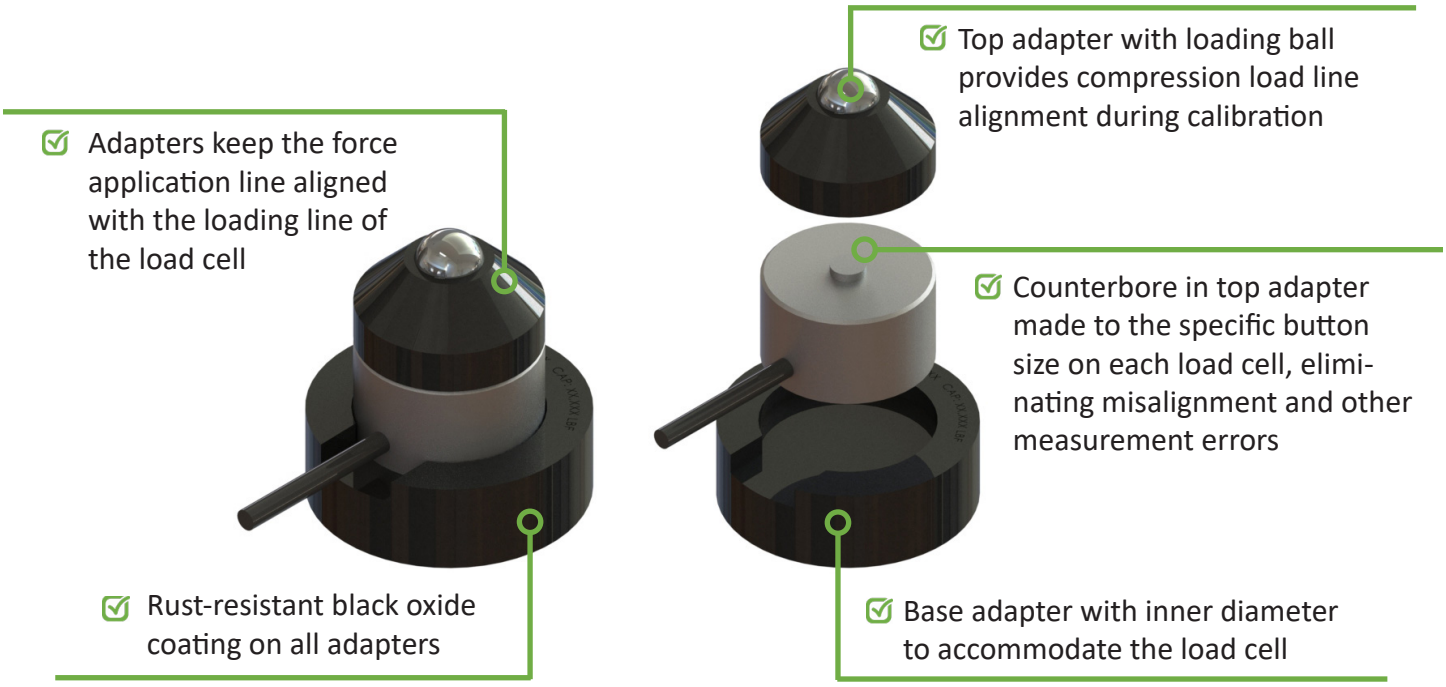


Compression Load Pad System

Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Miniature Button Load Cell Adapters

Button load cells are sensitive in rotation and any misalignment will produce large errors that impact measurement uncertainty. Our button load cell adapters improve alignment and stability of the setup during calibration. They provide more accurate and repeatable calibration results, save on calibration time, and facilitate easy setups.



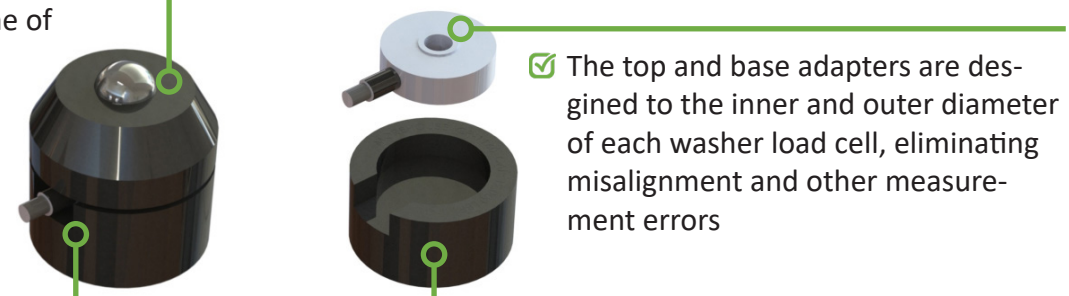
Each set includes a base adapter, top adapter, and an optional alignment plug for the base adapter. The optional alignment plug can also be used with the base adapter to keep the setup aligned with the calibrating machine.

Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Miniature Washer Load Cell Adapters

Washer load cells are sensitive in rotation and any misalignment will produce large errors that impact measurement uncertainty. Our washer load cell adapters improve alignment and stability of the setup during calibration. They provide more accurate and repeatable calibration results, save on calibration time, and facilitate easy setups.

- Top adapter with loading ball provides compression load line alignment during calibration
- Adapters keep the force application line aligned with the loading line of the load cell
- The top and base adapters are desgined to the inner and outer diameter of each washer load cell, eliminating misalignment and other measurement errors
- Rust-resistant black oxide coating on all adapters
- Base adapter with inner diameter to accommodate the load cell

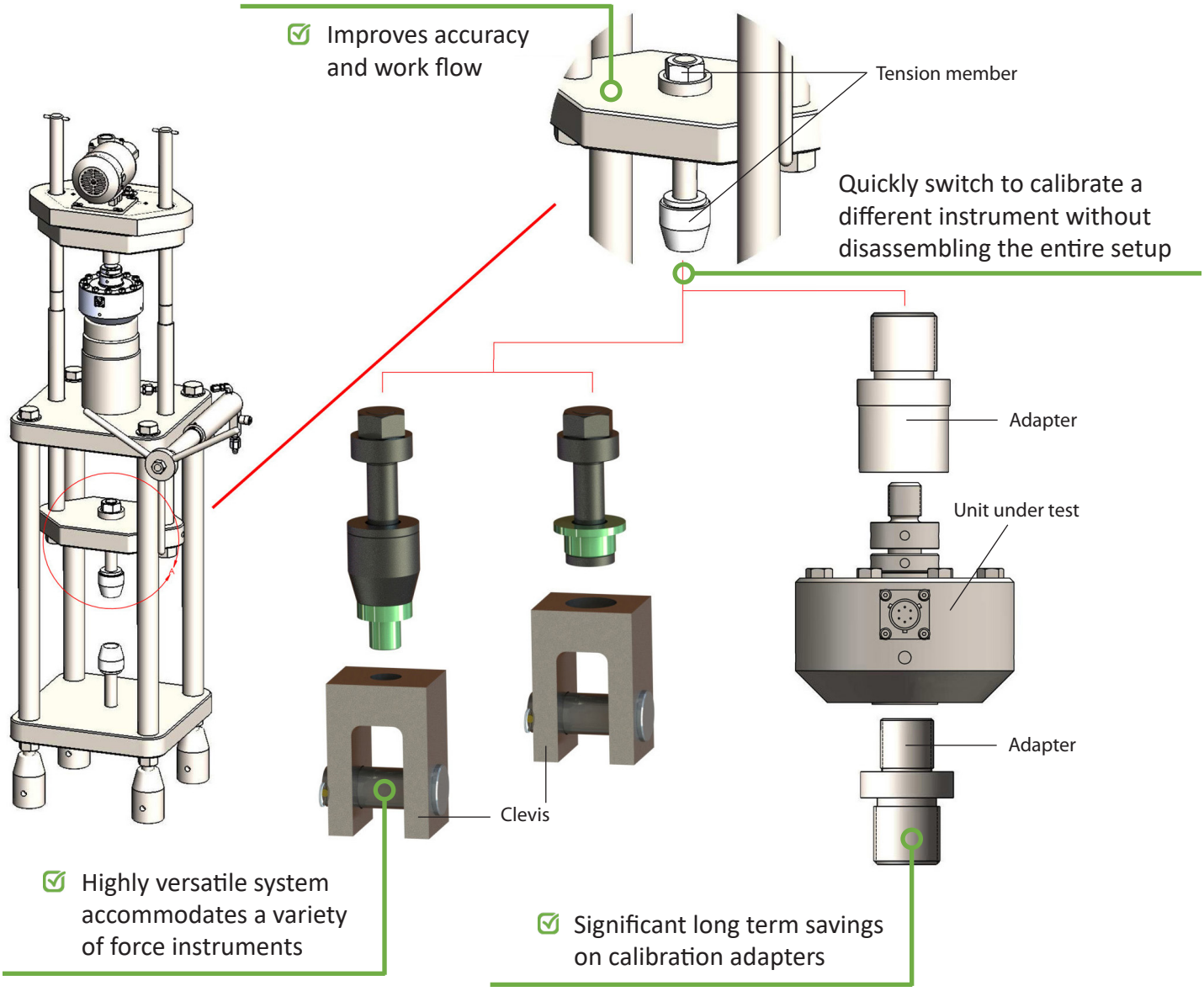


Each set includes a base adapter, top adapter, and an optional alignment plug for the base adapter. The optional alignment plug can also be used with the base adapter to keep the setup aligned with the calibrating machine.

Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Quick Change Setup

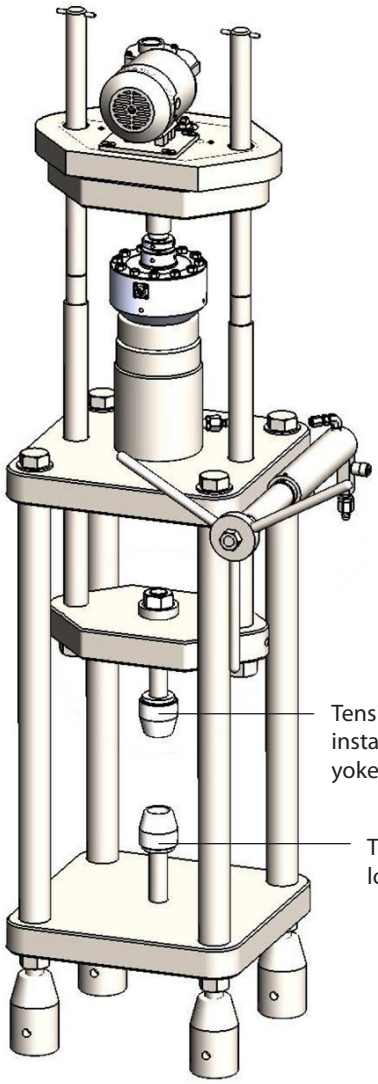
The quick change tension adapter system is designed to perform tension calibration on a variety of force instruments. It reduces changeover and cycle time, improves measurement repeatability, and yields significant savings. The system eliminates factors that can be significant contributors to measurement uncertainty.



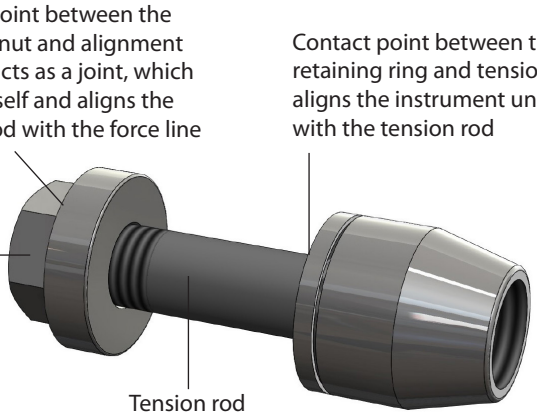
Force Calibration Setup with Quick Change Tension Members

Quick Change Tension Members

For machines with 100,000 lbf (500 kN) capacity and less, to calibrate an instrument in tension two tension members must be installed.



Tension member is designed according to ISO 376 Annex A.4.1 "Loading fittings should be designed in such a way that the line of force application is not distorted. As a rule, tensile force transducers should be fitted with two ball nuts, two ball cups."



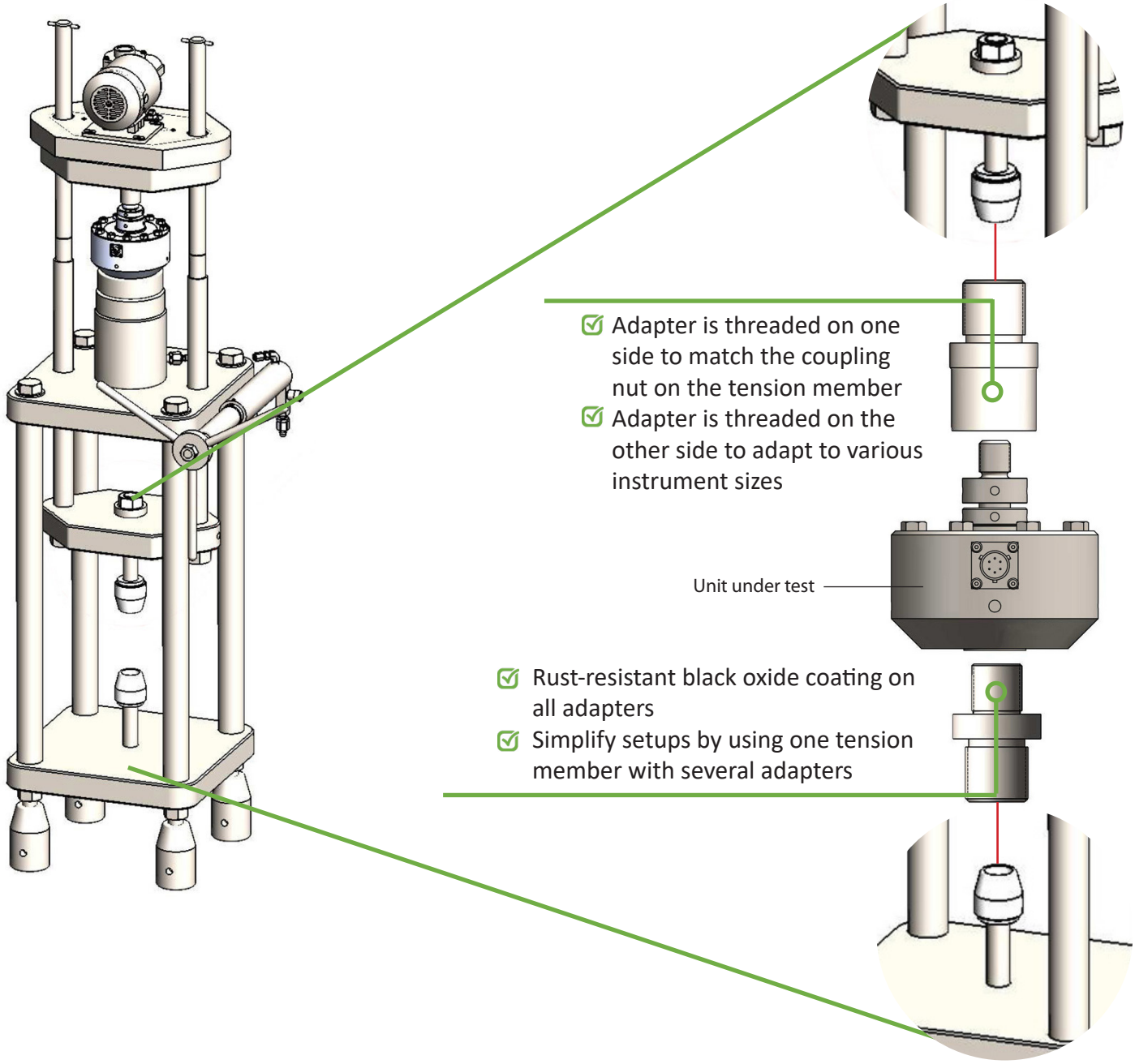
Tension Member

Two Tension Members for UCMs 100,000 lbf (500 kN) capacity and less

Note: For machines with 200,000 lbf (900 kN) capacity and higher, high capacity tension adapters must be installed (see page 19).

Quick Change Tension Member Adapters

Intermediate adapters are threaded onto the tension members to mount multiple types of instruments for tension calibration.



Tension Members with Adapters for UCMs 100,000 lbf (500 kN) capacity and less

Quick Change Tension Adapter Value Kit

The quick change tension adapter value kit includes two tension members and common adapter sizes to calibrate most force instruments available on the market. Kits are avilable for machines up to 100,000 lbf (500 kN) capacity.

These adapters were developed with Lean principles in mind. They can be stored near the machine so a technician can easily make the appropriate tension setups without wasting precious time hunting for adapters.

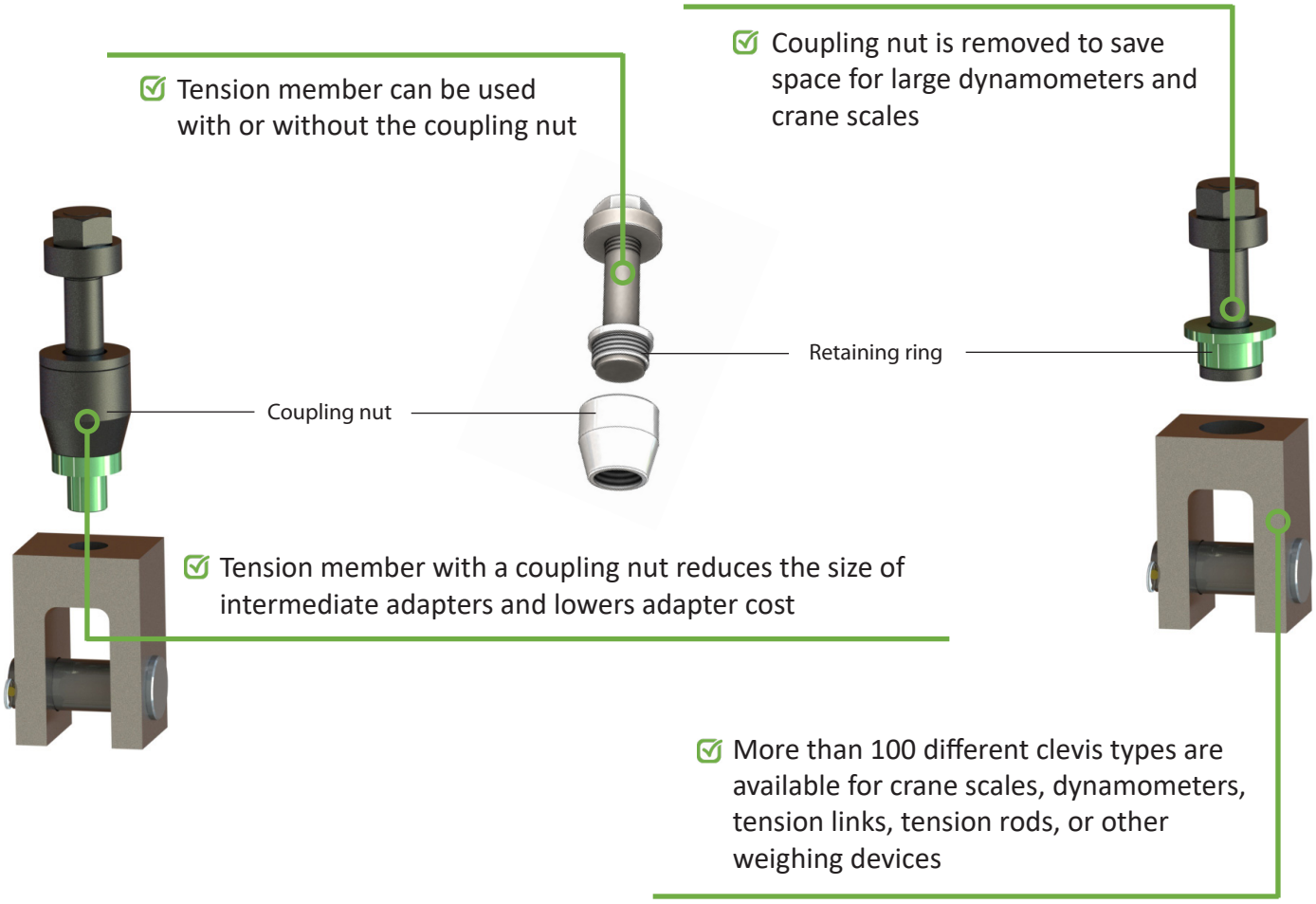
- Swiveling tension members for maximum versatility
- Rust-resistant black oxide coating
- Capable of adding other adapters to reach any other thread size
- Self-aligning tension system to eliminate eccentric loading
- Various adapters for most common instrument sizes
- 20 % discount off individual parts

Kit for UCMs 100,000 lbf (500 kN) capacity and less

Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Clevis

A clevis is used to calibrate dynamometers, load links, tension rods, crane scales, or other weighing devices. The clevis is mounted to the tension member through a common thread on the coupling nut or retaining ring.



Clevis with Tension Member

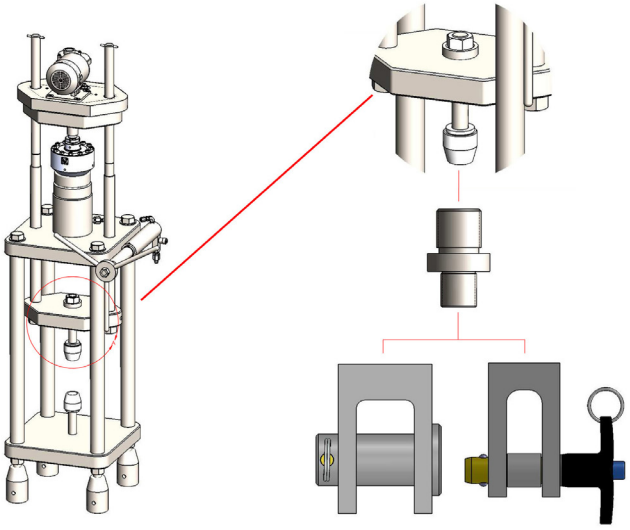
Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Adaptable Clevis Value Kit

A set of two clevises and several pins is a versatile solution that eliminates the need for acquiring several clevises and yields significant savings in equipment cost. Finding the right pin size can be challenging and the using wrong pin size can significantly increase bias. Additional pin sizes can be ordered for new instruments.

- Precision machining lowers calibration errors
- Can be used with quick change tension members
- Rust-resistant black oxide coating
- Adaptable to numerous instruments through various available shoulder pins
- Remarkable savings on calibration adapters cost

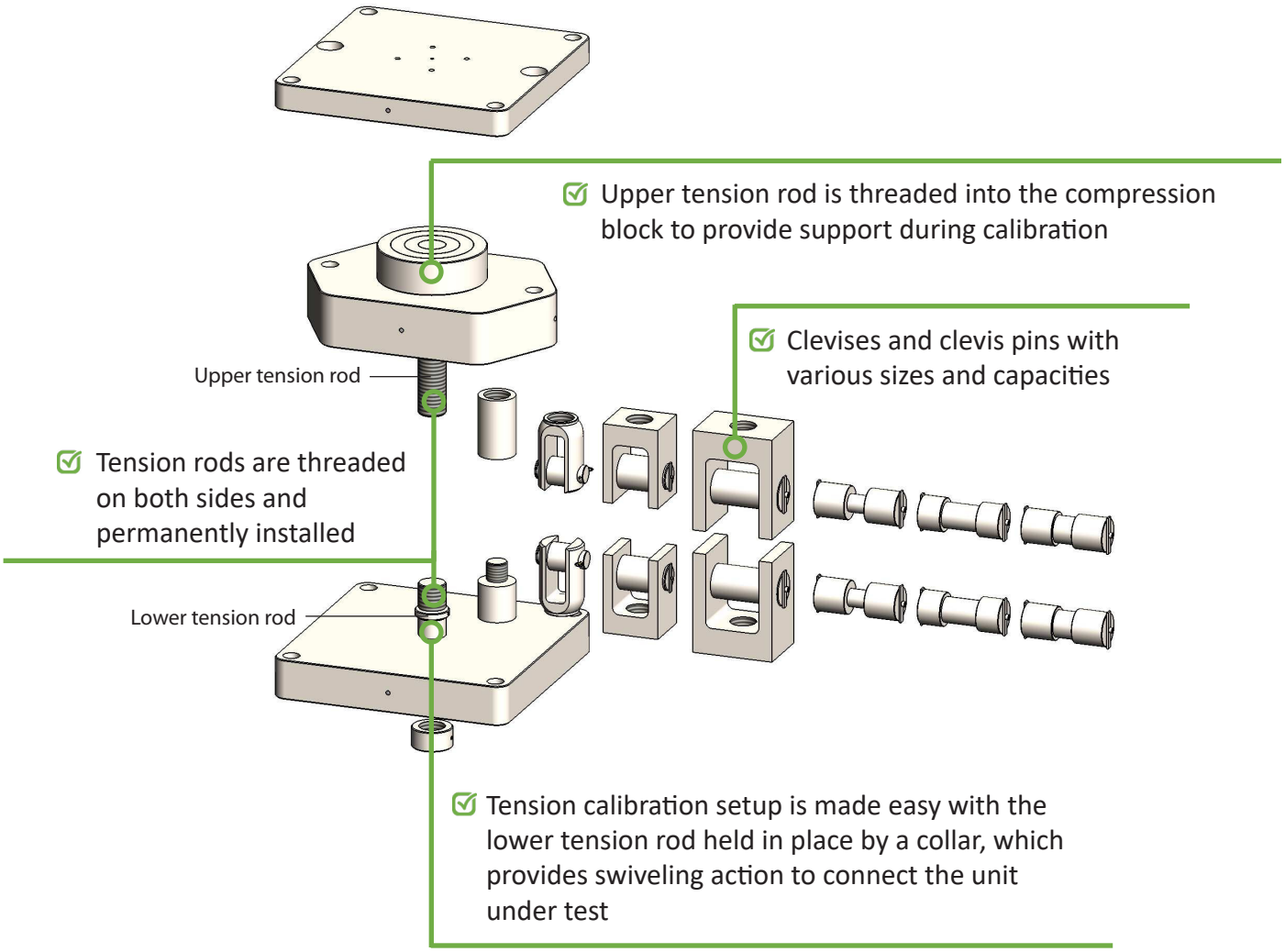
Kit with Two Clevises and Several Pins



UCM with Tension Member, Adapter, and Clevises

High Capacity Tension Adapters

For machines with 200,000 lbf (900 kN) capacity and higher, to calibrate an instrument in tension high capacity tension adapters must be installed.



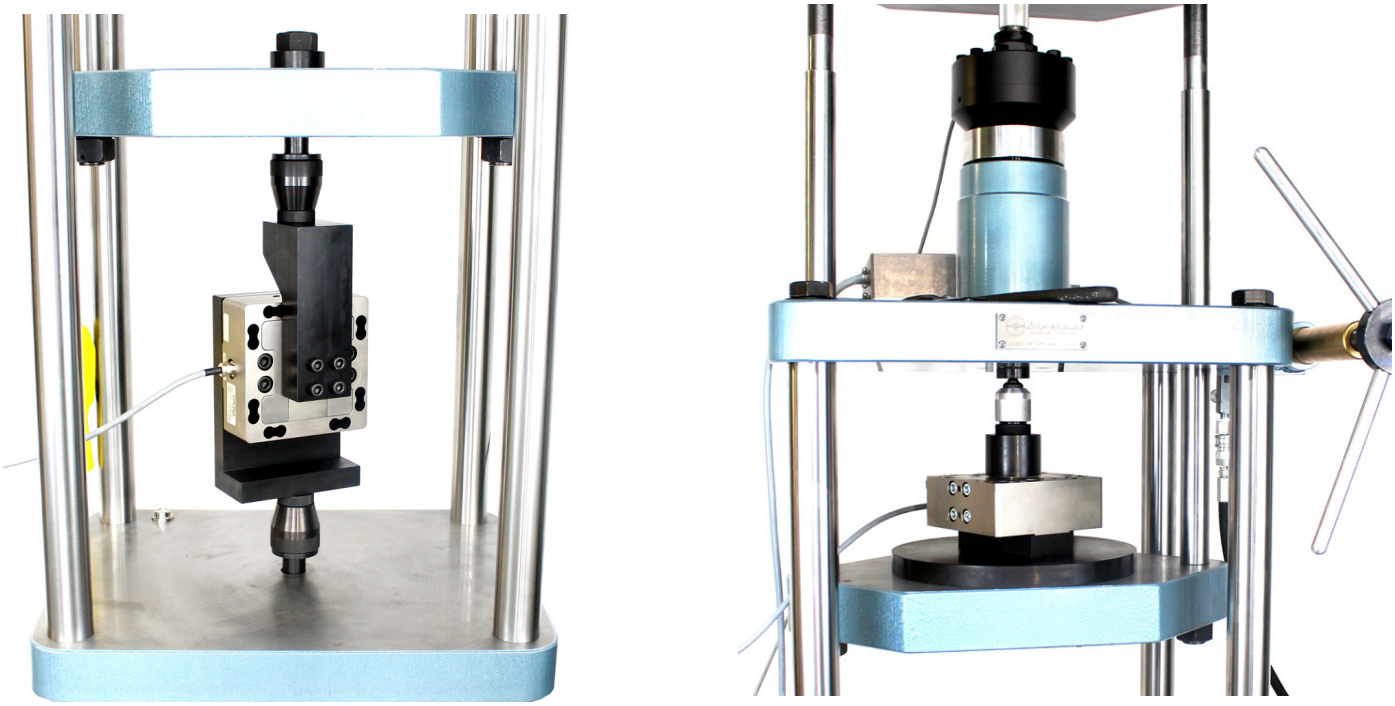
Tension setup with High Capacity Tension Adapters for UCMs 200,000 lbf (900 kN) capacity and higher

Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Custom Multi-Axis Load Cell Adapters

To calibrate a multi-axis load cell in a universal calibrating machine, proper adapters must be designed to meet the configuration and capacity. Morehouse can design and manufacture a multi-axis load cell adapter to minimize off-center loading, isolate the system from erroneous lateral forces, lower crosstalk between channels to negligible amounts, and improve safety.

Contact Morehouse for a consulatation to ensure the right type and size adapters are manufactured for each specific requirement. Morehouse has provided calibration adapters for several multi-axis load cell models available on the market. These adapters have a proven record of good performance and lowering the crosstalk between channels to negligible amounts.



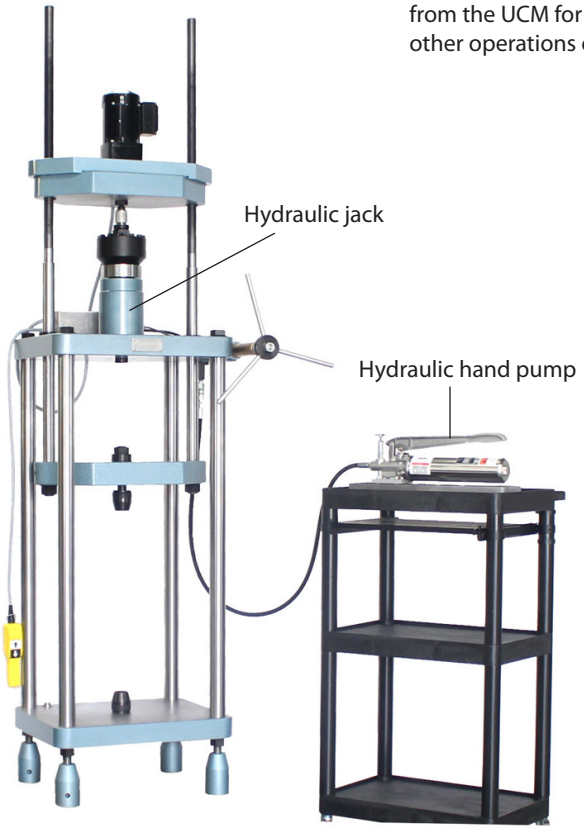
Adapter Design for 3-Axis Load Cell with Calibration of X an Y Axes (left) and Z Axis (right)

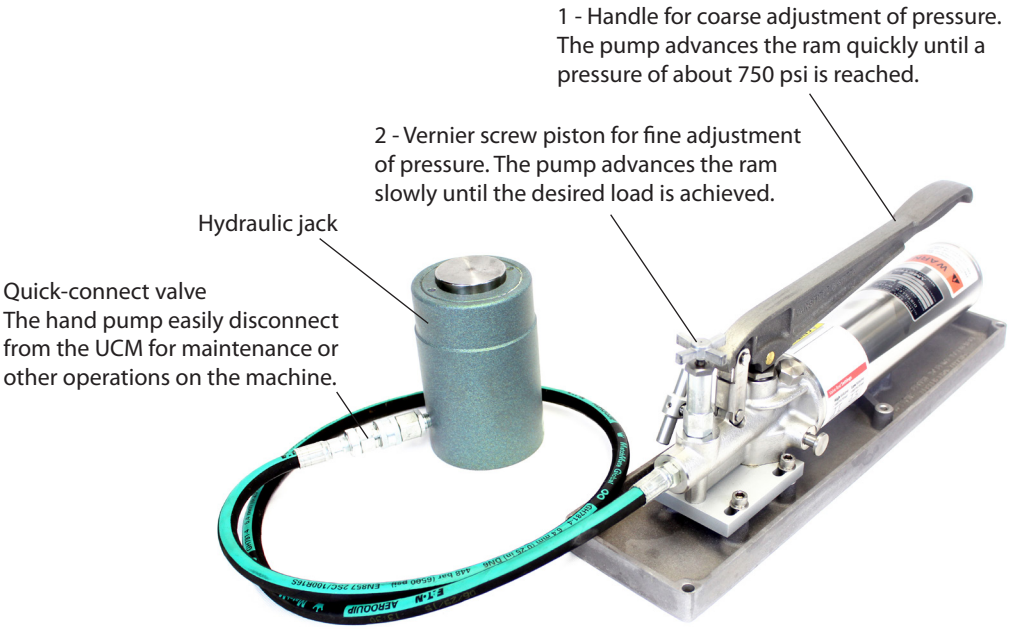
Most adapters shown in this document can be used in other machines. Please contact us to find out if these can work for your application.

Hydraulic Hand Pump

The Universal Calibrating Machine is actuated by hydraulic pressure. A hydraulic power system is required to supply, maintain, and adjust the hydraulic pressure in the hydraulic jack, which accommodates various calibration loads. The standard system for generating the hydraulic pressure is the hydraulic hand pump, which does not need any source of electric power to operate.

The hydraulic hand pump has two speeds of operation to control the applied force to the force standard and unit under test.

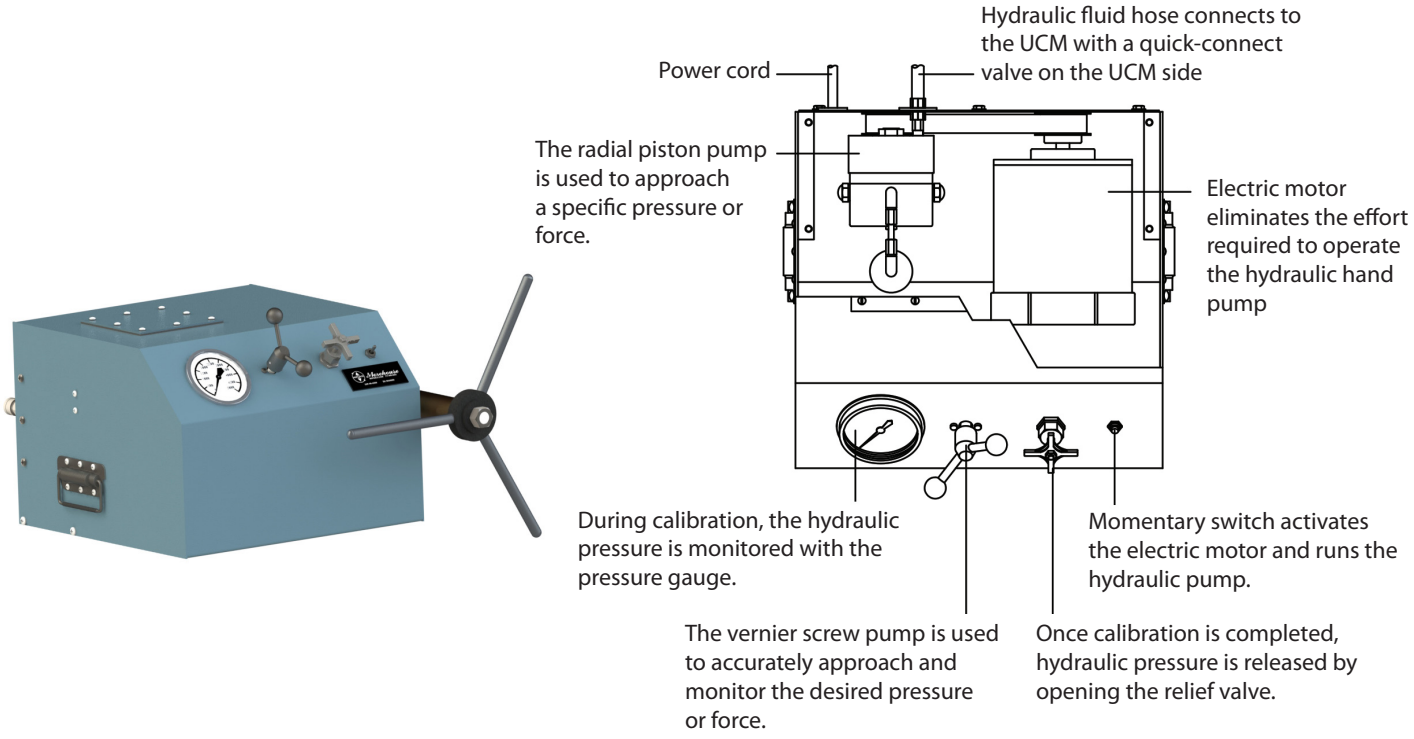




Hydraulic hand pump

Universal Hydraulic Pump (UHP)

An upgraded replacement to the hydraulic hand pump, the universal hydraulic pump (UHP) is an electronically powered system that provides higher flow rate and power to the Universal Calibrating Machine. With a UHP, the operator can easily control the forces and speed up the calibration. Morehouse recommends a universal hydraulic pump for all Universal Calibrating Machines with capacities of 100,000 lbf (500 kN) and higher. It is available for use with machine capacities of 60,000 lbf (275 kN) and higher. The operator uses the momentary switch in front of the unit to activate the electric motor and run the hydraulic pump.



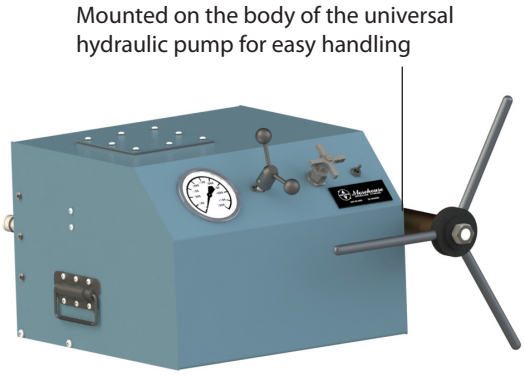
Universal Hydraulic Pump

Auxiliary Screw Pump

The auxiliary screw pump is a manually powered system specifically designed to adjust and maintain the Universal Calibrating Machine's calibration force at a very fine level. It gives the operator exceptional control over the calibration force. It enables accurate calibration at any desired force, improving the repeatability of the measurement, thus decreasing the expanded measurement uncertainty, resulting in less rework and the ability to "Pass" more instrumentation.

The auxiliary screw pump is included with the universal hydraulic pump and is mounted on the body for easy handling. It is an optional add-on with the hydraulic hand pump and is installed on the machine's frame directly.

Auxiliary Screw Pump used with a Hydraulic Hand Pump



Auxiliary Screw Pump used with a Universal Hydraulic Pump

Upgrade Kit for Momentary Pendant Switch

An upgrade kit is available to change a stationary toggle switch to a momentary pendant switch. Contact Morehouse to order an upgrade kit with instructions on wiring the new system.

Older models of universal calibrating machine were manufactured with a stationary toggle switch for yoke adjustment. These switches were fixed on a part of the machine based on the size.

Upgrade

All new models of the universal calibrating machine with capacities of 60,000 lbf (275 kN) or higher are built with a momentary pendant switch for yoke adjustment. This system provides better access to the operator while adjusting the calibration space in compression or tension.

Upgrade the Stationary Toggle Switch to a Momentary Pendant Switch

Morehouse Universal Calibrating Machine ...

Force Calibration Simplified!

Force calibration can be complex because the mechanical interactions of not using the proper adapters can produce significant errors. The Morehouse Universal Calibrating Machine with the right adapeters simplifies force calibration by reducing rework, errors from misalignment, and problematic setups.

We welcome the opportunity to help reduce these errors by answering your questions or concerns.

Contact us:
(717) 843-0081
sales@mhforce.com
www.mhforce.com

Learn more:
Universal Calibrating Machines versus Universal Testing Machines - These machines are different
Recommended Compression and Tension Adapters for Force Calibration
Common Measurement Errors