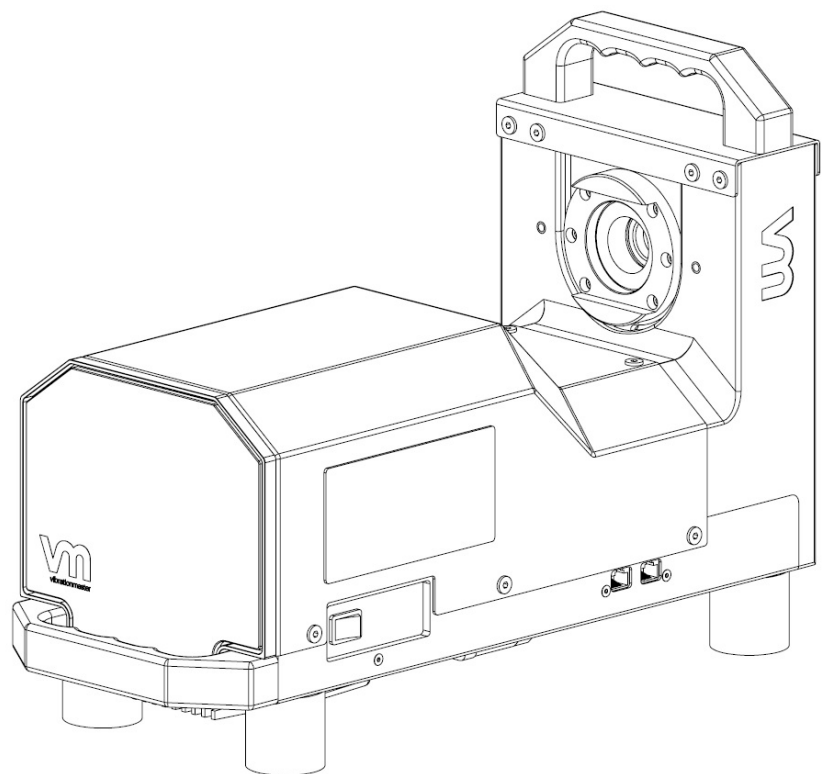


Operating Manual

J160 Fastener test bench



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Amendments

Amendments

Revision	Date	Amendment Details	Issued by
1.0	Apr 2022	Initial issue	MS
1.1	Jun 2022	Updates to Software section item 4	MS

1. Introduction

Overview

Thank you for purchasing a J160 fastener test bench. We have put considerable effort into designing and manufacturing this machine and we hope it will be useful to you in testing and demonstrating the self-loosening behaviour of bolted joints under vibration conditions as well as the relationship between applied torque and achieved tension.

Throughout this document, we may refer indiscriminately to the J160 fastener test bench as “J160”, “machine” or “unit”.

About this Manual

The J160 operator should follow all relevant safety and operating instructions when operating the machine to ensure the safety of both the operator and others close to the machine.

In this operating manual, safety related or other important information is indicated using a graphic with accompanying text, as shown in the example below:



The user must not operate the machine unless they are totally familiar with its functions and operations.

These warnings must be read carefully to ensure the safety of the operator and others as well as to avoid damage to the J160.

The user will also find useful information and comments at various points throughout the manual. These are indicated using a graphic with accompanying text, as shown in the example below:



Are any items missing? If they are, please contact Vibrationmaster immediately by telephone (+352 24 51 30 19) or email (support@vibrationmaster.com).

These hints represent general ideas and recommendations from the Vibrationmaster team, and may be useful when operating the J160.

Introduction

Safety Information

The operator should follow all these safety instructions when working with the machine to ensure the safety of both themselves and others around them.



Fastener testing involves inherent hazards from high forces, rapid motions and stored energy. To operate the machine, users must make themselves aware of all the operations and components that might cause potential hazards.

Users must not operate the machine unless they are familiar with its functions and operations.

Carefully read this manual and observe all safety instructions. The best safety precaution is to always have a thorough understanding of how the equipment operates and to always use good judgement.

The points below are general safety instructions to be followed when using the J160:

- Before beginning the installation of the J160, please check for any external damage. If any damage is found, do not continue with the installation and contact Vibrationmaster immediately
- Do not operate or store the machine where it will be exposed to external weather conditions
- Do not tamper with the controls or the control system software
- Do not repair or replace any part of the machine or attempt any servicing unless this is specifically recommended in the maintenance instructions contained in this manual
- Do not reach into the test area while the J160 is in operation. Wait until all motion has completely stopped before doing so.
- To minimise the possibility of electric shock, unplug the machine from the power supply before attempting any maintenance or cleaning
- Follow the machine preparation instructions thoroughly as described in this manual
- Do not apply excessive torque to fasteners resulting in an achieved clamping force above the values specified in the machine specifications
- Use appropriate tools to tighten the fasteners

- Do not close the browser window of the operating computer until the test in progress has completely finished
- Do not move the operating computer beyond wireless range until the test in progress has completely finished
- Do not shut down the operating computer until the test in progress has completely finished.



The J160 has been designed for testing and demonstrating fasteners in the size range M3 to M16 ISO Metric and #4 to 5/8" UTS. Extensive use of only large size fasteners will significantly increase the stress on the J160 and increase wear and tear, with the result that the machine's operating life will be reduced.

Repeated use of high static clamping forces in the upper part of the range from 0 to 75 kN (0 to 16,900 lbf) will significantly increase the stress on the J160 and increase wear and tear with the result that the machine's operating life will be reduced.

The J160 has been designed for a peak maximum preload of 75 kN (16,900 lbf). Tightening the bolt and nut above the specified clamping force level will result in permanent damage to the J160 and must be avoided.

When conducting a fastener test or demonstration, proper lubrication of the fastener and nut must be carried out to obtain the appropriate coefficient of friction (μ_{tot}) of 0.09 to 0.14. Not lubricating the fastener and nut will result in increased friction and as a result a higher μ_{tot} value; this will significantly increase the stress on the J160 and increase wear and tear with the result that the machine's operating life will be reduced.

Suitable lubrication is also an important contributing factor to the test result reproducibility and accuracy.

Adaptor parts such as the top adaptor, sleeve and test washer are all consumables and must be replaced as soon as possible if any wear or damage is evident.

The precision of the adaptor parts dimensions has a strong influence on the reproducibility and accuracy of the test results.

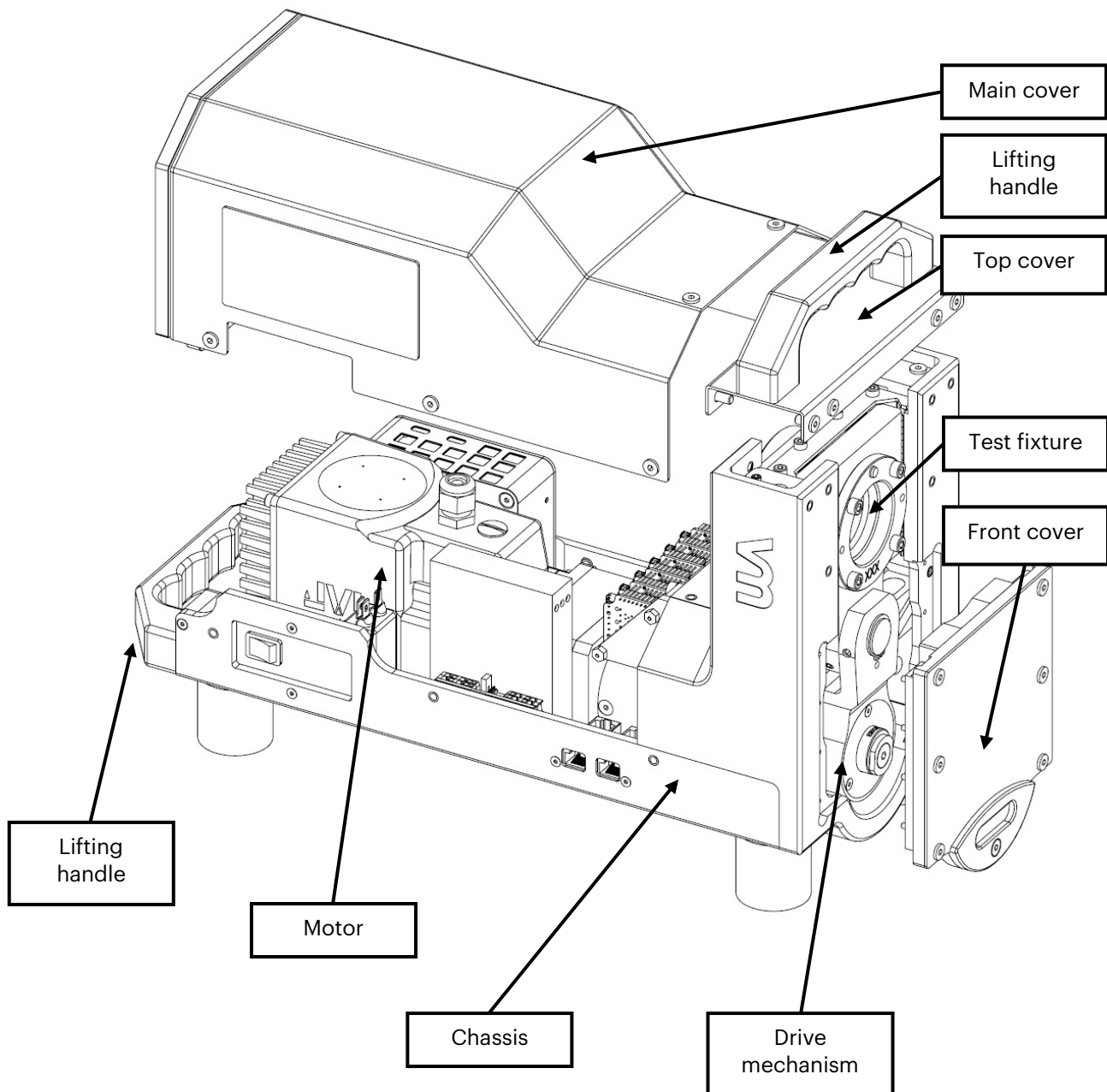


When packing and unpacking the J160 in its transport trolley case, please ensure that:

- The J160 is fitted correctly into the transport case – incorrect placement can cause the protective foam to rub against and damage the carbon fibre protective covers
- The protective foam in the trolley case is correctly fitted

2. Mechanical System Description

Mechanical overview



The J160 consists of several assemblies or parts, and these are briefly described below:

Chassis: the machine monobloc chassis functions as a base for mounting the drive system, fixture and other components in the machine. The chassis stands on rubber feet and is designed to withstand all the vibration and forces produced during a fastener test.

Fixture: the machine fixture consists of two groups of components, the stationary parts and moving parts. The stationary parts are integrated with the chassis and consist of needle roller bearings, an adaptor sleeve and a clamping force sensor for measuring the fastener tension. The moving part of the fixture consists of a glider plate guided in angular cage bearings. The glider plate has a seat for the top adaptor. A displacement sensor displays accurately in real-time the transverse movement being applied to the fastener. The optional transverse load force sensor can give valuable insight to design engineers when simulating the real service conditions of bolted joints in assemblies.

Drive system: the mechanical parts of the drive system consist of a connecting rod and an axle with an eccentric bush. These components act as links in a four-bar mechanism and convert rotary motion into translatory motion. The prime mover for this mechanism is an electric servo motor that is controlled by an operating system.

Read the section “Changing eccentricity” for instructions on how to swap to different eccentric bushes.

Covers: the machine has three protective covers. The main, top and front covers are fixed and should never be removed except for maintenance purpose. The front cover is mounted on vertical slides to allow a quick and easy access to the eccentric bush.

Power supply: the J160 is pre-set during manufacturing for either 100–115V 60Hz or 230V 50Hz electric voltage. The voltage setting is decided by the customer at time of ordering and cannot be changed after delivery.

Machine control system: this consists of a motor drive unit, electronic circuit and any PC running Vibrationmaster proprietary browser based software. The PC forms the user interface to operate the J160.



The protective covers isolate the moving parts of the J160 from direct access. They are fitted for the operator's protection – never operate the J160 without the protective covers in place.

Fastener adaptors

Fastener adaptors are required to mount the fastener sample on the J160, either for the torque/tension test and friction coefficient analysis, or for the transverse vibration test. The J160 is designed to test and demonstrate fastener locking elements ranging in size from M3 to M16 ISO Metric and #4 to 5/8" UTS.

The J160 allows testing a wide variety of different fastener applications from the smallest screws to long cylinder block studs, double ended studs, self-tapping screws, and even non-threaded fasteners such as lock-bolts and lock-collars.

The user will need a set of fastener adaptors for each size of fastener to be tested. To achieve useful test results, you should always use the most appropriate fastener adaptors for your application.

3 types of adaptors sets to cover most of the fastener applications:

- Fastener adaptors with bolt anti-rotation system, to allow the rotation of only the nut and the locking element (most commonly used)
- Fastener adaptors without anti-rotation
- Fasteners adaptors with threaded insert.

You can find the description and composition of each set in the next sections of this Operating Manual.

While these adaptors will accommodate the requirements of most users, they may not suit all test or demonstration purposes and Vibrationmaster therefore further offers custom designed adaptors to fit your exact testing needs.



Using the correct type of fastener adaptors will ensure reliable and reproducible test results.

Mechanical System Description

Fastener adaptors with bolt anti-rotation system

This set of fastener adaptors will allow the rotation of only the nut and locking element placed on the top adaptor (TA) side, while preventing the hexagonal head bolt DIN 931/933, ANSI B18.2.1 from rotating during the test. The sleeve with bolt anti-rotation system (SA) has a built-in design feature that restricts the bolt from rotating as the cross flats of the hexagonal head mates with the sleeve's inner dimension.

Orientation of bolt: insert from Sleeve side.

Position of nut and locking element: on the Top Adaptor side

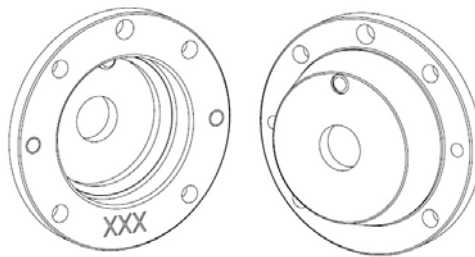
Type of bolt accommodated: hexagonal head bolts according to DIN 931/933 or ANSI B18.2.1

Length to diameter ratio: 1:1.7 for fastener dimensions M3 to M16 ISO Metric and #4 to 5/8" UTS. Higher ratios, such as 1:2.0 or 1:2.5 can be ordered.



The fastener adaptor set has been designed for hexagonal head bolts following DIN 931/933 or ANSI B18.2.1. For other bolt, please check that the "width across flats" dimension of the Sleeve matches the dimension of your bolt.

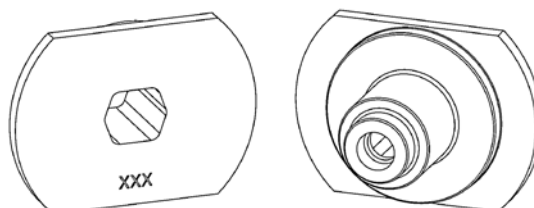
Top adaptor (TA)



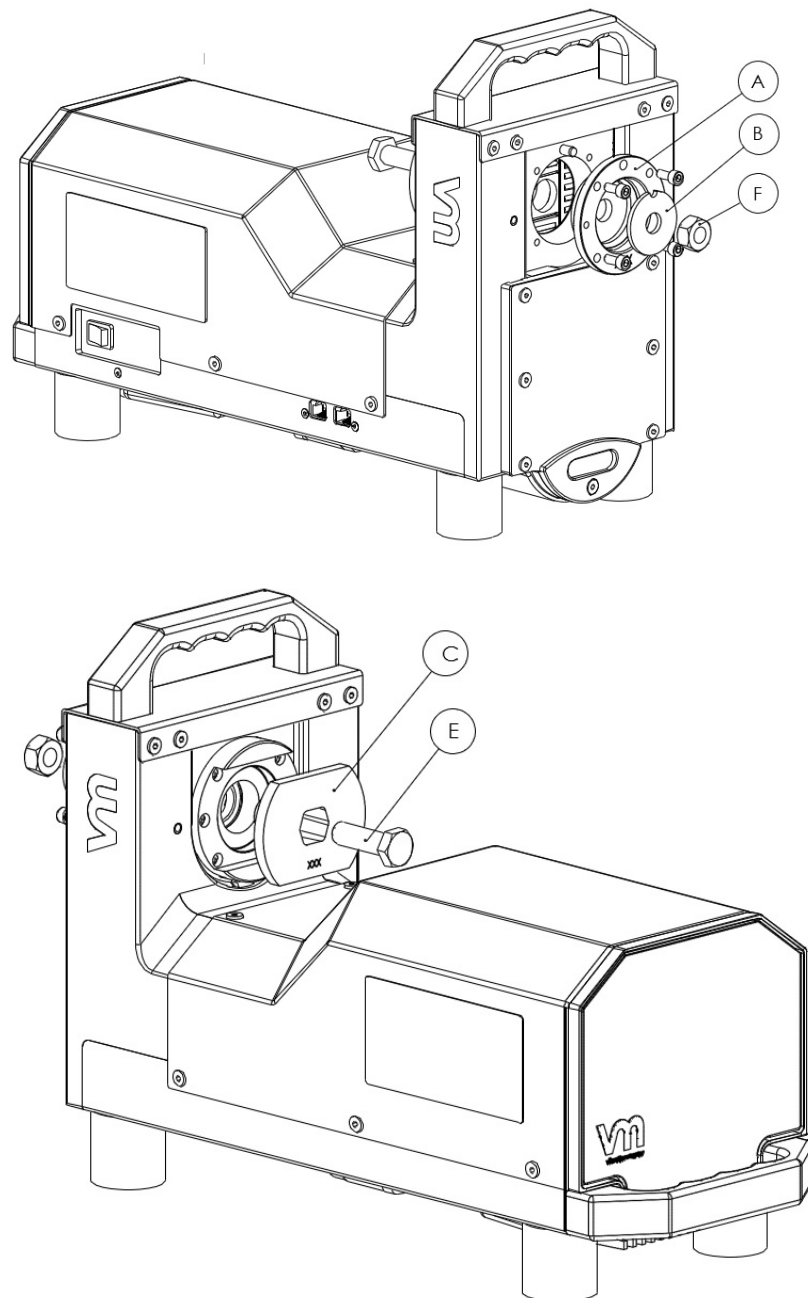
Test washer (TW)



Sleeve with bolt anti-rotation system (SA)



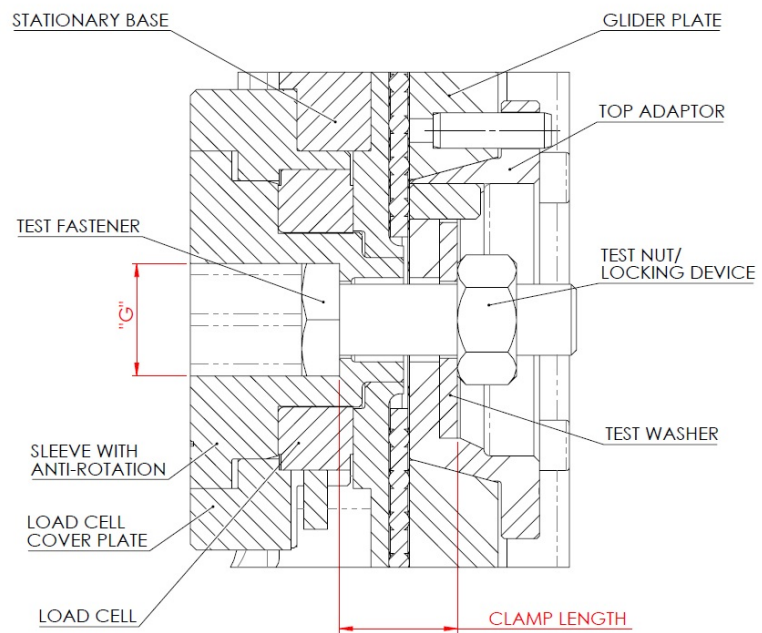
Fastener adaptors with bolt anti-rotation system – installation into J160



Item	Description
A	Top adaptor (TA)
B	Test washer (TW)
C	Sleeve with bolt anti-rotation system (SA)
E	Test fastener
F	Test Nut (with or without locking element)

Mechanical System Description

Fastener adaptors with bolt anti-rotation system – section view of test fixture



Fastener adaptors without anti-rotation

This set of fastener adaptors uses the Top adaptor (TA) and Test washer (TW), a Sleeve without anti-rotation (SL) and a Sleeve washer (SW).

When using these fastener adaptors, the bolt head, the nut and the locking element are free to rotate.

The Sleeve washer (SW) is installed bellow the fastener head into the Sleeve to avoid deterioration of the Sleeve caused by the possible rotation of the fastener during test and demonstration.

Orientation of bolt: insert from Sleeve side.

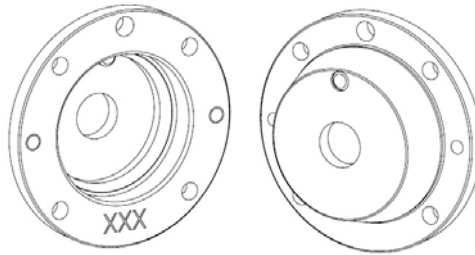
Position of nut and locking element: on the Top adaptor side

Type of bolt accommodated: any.

See table below for space restriction " $\varnothing C$ ".

Length to diameter ratio: 1:1.7 for fastener dimensions M3 to M16 ISO Metric and #4 to 5/8" UTS. Higher ratios, such as 1:2.0 or 1:2.5 can be ordered.

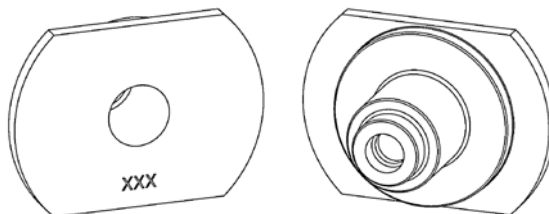
Top adaptor (TA)



Test washer (TW)



Sleeve without anti-rotation (SL)

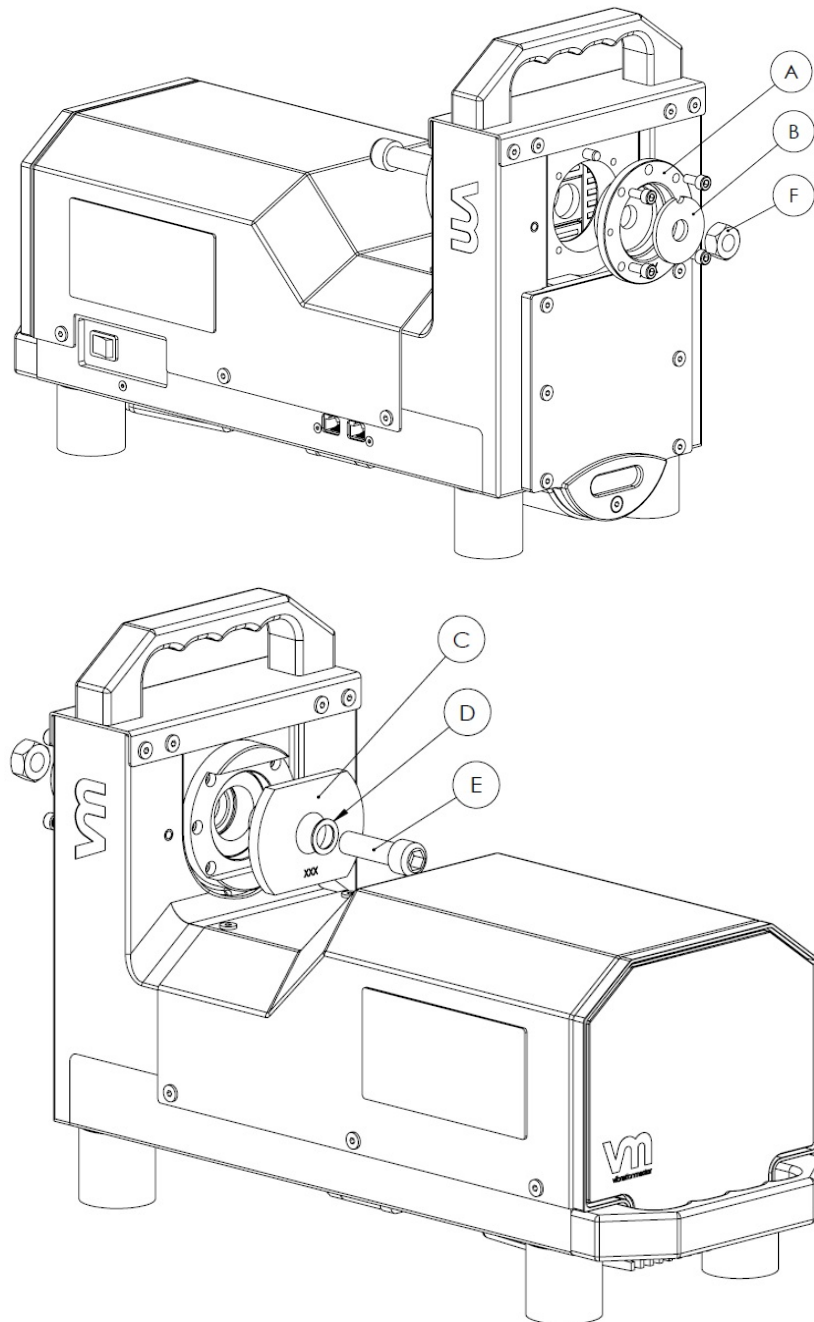


Sleeve washer (SW)



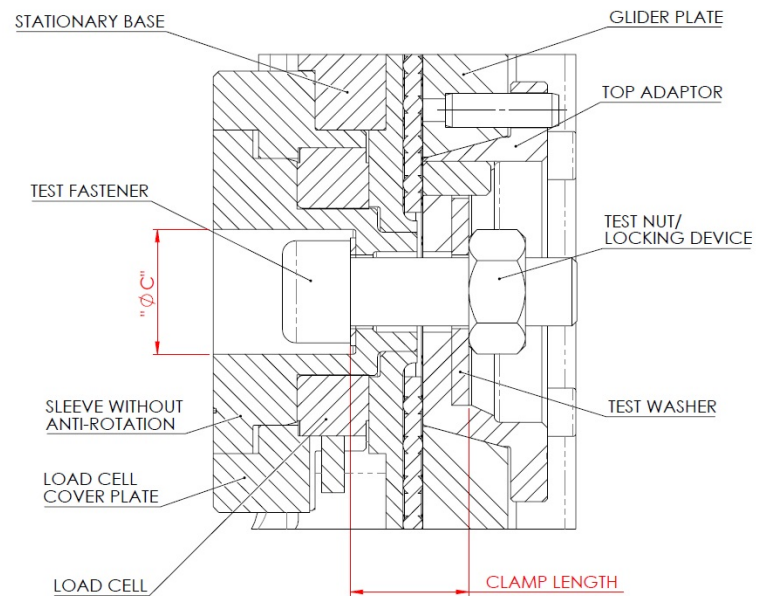
Mechanical System Description

Fastener adaptors without anti-rotation – installation into J160



Item	Description
A	Top adaptor (TA)
B	Test washer (TW)
C	Sleeve without anti-rotation (SL)
D	Sleeve washer (SW)
E	Test fastener
F	Test Nut (with or without locking element)

Fastener adaptors without anti-rotation – section view of test fixture



Mechanical System Description

Fastener adaptors with threaded insert

This fastener adaptor set is used to simulate the bolt or self-tapping screw being tightened into a blind hole. The set is comprised of a Top adaptor (TA) and Test washer (TW) together with Sleeve with insert (SI) and Threaded insert (TI).

The Sleeve with insert is equipped with a shaft-clamping unit to block the Threaded Insert. It allows the threaded insert to be easily and quickly exchanged.

The Threaded insert can be made in the material of your choice such as steel, aluminium, and plastics. The Threaded insert can further be pre-tapped or you may use the Threaded insert without thread for testing and demonstrating self-tapping screws.

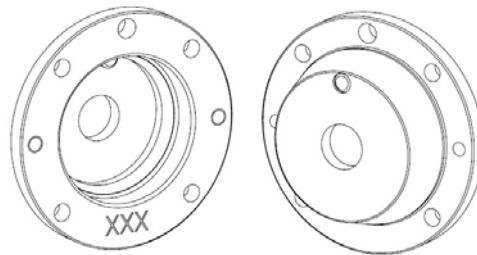
Orientation of bolt: insert from Top adaptor side.

Position of nut and locking element: included in the Threaded insert.

Type of bolt accommodated: any.

Length to diameter ratio: 1:1.7 for fastener dimensions M3 to M16 ISO Metric and #4 to 5/8" UTS. Higher ratios, such as 1:2.0 or 1:2.5 can be ordered.

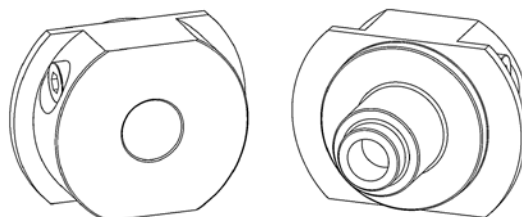
Top adaptor (TA)



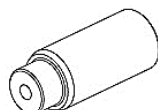
Test washer (TW)



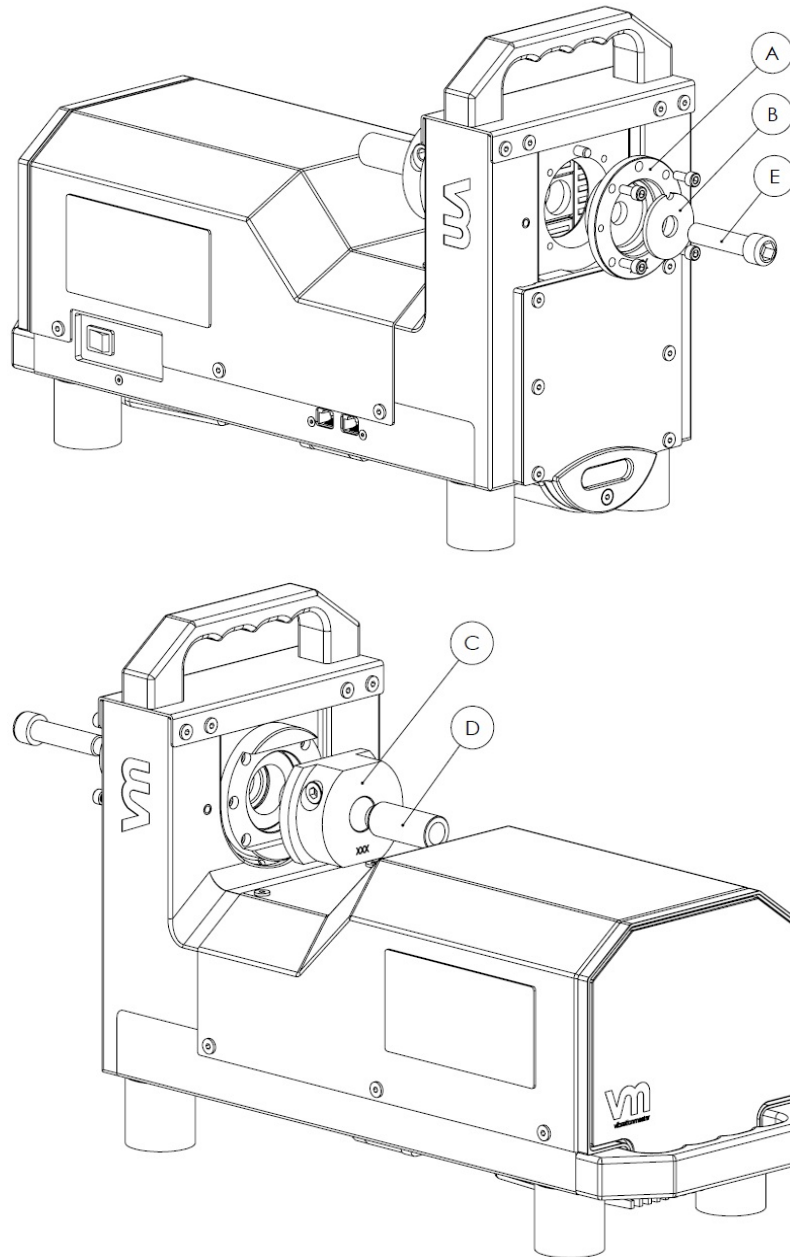
Sleeve with insert (SI)



Threaded insert (TI)



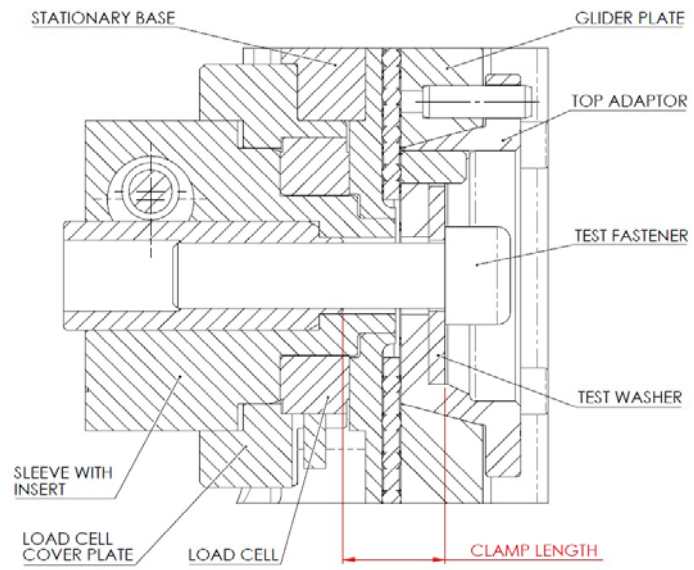
Fastener adaptors with threaded insert – installation into J160



Item	Description
A	Top adaptor (TA)
B	Test washer (TW)
C	Sleeve with insert (SI)
D	Threaded insert (TI)
E	Test fastener

Mechanical System Description

Fastener adaptors with threaded insert – section view of test fixture

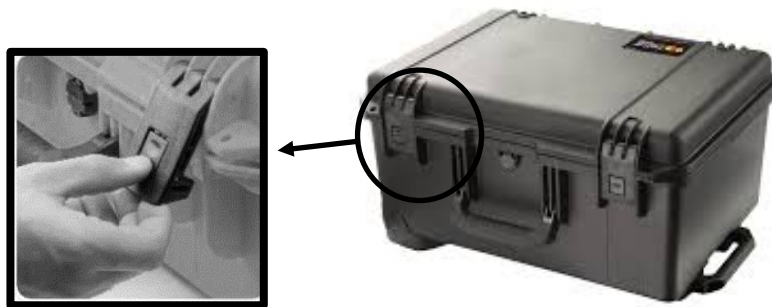


3. Preparing the machine

Unpacking the J160

The J160 is supplied in a shockproof and waterproof trolley case made from a high-performance resin. The case is fitted with a permanently attached regulating valve that automatically adjusts the internal air pressure without letting in water.

To open the case, press in the latch's centre tab and then pull the latch forward, as shown below:



When first receiving the J160 and opening the trolley case, please check that all the items ordered are included. As a minimum, the trolley case should include:

- J160 Operating manual (this manual)
- Wireless password and Calibration certificate
- J160 Fastener Test bench
- US power cord (NEMA 5-15P) for J160 or,
European power cord (Plug 7/7 CEE) for J160
- Torque sensor (if ordered)
- Eccentric bushes as ordered
- Fastener adaptors as ordered.



Are any items missing? If they are, please contact Vibrationmaster immediately by telephone (+352 24 51 30 19) or email (support@vibrationmaster.com).

Preparing the machine



To prepare the J160 for use:

1. Carefully lift the J160 from the protective foam cradle and place the unit on its feet
2. The J160 should be used on a level, horizontal hard surface capable of withstanding both the equipment weight and vibrations created during fastener demonstrations
3. Make sure the J160 is positioned close to a power outlet.



Do not attach or detach any sensor while the J160 is powered on, as this may permanently damage the measuring load amplifiers.

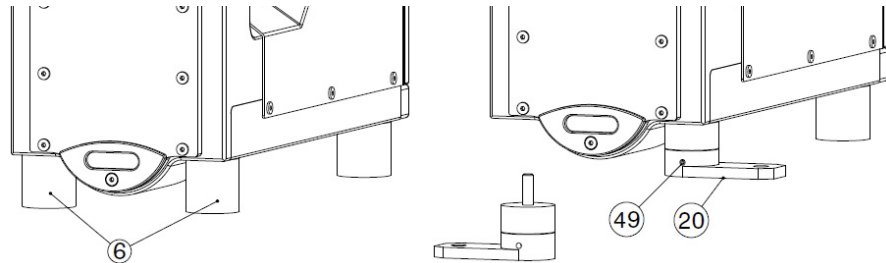
Always use the lifting handles on the top and back of the machine - never lift the J160 by any of the covers.

Installing the optional fixation mount

The optional fixation mount allows the mounting of the J160 on a table or a stand. It facilitates the tightening process as there is no need to manually hold the machine in place during tightening. It is then easier to reach the required tightening torque.

The optional fixation mount consists of two feet that are replacing the two front antivibration mounts. To install them:

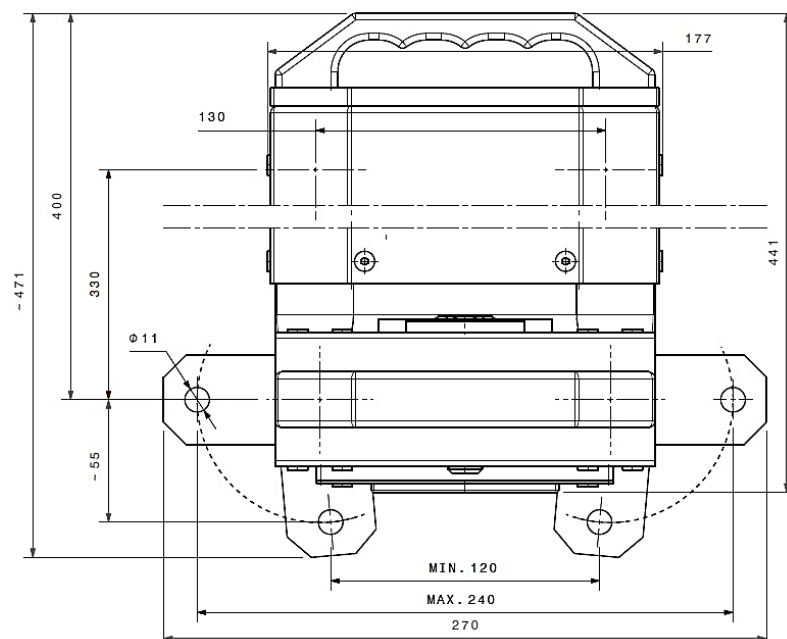
1. Untighten the two standard antivibration mounts (item 6)
2. Tighten the M5 screw (item 49) located on the fixation mount foot (item 20) and tighten the foot into the frame.
3. Repeat the operation for the second foot.



Once installed, the operator can fasten the J160 on the table or stand using two M10 fasteners (not included).

It is possible to adjust the position of the two fixation points ($\varnothing 11$ hole) by rotating the feet. To rotate the feet, first untighten the M5 screws (item 49) located on each foot.

The distance between the feet is adjustable from 120mm to 240mm, as show on the top-down view below:

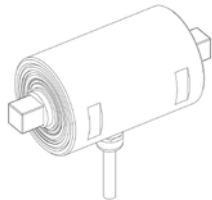


Preparing the machine

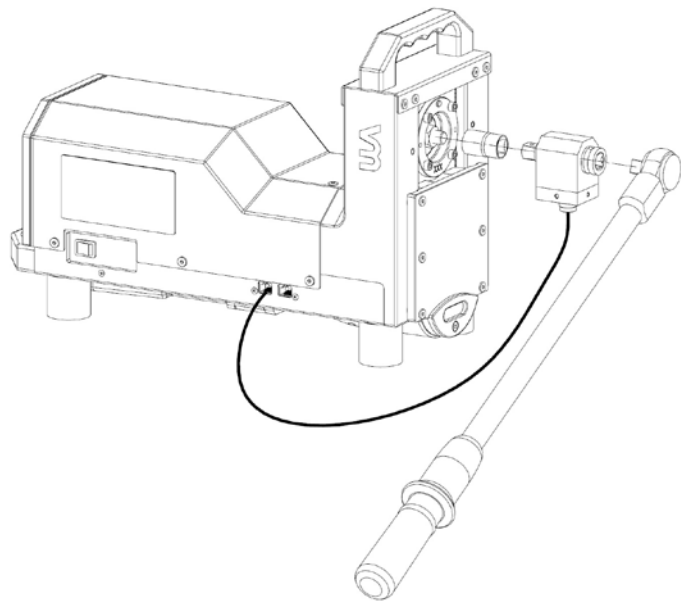
Installing the optional torque sensor

The J160 can be delivered with an optional torque sensor which will turn the J160 into a torque/tension test unit capable of testing the torque and tension relationship during a tightening and untightening process.

With the software's ability to calculate the total coefficient of friction (μ_{tot}) and K (Nut Factor) in real-time, the operator receives immediate feedback on the effect of lubrication, coatings and materials in the bolted joint.



1. Turn off the J160
2. Attach one end of the sensor cable to the torque sensor and the other end of the cable to the J160's Ethernet socket "Ext. 1"
3. The torque sensor can be used as shown on the image below

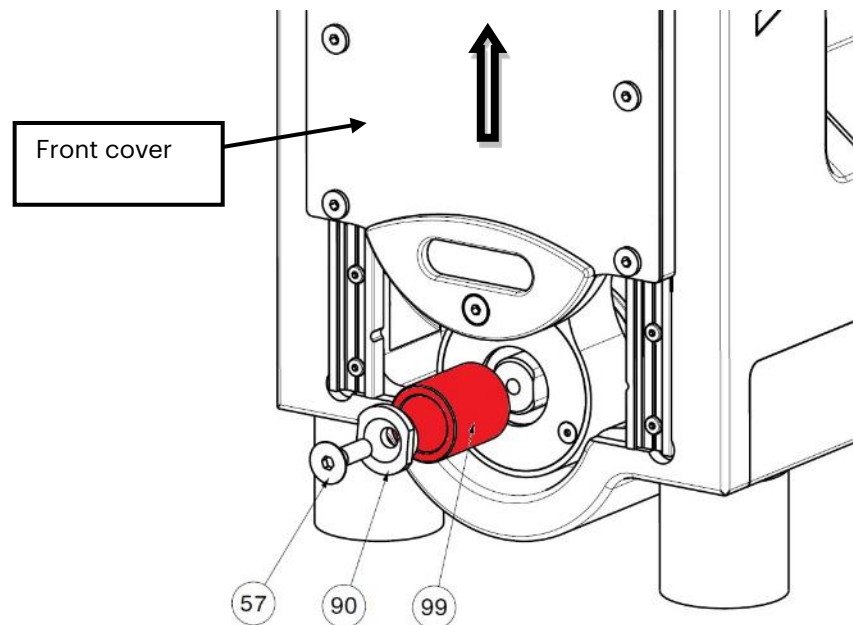


Do not attach or detach the torque sensor from the J160 while the machine is powered on, as this may permanently damage the sensor or the electronic parts of the machine.

Removing the transport eccentric bush

The J160 is delivered with a transport eccentric bush to prevent the drive mechanism from moving during the transport of the machine. Before starting any test, this transport eccentric bush should be replaced by the eccentric bush you need for your test. To change eccentricity, please follow these steps:

1. Open the front cover by sliding it vertically (items 4 and 5)
2. Remove the eccentric bush sleeve (item 90) by unscrewing and removing the M6 screw (item 57)
3. Remove the transport eccentric bush (item 99)
4. Install the bush that fit your testing need. See section "Changing eccentricity"

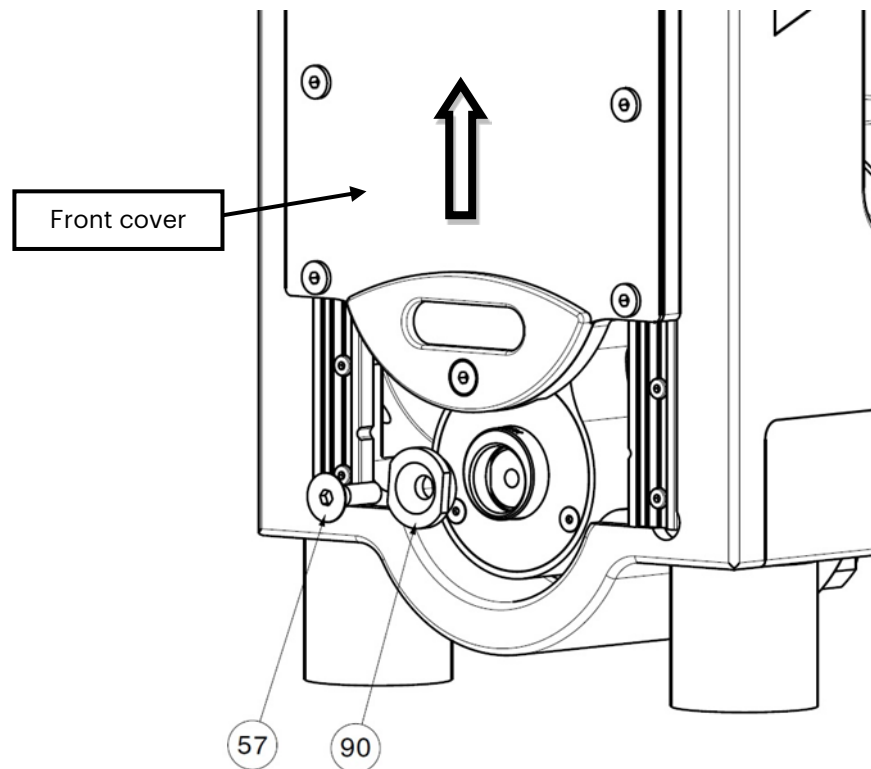


Preparing the machine

Changing eccentricity

The J160 is designed with variable and exchangeable eccentricity from ± 0.05 mm to ± 1.60 mm. Changing the eccentricity is accomplished by replacing the existing eccentric bush with another bush of different eccentricity. To change eccentricity, please follow these steps:

1. Remove any tested fastener and the top adaptor from the test fixture
2. Open the front cover by sliding it vertically upwards
3. Remove the eccentric bush sleeve (item 90) by unscrewing and removing the M6 screw (item 57)

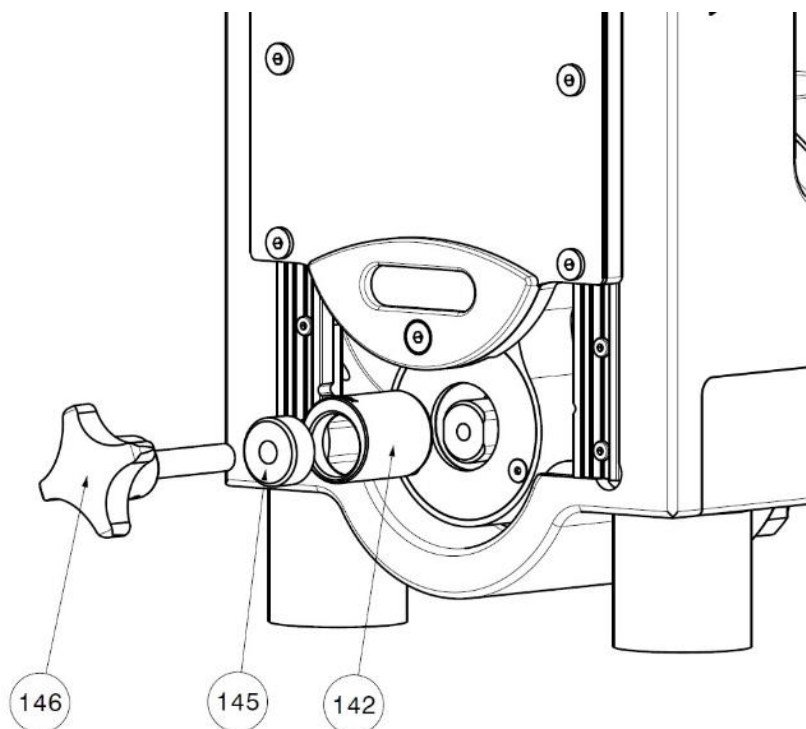


Preparing the machine

4. Tighten the eccentric bush puller (item 145) into the eccentric bush (item 142)
5. Tighten the star knob M8 (item 146) into the eccentric bush puller (item 145) and the eccentric bush will gradually move outwards from the connecting rod bearing and axle.
6. A wide range of eccentric bushes with different amplitude is available from Vibrationmaster. They are delivered in a strong wood box. Select the new eccentric bush to install in the J160.



7. Insert the new eccentric bush (item 142) on the axle and reassemble parts in the reverse order of disassembly
8. Tighten the M6 screw (Item 57) to lock the bush securely in place

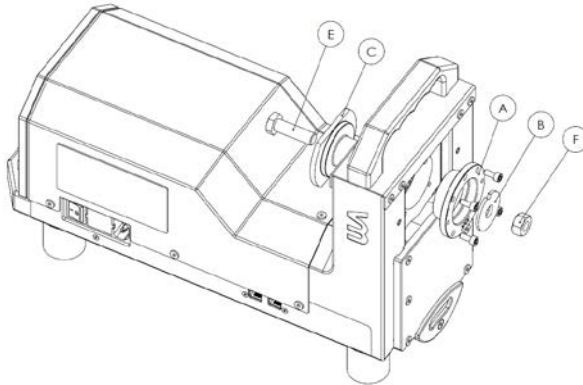


Vibrationmaster recommends lubricating the eccentric bushes on the inner surface before inserting the eccentric bush on the axle as this will make the eccentric bush easy to remove after use.

Preparing the machine

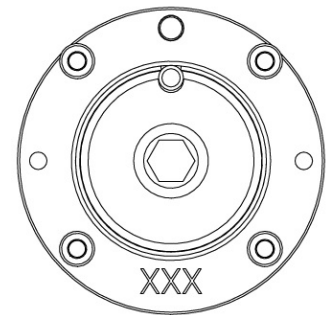
Installing fastener adaptors

These images show the mounting of adaptors with bolt anti-rotation system.

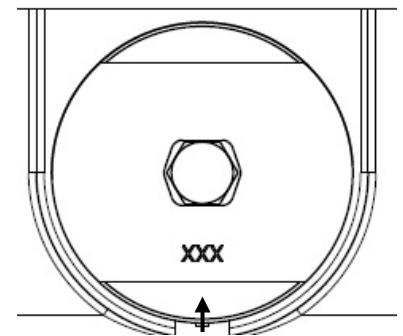


Item	Description
A	Top adaptor (TA)
B	Test washer (TW)
C	Sleeve with bolt anti-rotation system(SA)
E	Test fastener
F	Test Nut (with or without locking element)

Insert the top adaptor onto the glider plate with the accompanying test washer. Tighten the top adaptor to the glider plate using the M5 screws.



Insert the sleeve from the rear of the machine onto the clamping force sensor cover plate. This cover plate prevents the sleeve from rotating during demonstrations. When correctly mounted, the sleeve will be level with the cover plate.



Clamping force sensor cover plate

Insert the bolt through the sleeve.

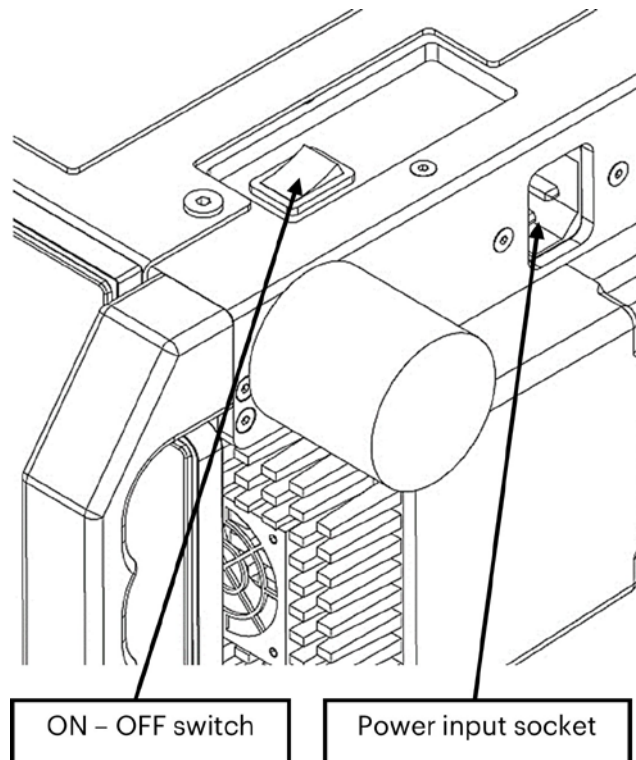
On the top adaptor side, screw on by hand the lubricated lock nut or locking element to be tested or demonstrated and gently tighten it finger tight



Do not tighten the nut with any tools until the Vibrationmaster Test software program is fully operational, all test parameters have been set and the clamping force value can be read on the screen.

Connecting to the mains supply

The J160 is fitted with a power input socket (IEC-C14 type) located below the chassis and an ON-OFF switch mounted on the back end of the chassis:



One power cord is supplied with the machine for connection to the mains supply.



Connect the J160 to an earthed mains power source by using either the US or EU power cord provided.

Do not use an extension cord, lead or double adaptor to power the unit.

Preparing the machine

Establishing connection between J160 and the operating device

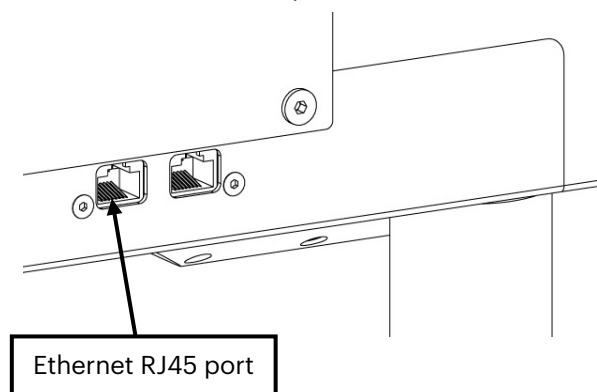
The J160 is operated using the machines inbuilt software (firmware) named Vibrationmaster Test Suite. Any PC laptop, smartphone and any other Wi-Fi enabled device can be used to operate the machine. Before operation can begin, a connection between the J160 and the desired operating device such as a laptop PC must be established.



Although the unit can be operated by any Wi-Fi enabled device with a browser installed, Vibrationmaster recommends using a powerful PC with a good graphics card in order for the PC to cope with the thousands of datapoints captured during a test.

Connection with an ethernet cable

Connect a RJ45 ethernet cable (not included) between the user's computer and the ethernet port on the machine "Network". The user's device will automatically find and connect to the J160's network.



Wireless connection

The J160 is equipped with an 802.11n capable wireless chip, enabling connection to any Wi-Fi capable device. To connect to the J160 and access its web-based graphical user interface, turn on the J160 and allow approximately 60 seconds for the operating system to boot.

Once ready, the J160 will spawn a WPA-protected Wi-Fi network named J160.x.xxxx where the x.xxxx is equal to the unit's unique serial number. The unique password allowing connection to the J160 has been predefined before delivery by Vibrationmaster and cannot be changed. The password can be found on the unit's calibration certificate.



The unique password to connect to the J160's operating system can be found on the document Wireless password and calibration certificate enclosed with the delivery.

The password cannot be changed by the operator.

Forgot the Wi-Fi password or lost the calibration certificate? No problem, please contact Vibrationmaster immediately by telephone (+352 24 51 30 19) or send an email to support@vibrationmaster.com.



When connecting to the J160 through its Wi-Fi network, try to minimize radio interference from other devices using radio in frequencies close to the 2.4 GHz and 5 GHz bands, such as cordless keyboard and mouse.

In the event the computer is connected to the J160 with both Wi-Fi signal and the ethernet cable, the user's device will determine which connection will prevail and prevent any conflict.

Software

4. Software

Launching Vibrationmaster Test Suite software

Once connected to the J160's network, open a web browser to the address: <http://10.0.0.1/>

The Vibrationmaster Test Suite application will load in the browser window and in the process, query the J160 about its operating status.

Please note, the Vibrationmaster Test Suite has been developed primarily for Google Chrome and secondly for Chromium browsers. The Vibrationmaster Test Suite is not supported for browsers such as Microsoft Internet Explorer, Microsoft Edge or Apple's Safari. Using a non-supported browser to operate the J160 may cause the Vibrationmaster Test Suite to not function properly and may limit functionalities.

Network strength signal symbol

A network strength signal symbol in the upper right corner of the Vibrationmaster Test Suite Title bar indicates whether connectivity, either through the Ethernet cable or via Wi-Fi, between the J160 and the operating device is established.



A crossed red symbol indicates that there is no connection established and the software status is offline.



A full green symbol indicates connectivity between the J160 and the operating device is established.

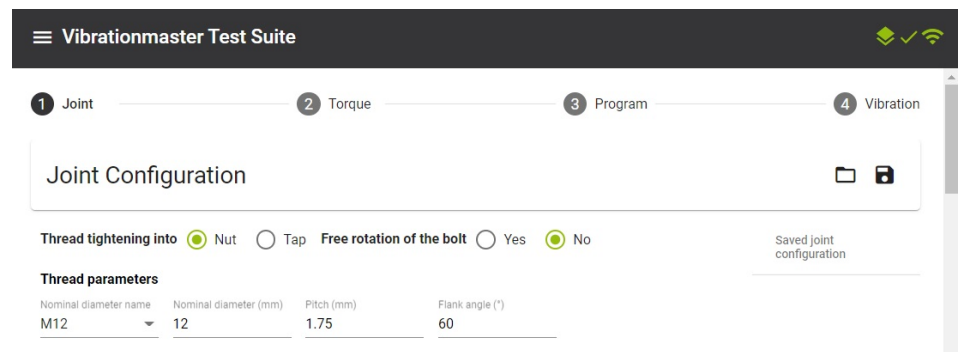
Passing the cursor over the network strength symbol, or tapping the symbol on a mobile device, will display a detailed status notification.

Overview of Vibrationmaster Test Suite

The Vibrationmaster Test Suite user interface is divided into two main parts:

- Title bar
- Content area.











The Title bar gives access the Main menu and a notification area.



Notifications

At the top right of the Title bar, important notifications are displayed that can be divided into three categories:

- Initialization
- Machine state
- Connectivity

Category	Icon	Description
Initialization		The machine has been successfully Initialized .
Initialization		Clicking this red icon will Start the initialization process and the icon turns green once initialised
Machine state		The machine is in Uninitialized state and must be initialized before operation is possible
Machine state		The machine is ready in Idle state and waiting for user input.
Machine state		The machine is in Busy state while performing an operation
Machine state		The machine is performing Vibration test procedure
Machine state		The machine is performing a Torque test procedure
Machine state		The machine is in an Error state and corrective action are required before operation
Connectivity		Connection between the J160 and Vibrationmaster Test Suite on an operating device is established
Connectivity		There is No connection between the J160 and Vibrationmaster Test Suite software

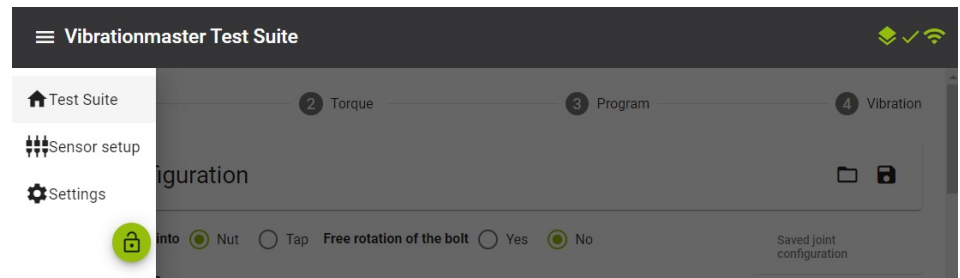
Software




Main Menu

The Main menu is accessed by clicking on the menu icon in the upper left side of the Title bar and has three items:

- Test Suite
- Sensors Setup
- Settings.



Entry	Description
Test Suite	Access to all the test related functions of the machine. The Test Suite is the default loaded page
Sensors setup	Access to the Sensor setup page
Settings	Access to general Settings
	Unlock or lock the main menu to be visible on the screen at any time (Lock) or disappear (Unlock)

Machine Initialization

Upon switching ON the J160, the machine will automatically attempt to initialise. The initialisation icon turns green after successful completion of the process and the Idle icon is shown to indicate the machine is ready waiting for user input.



Test Suite section

From the Test Suite section of the software, the user can configure the bolted joint related parameters, make a series of theoretical calculations, perform torque/tension tests, set-up the vibration test program, and perform vibration tests.

The Test Suite section has four main views:

- Joint
- Torque
- Program
- Vibration

On top of the Content area, a stepper guides to convenient navigation between the four different pages.



Joint page

In the Joint page all parameters relating to the bolted joint is defined. Initially, the type of bolted joint to be tested by selecting if the bolt is tightened into a Nut or Tap. The user can also define if the bolt is able to rotate or fixed from rotation.

Thread tightening into ☒ Nut ☐ Tap Free rotation of the bolt ☒ Yes ☐ No

On the second part of the joint configuration section, the user can set the fastener nominal diameter size, pitch and flank angle of the thread he wants to test.

Thread details

Nominal diameter name	Nominal Diameter (mm)	Pitch (mm)	Flank angle (°)
M12 ▼	12	1.75	60

Optional description

The setups in the first two parts are mandatory to obtain measurements. The third setup that can be taken into consideration for the material used.

Bolt specific parameters

Grade	Material	Yield strength (MPa)
8.8 ▼	Steel	640
Young modulus (MPa)	Necked-down ø (mm)	Proof tensile load (kN)
210000	0	48.54

Optional description

Depending on what the type of test (nut or tap), the user can set the material for this. For the nut the user has the choice to set the proof strength and thread length, the proof tensile load will be automatically calculated from the input values.

Nut specific parameters

Grade	Material	Proof strength (MPa)
8	Steel	800
Thread length (mm)	Proof shear load (kN)	
9.88	53.93	

Optional description

For the tap the user has the choice to set the thread engagement, the proof shear load will be automatically calculated from the input values.

Tap specific parameters

Material	Yield strength (MPa)
Steel	800
Thread engagement	Proof shear load (kN)
9.88	53.95

At the end of the joint configuration section, the specific parameters are set.

Joint specific parameters

Inner ϕ (mm)	Outer ϕ (mm)	Dkm (mm)
13	16.6	14.8
Clearance hole ϕ (mm)	Clamping length (mm)	Real friction between joi...
13	20.4	0

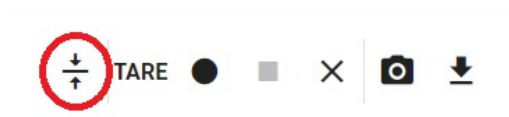
For the help of the user, a Torque / Clamping force calculator is implemented in the software. By setting Theoretic total friction and % of proof load, the software will calculate required torque and clamping force to reach the desired Joint proof load.

Torque / Clamping force calculator

Joint proof load	Theoretic total friction f...	% of proof load
48.54	0.14	75
Calculated torque (N·m)	Calculated clamping for...	
69	31.5	

Torque Test

Before starting a new torque test or vibration test please conduct a zero alignment - first button in the toolbar. The zero alignment will ensure the inner diameter of the Top Adaptor is concentric to the inner diameter of the Sleeve.



After the zero alignment is finished the user may perform a tare function - second button in the toolbar. The tare function will reset all sensors to zero.



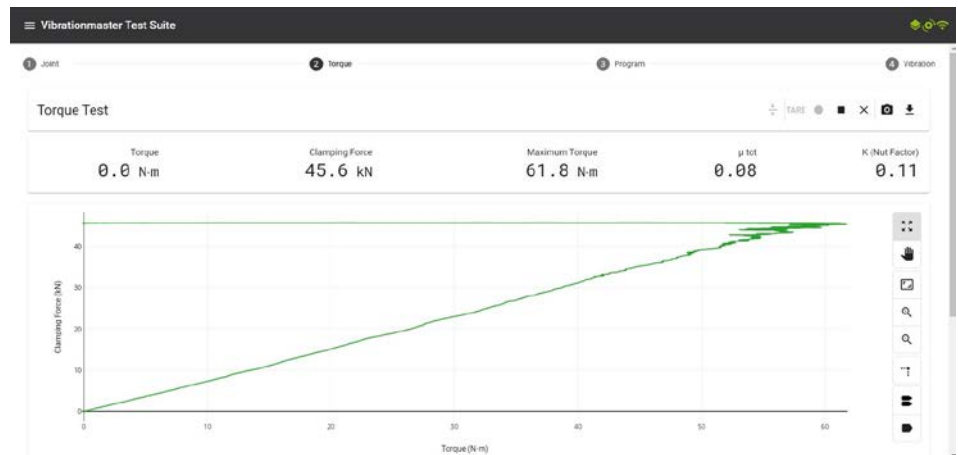
The user can now install the new fastener to be tested.

In the torque section, the application uses the parameters set in the previous section - joint configuration, to display in real time the torque, clamping force and maximum torque. The application will automatically calculate the total coefficient of friction (μ_{tot}) and K (Nut factor) and displays those values real-time in the measurement section.

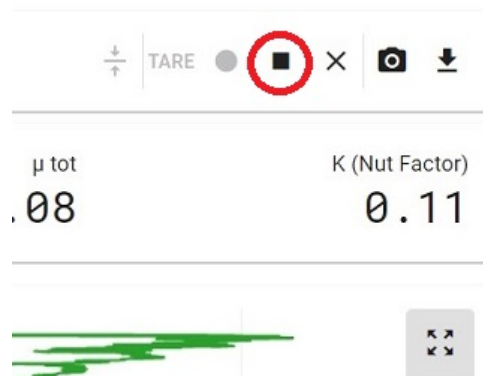
The user can now record the torque test parameters, pushing the record button - 3rd button.



Now we can see the real-time measurements on the torque cockpit and the results in the graph area.



Once the tightening process is completed, press the STOP RECORD button to stop the recording



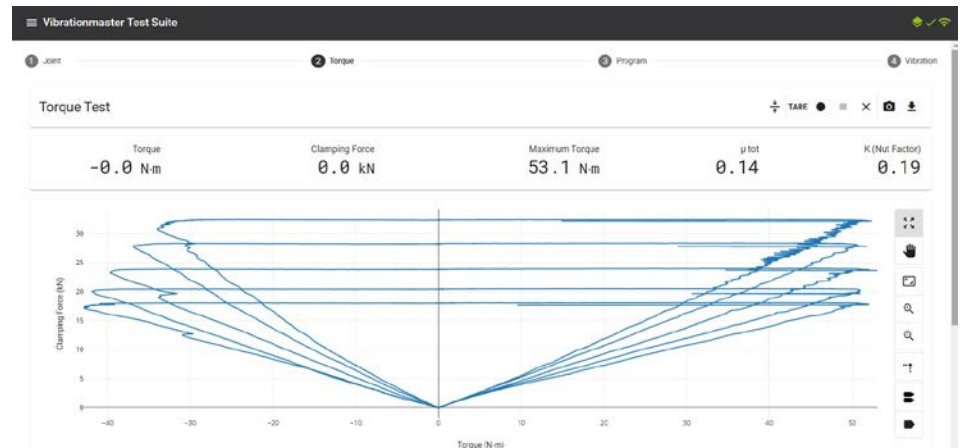
The user can also record the untightening process or record a new tightening process. If the recording is not manually stopped after the tightening process, it allows the user to register the untightening process on the same curve as the tightening process.



To record the untightening process on a new curve, click on the RECORD button and then untighten the fastener.

Once the untightening process is completed, press the STOP RECORD button to stop the recording.

To record multiple tightening and untightening processes, repeat the previous steps as many times as needed.



Cockpit section

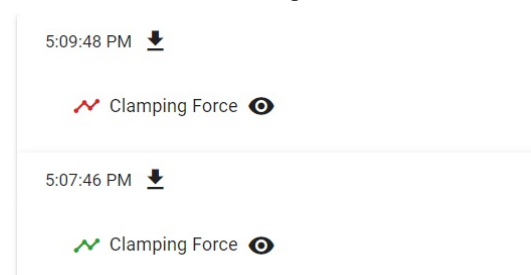
The cockpit section shows the data related to the torque/tension tests.



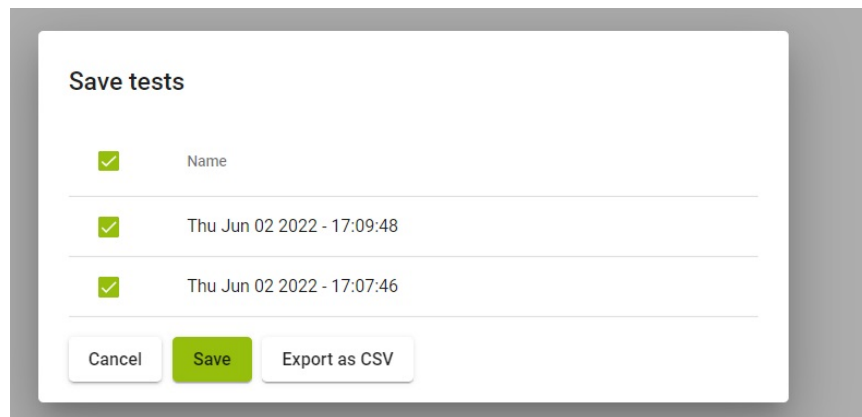
When performing a torque/tension test, the display section shows in real-time the torque and clamping force curve and displays the following data:

- Current clamping force [kN or lbf]
- Torque [$N \cdot m$]
- Maximum torque [$N \cdot m$]
- Total coefficient of friction (μ_{tot})
- Nut factor (K)

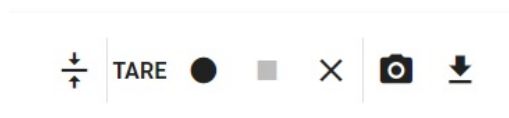
The user can now work with every saved torque test measurements individual in the working area and download every measurement.



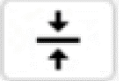





The user can save all the tests made for a fastener setup with a click on the general save button - the last in the toolbar. This will open a dialogue window where he can set all or filter torque test measurements and save this or export the results as CSV file.

A screenshot of a 'Save tests' dialog box. The dialog has a title bar 'Save tests'. Inside, there is a table with three rows. Each row has a green checkmark in a small box on the left, followed by a text field. The first row's text field is labeled 'Name'. The second row's text field contains 'Thu Jun 02 2022 - 17:09:48'. The third row's text field contains 'Thu Jun 02 2022 - 17:07:46'. At the bottom of the dialog, there are three buttons: 'Cancel', 'Save' (highlighted in green), and 'Export as CSV'.

Tool Bar explained



The following action buttons are available at the top of the measurement section:

Field	Name	Description	Comments
	Align	Will align the Top Adaptor to the centre of the sleeve	The ALIGN button is only active before starting a test.
	Record	Starts the record torque test	
	Stop	Stops the torque test	This button is selectable once the test is completed
	Clear results	Allows the user to clear, delete all recorded data of the current test	This button is selectable once the test is completed
	Snapshot	Allows the user to save a screenshot of the current display as a .png image file	The operation mode and available actions are described in the "Saving and opening test data files" section of this manual
	Save tests	Allows the user to save test data, as well as export that data to a .csv files	The operation mode and available actions are described in the "Saving and opening test data files" section of this manual

Software

Program Configuration

In the program configuration, the user can define a vibration test program. A vibration test program can consist of one or more individually configurable steps and a target value that defines when the test program is automatically stopped.

Program Configuration

Output from tightening

Tightening torque (Nm)	Clamping Force (kN)	Total Friction Factor (μtot)	
63.37	43.12	0.09	
% of bolt yield strength	% of joint proof load	Underhead friction factor	Transverse load to slip(kN)
79.95	88.83	0.09	3.88

Marginal slip calculation

Calculation method

0

Marginal Slip displacement (mm)

1.04

Program

Frequency (Hz)	Cycles		No.	Frequency (Hz)	Cycles	Delete
12.5	200	+				

Stop when clamping force reaches [h]

5

Unit

%

In the first section, the measured and calculated values from the last tightening is displayed.

Output from tightening

Tightening torque (Nm)	Clamping Force (kN)	Total Friction Factor (μtot)	
63.37	43.12	0.09	
% of bolt yield strength	% of joint proof load	Underhead friction factor	Transverse load to slip(kN)
79.95	88.83	0.09	3.88

For the information of the user, a marginal slip calculator is added to inform the user, when the first marginal slip is expected. The user can select between different calculation principles for the marginal slip, as stiff joint (Junker), soft joint or customer.

Marginal slip calculation

Calculation method

Soft joint

Marginal Slip displacement (mm)

0.11

Max displacement geometry(mm)

1.04

In the program section the user can set frequency and duration for each individual step and then add that step to the overall program with a click on + button.

Program

Frequency (Hz)	Cycles	
12.5	200	+

Stop when clamping force reaches [%]

5

Unit

%



The values entered will be validated and, provided they are within the acceptable ranges, added to the program.

For the safety of the user and to avoid fastener failure by fatigue, the maximum total number of cycles for one program is 2500 cycles in one or several steps.

Program
Frequency (Hz)
5
Cycles
500
+
Stop when damping force reaches [%]
5
Unit
%



No.	Frequency (Hz)	Cycles	Delete
1	12.5	1000	—
2	2	250	—
3	5	500	—

The user can also save the current program to the device's local storage using the SAVE button or load a predefined program from the device's local storage using the LOAD button.

Customer program configurations

Customer Program

Field	Description	Comments
+	Add a program step	This button adds the current step to the program.
	Load a saved program	Load a previously saved program from the list of saved programs
	Save the current program	Save the current program to disk as a JSON file

Software

Vibration Test



If a zero alignment was not already done before torque tightening, please conduct a zero alignment - first button in the toolbar. The zero alignment will ensure the inner diameter of the Top Adaptor is concentric to the inner diameter of the Sleeve.

On the left-hand side of the vibration test screen, the program loaded for this test is displayed.

Vibration Test

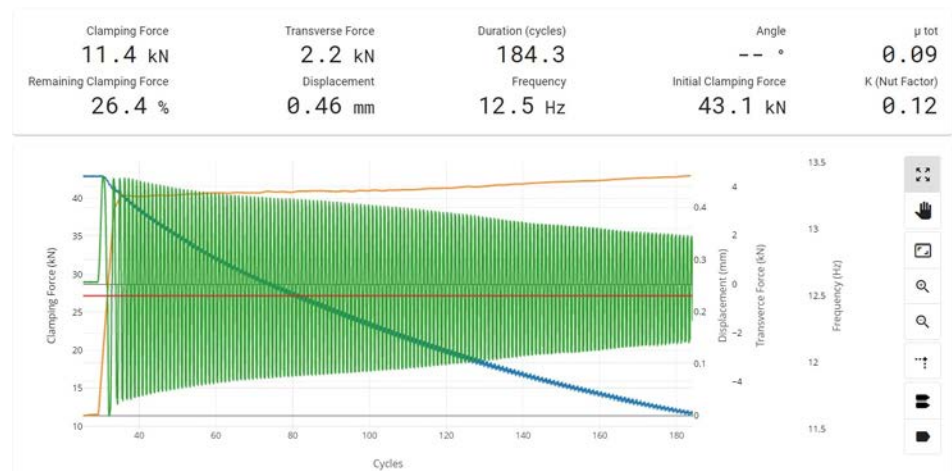
Frequency (Hz)	Cycles
12.5	1000
2	250
5	500

When performing a vibration test, the measuring section shows the real-time evolution of the Clamping force, transverse force, displacement, and frequency. The following data is displayed

- Clamping Force real time [kN or lbf]
- Remaining Clamping Force real time [%]
- Transverse force real time [kN]
- Displacement real time [mm] real time
- Duration real time [Cycles]
- Frequency real time [Hz]
- Rotational angle real time [°]
- Initial clamping force [kN or lbf]
- Total coefficient of friction calculated (μ_{tot})
- K (Nut Factor) calculated

Clamping Force 2.2 kN	Transverse Force 0.8 kN	Duration (cycles) 468.4	Angle -- °	μ_{tot} 0.09
Remaining Clamping Force 5.0 %	Displacement 0.50 mm	Frequency 12.5 Hz	Initial Clamping Force 43.1 kN	K (Nut Factor) 0.12

In the graph section, the real time development of the vibration test is displayed.



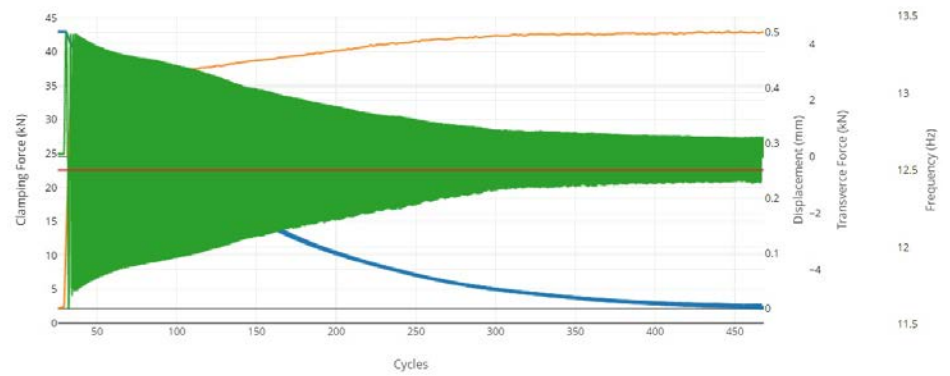
The display section shows the following data:

Field	Description	Units	Comments
Clamping Force	Displays the current preload value reported by the clamping force sensor	kN or lbf	If a filter is applied to the clamping force sensor, the displayed value is the filtered value
Remaining Clamping Force	Displays the % of remaining clamping force from the start of the vibration test	%	It is calculated using the "Initial clamping force" and the current displayed "Clamping force" (filtered value if a filter has been selected)
Transverse force	Displays the real-time transverse force acting on the tested fastener	kN or lbf	Optional transverse force sensor required. If a filter is applied to the transverse force sensor, the displayed value is the filtered value
Displacement	Displays the real-time displacement of the test fixture	mm	If a filter is applied to the displacement sensor, the displayed value is the filtered value
Duration	Displays the number of cycles elapsed since the starting of the test	Cycles	

Software

Frequency	Displays the current frequency of the test step	Hz	The frequency level is also drawn on the graphics
Rotational angle	Displays the self-loosening rotation of the bolt head or nut	Degree °	
Initial clamping force	Displays the clamping force value registered at the time the user presses the START button	kN or lbf	
Total coefficient of friction (μ_{tot})	Displays the real-time total coefficient of friction calculated during the tightening process		Optional torque sensor required.
K (Nut Factor)	Displays the real-time nut factor calculated during the tightening process		Optional torque sensor required.

Below the graph section, the data set labels are displayed.



6:27:57 PM







- ☒ Clamping
- ☒ Displacement
- ☒ Transverse
- ☒ Frequency

By a click on the eye on the right hand side after each data label, the user will show or hide the respective graphical display of that data set.

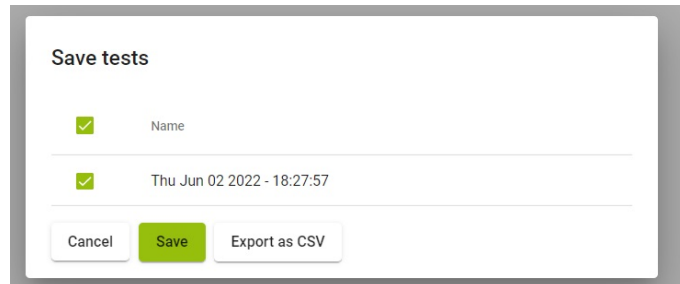
Tool Bar explained



The following action buttons are available at the top of the measurement section:

Field	Name	Description	Comments
	Align	Will align the Top Adaptor to the centre of the Sleeve	If an alignment was already done before tightening, zero alignment on the vibration test screen may be disregarded
	Play	Starts the vibration test	
	Stop	Stops the vibration test	This button is selectable once the test is completed
	Clear results	Allows the user to clear, delete all recorded data of the current test	This button is selectable once the test is completed
	Snapshot	Allows the user to save a screenshot of the current display as a .png image file	The operation mode and available actions are described in the "Saving and opening test data files" section of this manual
	Save tests	Allows the user to save test data, as well as export that data to a .csv files	The operation mode and available actions are described in the "Saving and opening test data files" section of this manual

Test results can be saved with a click on the general save button - the last in the toolbar. This will open a dialogue window and enable the data set(s) to be saved or exported.

A screenshot of a 'Save tests' dialog box. The dialog has a title bar 'Save tests'. Inside, there are two rows of data. The first row has a green checkmark in a box and the text 'Name'. The second row has a green checkmark in a box and the text 'Thu Jun 02 2022 - 18:27:57'. At the bottom of the dialog, there are three buttons: 'Cancel', 'Save' (highlighted in green), and 'Export as CSV'.

Software

Sensors Setup



The user should not amend the sensor setup unless they are completely familiar with the effects of changing data. Changing parameters in the Sensor setup section may cause permanent damage to the unit.




The Main Menu has 3 items: Test Suite, Sensors Setup and Settings. Sensors Setup is loaded from the left side navigation bar menu.



Tool Bar explained



The following action buttons are available at the top of the sensor setup section:

Field	Name	Description	Comments
	Add new Sensor	Allows the user to add a new sensor to the actual sensors file	
	Save sensors setup	Allows the user to save sensors set up on the machine	The operation mode and available actions are described in the "Saving and opening sensors setup data files" section of this manual
	Load sensors setup	Allows the user to load sensors setup from the machine	The operation mode and available actions are described in the "Saving and opening sensors setup data files" section of this manual

Sensor setup section

Allows the user to set sensor relevant parameters such as port on the control system, measurement type, communication protocol, sensor amplifier output mode, sensor amplifier resolution, sensor amplifier gain,

sensor amplifier control voltage as well as an optional description of the sensor module.

4 - clamping : Clamping Sensor Setup ✓

☒ Enabled

Port
4

Measurement
Clamping Force

Communication protocol
VARSig

PGA Mode
Bridge

PGA Resolution
16 bits

Amplification gain
200

Control Voltage
3V

Optional Description
Clamping Sensor Setup






Please consult Vibrationmaster if you feel changes are needed to the sensor setup. Changing parameters in the Sensor setup section may cause permanent damage to the unit.

The sensor setup section let the user set the following parameters for the sensor.

Field	Description	Comments
Enabled	Enables or disables the sensor	
Port	Defines the port in the control system where to the sensor is connected	
Measurement	Defines the type of measurement of the sensor	
Communication protocol	Defines the type of communication protocol.	Allows the user to set a VARSig or SSI. Contact Vibrationmaster for further information
PGA Mode	Defines the type of sensor output to the sensor amplifier.	Allows the user to select Bridge mode if the sensor has a mV/V output or Single-ended mode if the sensor has a 0-10V analogue output. Contact Vibrationmaster for further information
PGA Resolution	Defines the resolution of the sensor amplifier.	Allows the user to select 16 bits or 24 bits. Contact Vibrationmaster for further information

Software

Amplification gain	Defines the gain set in the sensor amplifier.	Contact Vibrationmaster for further information
Control voltage	Defines the voltage supply to the sensor when in Bridge mode.	Contact Vibrationmaster for further information
Optional Description	Allow the user to set more information about the sensor	Free text input field
Calibration Points	Used to set the calibration points	
Unit	Allow the user to set the unit	The calculation is made automatically from the VAR controller
Zero Reading	Sets the zero reading	
Nominal	The real physical value applied to the sensor	Input field
Sensor	The raw value measured by the sensor	Input field
Multiplier	The correction factor	The correction factor calculated with the formula: $Multiplier = \frac{Nominal}{Sensor}$
	Delete a calibration point	
	Add an additional calibration point	
	Delete the sensor and all input	


Save sensors setup



Please consult Vibrationmaster if you feel changes are needed to the sensor setup. Changing parameters in the Sensor setup section may cause permanent damage to the unit.

Allows the user to save all sensors parameters to the machine. For this, the user must input the device password found in the Calibration Certificate and on the Machine Type sign below the frame of the unit.

Device Password



SAVE

Maintenance of the J160

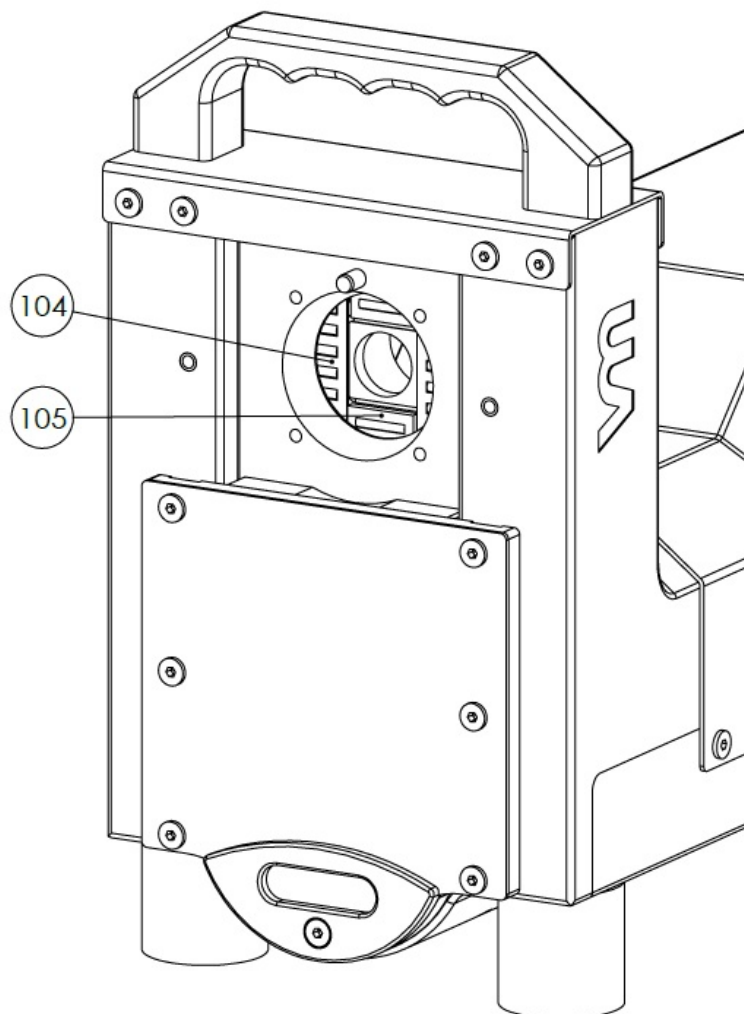
5. Maintenance of the J160

Periodic maintenance

To ensure the continued safe and reliable operation of the J160, certain maintenance operations need to be carried out on a periodic basis.

Before every use:

- Clean any dirt or foreign bodies from the machine and fixture surface but do not remove the lubrication from the contact surfaces. Use a soft damp cloth and a mild detergent to clean the anodised surfaces
- Make sure that the mains cable is not damaged
- Lubricate the flat cage bearings (item 104 and 105) with suitable bearing grease – Vibrationmaster recommends the use of all-purpose industrial bearing grease such as SKF LGMT 2/0.035.



Periodic:

Certain maintenance operations need to be carried out on a periodic basis to ensure the continued safe and reliable operation of the Vibrationmaster J160.

The table below indicates the recommended intervals for maintenance depending on the usage intensity:

Daily use: the machine is used every day of the week.

Weekly use: the machine runs a few tests per week.

Occasional use: the machine is used less than once per week.

Maintenance operation	Corrective action	Daily use	Weekly use	Occasional use
Lubricate the angular cage bearings, the flat cage bearings and the connecting rod bearing	Follow instructions in this manual	Monthly	Quarterly	Yearly
Check for unusual wear on bearings and parts in contact with them.	Replace worn or defective parts.	Monthly	Quarterly	Yearly
Check that all screws and bolts are tightened. If necessary tighten or change the screws/nuts	If necessary tighten or change the screws/nuts	Monthly	Quarterly	Yearly
Check for wear on the rubber feet	Replace them if they are damaged or excessively worn.	Monthly	Quarterly	Yearly
Check for wear on all moving parts	Replace worn or defective parts	Monthly	Quarterly	Yearly
Check the electrical wiring and ensure all wires are connected properly	Reconnect disconnected wire	Yearly		
WEAR PARTS: replace the bearings	Refer to the Spare Parts List for our bearings replacement kit	Yearly	Every 2 years	Every 5 years
Calibrate the clamping force sensor and amplifier to ensure continued measuring accuracy	Follow instructions in this manual	Yearly		
Calibrate the optional torque sensor and amplifier to ensure continued measuring accuracy	Follow instructions in this manual	Yearly		
Calibrate the optional transverse force sensor and amplifier to ensure continued measuring accuracy	Follow instructions in this manual	Yearly		

Maintenance of the J160

Corrective maintenance

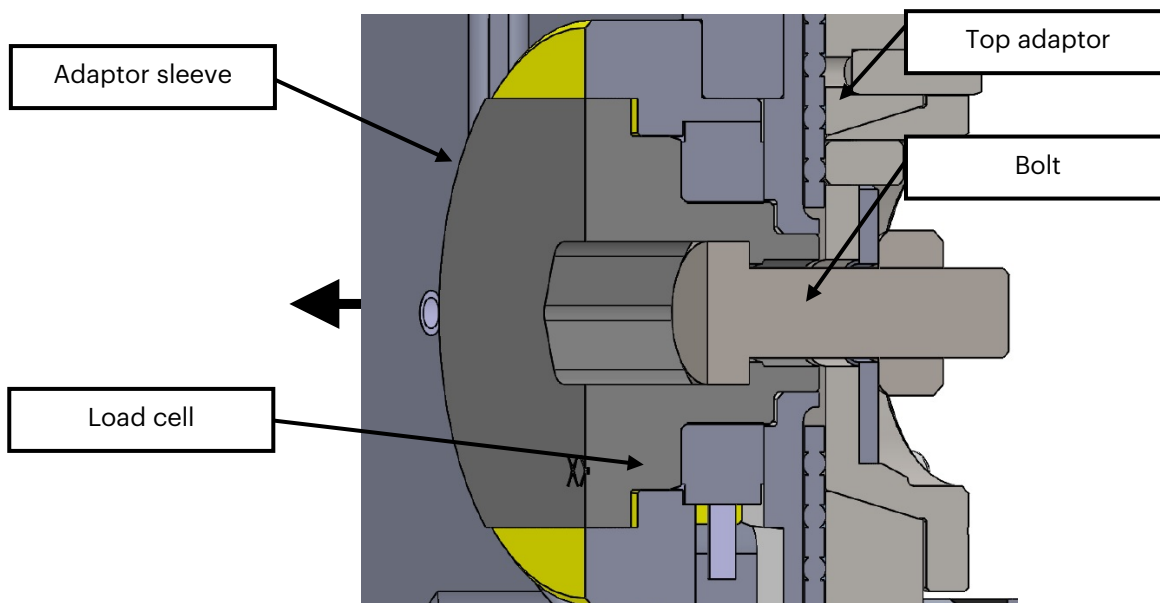
If experiencing problems when trying to use the J160, it may be necessary to carry out tests and perform corrective maintenance.

Tablet PC does not connect to the J160:

- Check that the J160 is plugged in and turned ON (both at the mains socket and on the J160 on/off switch)
- Check the fuse in the inline fuse holder inside the machine and replace if needed
- Check the tablet PC is turned ON and operating correctly
- Check the strength of the wireless connection between the J160 and the tablet PC. If required, move the tablet PC closer to the J160 to get a stronger wireless signal

Bolt clamping force values not seen / not updated on tablet screen:

- Check the strength of the wireless connection between the J160 and the tablet PC. If required, move the tablet PC closer to the J160 to get a stronger wireless signal
- Check for faulty or damaged cable connections and wiring from the clamping force sensor to the load amplifier ensuring the connection cable is undamaged
- Check the clamping force sensor mounting on the fixture: the clamping force sensor contact surface should always be parallel to the adaptor sleeve surface.
- Check that the adaptor sleeve and top adaptor are free to move into their housing when no bolt is tightened.



Motor does not start during test:

- Check that the J160 is plugged in and turned ON (both at the mains socket and on the J160 on/off switch)
- Check the fuse in the inline fuse holder inside the machine and replace if needed
- Check the test sample clamping force values. Reduce the clamping force if it is higher than the specifications and then restart the test
- Check if any foreign body has become trapped in the guide slots or drive mechanism
- Check if there is damage to the bearings on the axle. Replace the bearings if required or contact Vibrationmaster support for advice.

Displacement sensor does not return any value:

- Check the strength of the wireless connection between the J160 and the tablet PC. If required, move the tablet PC closer to the J160 to get a stronger wireless signal
- Check in Sensor setup that the sensor is Enabled
- Remove the front cover (see section "remove / install covers")
- Clean the top face of the sensor with a soft cloth.
- Reassemble the front cover.

The front cover doesn't slide up:

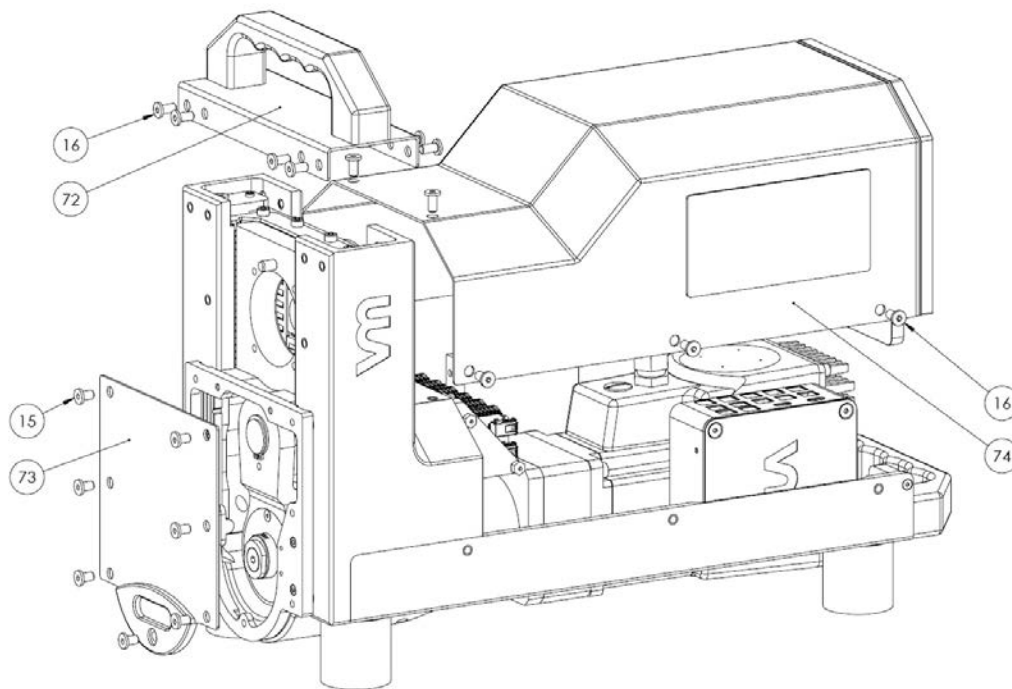
- Remove the front cover (see section "remove / install covers")
- Check that all screws on the front of the machine are properly tightened and do not prevent the cover from sliding.
- Inspect and remove any foreign body that may prevent the cover from sliding.
- Reassemble the front cover.

Maintenance of the J160

Remove / Install the covers

To perform certain maintenance operations, it is necessary to remove the covers and access the internal parts of the machine.

Always turn off the J160 and disconnect the mains cable before removing the covers.



1. Remove the main cover (item 74) by unscrewing and removing the eight M5 fasteners (item 16)
2. Remove the top cover (item 72) by unscrewing and removing the eight M5 fasteners (item 16). When removing the top cover, lift up the assembly carefully taking care of the wiring and the LED lights mounted thereon.
3. Remove the front cover (item 73) by unscrewing and removing the seven M5 fasteners (item 16)

To install the covers, reassemble the parts in the reverse order to disassembly



Always turn off the J160 and disconnect the mains cable before removing the covers.



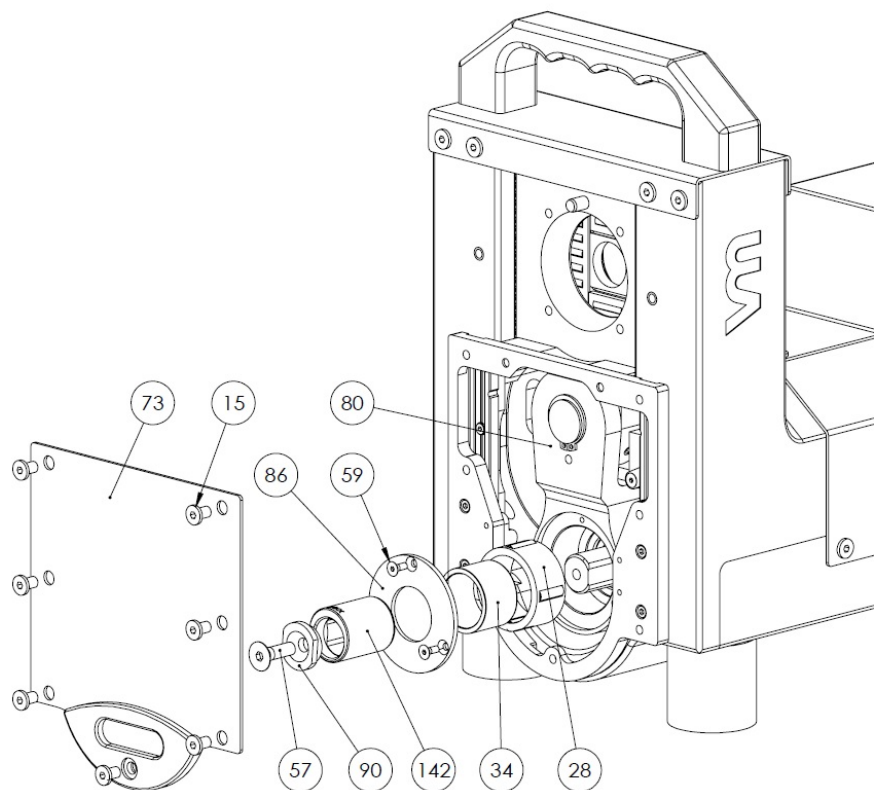
When removing the top cover, lift up the assembly carefully taking care of the wiring and the LED lights mounted thereon.

Lubricate / replace the connecting rod bearing

The connecting rod bearings require periodic maintenance to function properly and to reduce heat generation. It is recommended that a suitable grade of grease is used for lubrication – Vibrationmaster recommends the use of all-purpose industrial bearing grease such as SKF LGMT 2/0.035.

Lubrication procedure for the connecting rod:

1. Turn off the J160 and unplug the machine's power cord
2. Remove the front cover (item 73) by unscrewing the seven M5 fasteners (items 15)
3. Remove the eccentric bush sleeve (item 90) by unscrewing and removing the M6 screw (item 57)
4. Remove the eccentric bush (item 142) using the star knob and eccentric bush puller (see section "Changing eccentricity")
5. Remove the connecting rod cover (item 86) by unscrewing the three M3 screws (item 59)
6. Remove the connecting rod bearing inner ring (item 34)
7. Extract the connecting rod bearing needle cage (item 28) from the connecting rod (item 80)



Maintenance of the J160

8. Clean the bearing housing in the connecting rod, the bearing cage and the bearing inner ring. If needed, replace them.
9. Clean and check all disassembled parts. Replace them if any excessive wear or damage is evident. If required, contact Vibrationmaster support for advice.
10. Apply grease on the bearing cage and insert it back in the connecting rod together with its inner ring.
11. Reassemble the parts in the reverse order
12. Reconnect the electrical supply and turn on the J160
13. Check for correct operation.

Lubricate / replace the test fixture bearings

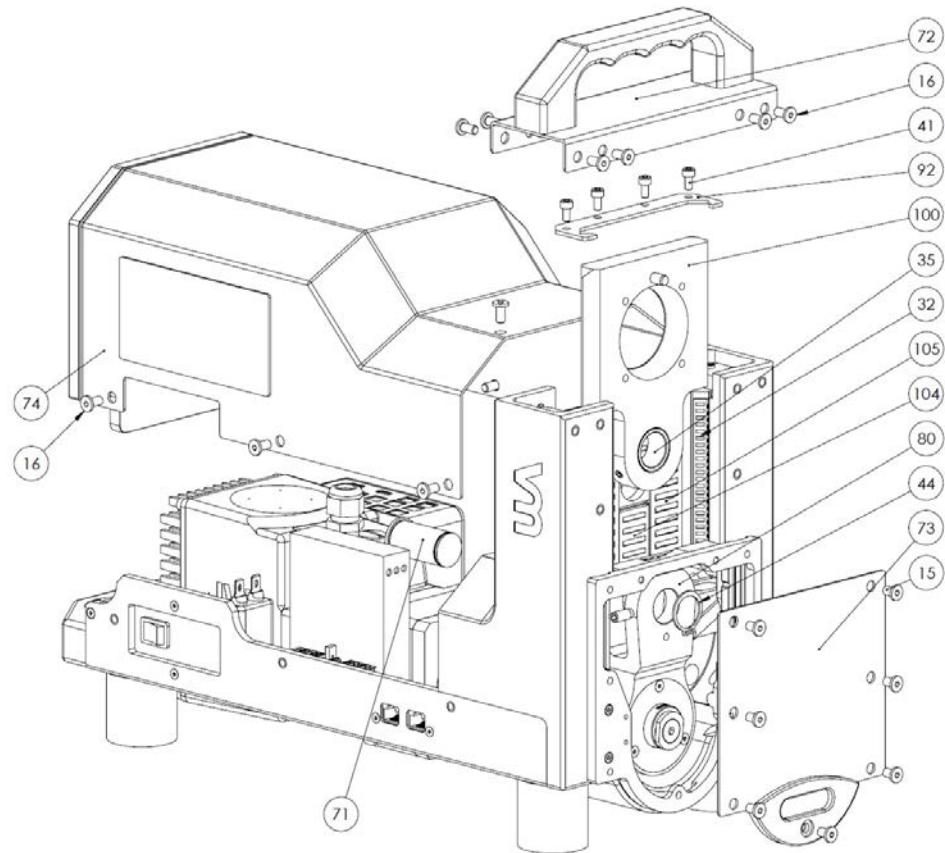
The guide bearings and load support bearings require periodic lubrication to function properly and to reduce heat generation. It is recommended that a suitable grade of grease is used for lubrication – Vibrationmaster recommends the use of all-purpose industrial bearing grease such as SKF LGMT 2/O.035.

To lubricate or replace the test fixture bearings:

1. Turn off the J160 and disconnect the mains cable.
2. Remove the top adaptor and sleeve from the fixture
3. Remove the top cover assembly (item 72) by unscrewing and removing the eight M5 fasteners (item 16). Lift up the top cover assembly carefully taking care of the wiring and the LED lights mounted inside the handle assembly
4. Remove the end piece top (items 92) by unscrewing and removing the four M4 screws (item 41)
5. Remove the front cover (item 73) by unscrewing and removing the seven M5 fasteners (item 15)
6. Remove the circlip (item 44)

Maintenance of the J160

7. Remove the main cover (item 74) by unscrewing and removing the eight M5 fastener (item 16)



8. Push back and remove pin (item 71) from the connecting rod (item 80) and glider plate (item 100)



Pay attention not to damage the clamping force sensor cable while removing the pin.



If you ordered the machine with the optional transverse load sensor, a load pin replaces the pin. See section “remove / install the transverse load sensor” to remove the load pin.

9. Lift the glider plate (item 100) upwards
10. Remove the four flat roller cage bearings (item 104 and 105) and two angled needle bearings (item 32) and clean them with grease detergent. Replace the bearings if wear is evident
11. Clean and check all disassembled parts. Replace them if any excessive wear or damage is evident. If required, contact Vibrationmaster support for advice.
12. If necessary, remove the plain bearing (item 35) using a press and press new one. This bearing doesn't require grease
13. After careful cleaning, apply grease on all six bearings and reposition them
14. Wipe away any excess grease before final assembly
15. Reassemble the parts in the reverse order
16. Before reassembling the top cover assembly, adjust the position of the glider plate (see section “adjust the glider plate”)
17. Reconnect the electrical supply
18. Turn on the J160 and check for correct operation.

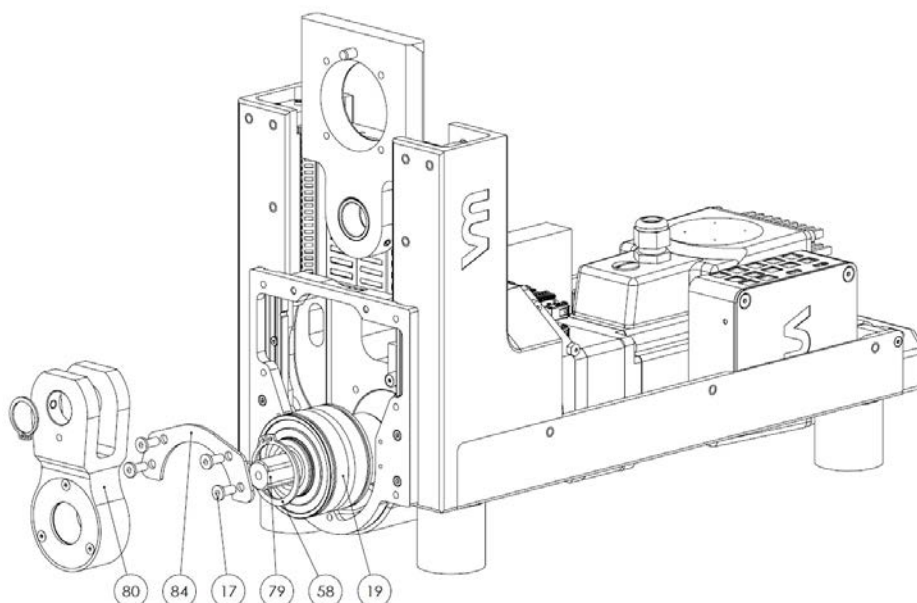
Maintenance of the J160

Replace the drive mechanism bearings

The bearings on the drive mechanism are greased for life and require periodic replacement to function properly and to reduce heat generation.

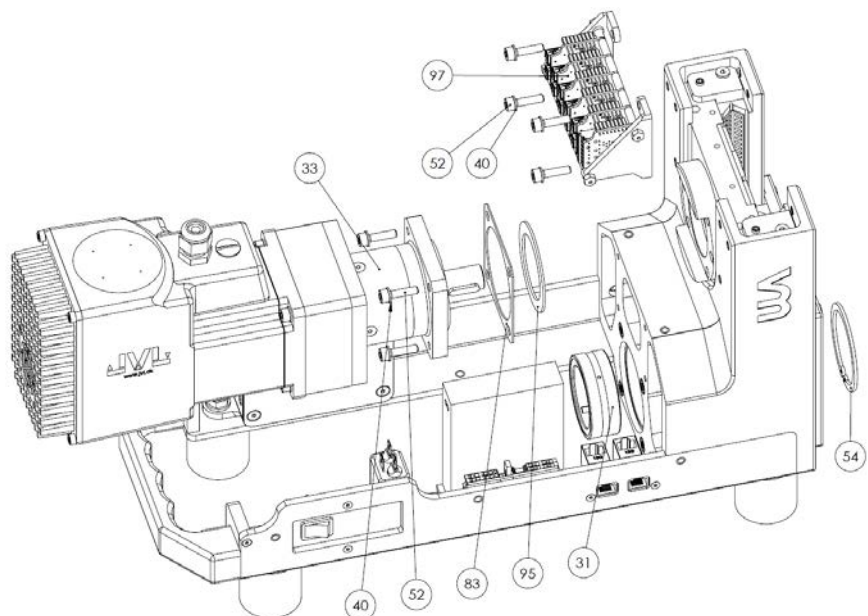
Replacement procedure for the drive mechanism bearings

1. Turn off the J160 and disconnect the mains cable
2. Remove the top adaptor and sleeve from the fixture
3. Remove the top cover assembly (item 72) by unscrewing and removing the eight M5 fasteners (item 16). Lift the top cover assembly taking care of wiring and the LED lights mounted in the handle assembly.
4. Remove the end piece top (item 92) by unscrewing and removing the four M4 screws (item 41)
5. Remove the front cover (item 73) by unscrewing and removing the seven M5 fasteners (item 15)
6. Remove the circlip (item 44)
7. Remove the main cover (item 74) by unscrewing and removing the eight M5 fasteners (item 16)
8. Push back and remove pin (item 71) from the connecting rod (item 80) and glider plate (item) upwards



9. Remove the eccentric bush using the star knob and eccentric bush puller (see section "Changing eccentricity")

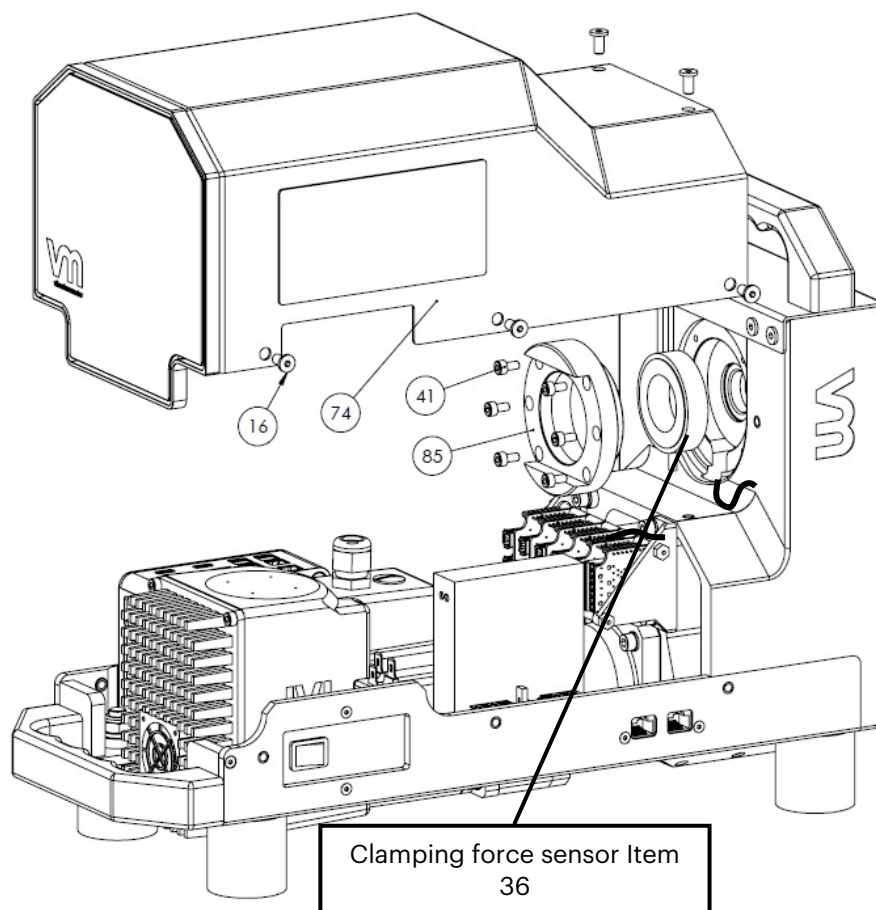
10. Remove the connecting rod (item 80) from the axle (item 79)
11. Remove the axle fixation (item 84) by unscrewing the four M5 screws (item 17)
12. Extract the axle with its bearing from the frame by pulling it
13. Remove the retaining ring (item 58) from the axle
14. Remove the axle front bearing (item 19) from the axle by using a press
15. Remove the sensor amplifier bracket (item 97) by unscrewing the four M5 screws (item 52) to access the gearbox fixation screws (item 40)
16. Remove the motor, gearbox, gearbox seal and stop washer (item 1, 33, 83, 95) by unscrewing the four M5 screws (item 52) and four M5 washers (item 40)
17. Remove the retaining ring (item 54) from the frame towards the front of the machine
18. Press out the axle rear bearing (item 31) towards the back of the frame by introducing a tool from the front of the machine
19. Clean and check all disassembled parts. Replace them if any excessive wear or damage is evident. If required contact Vibrationmaster support for advice.
20. Reassemble the parts in the reverse order
21. Before reassembling the top cover assembly, adjust the position of the glider plate (see section "adjust the glider plate" page 73)
22. Reconnect the electrical supply and turn on the J160
23. Check for correct operation.



Maintenance of the J160

Remove / install the clamping force sensor

To carry out some maintenance operations, it is necessary sometimes to remove the clamping force sensor.



1. Turn off the J160 and disconnect the mains cable
2. Remove the top cover (item 74) by unscrewing and removing the eight M5 fasteners (item 16)
3. Remove the clamping force sensor cover plate (item 85) by unscrewing and removing the M4 screws (item 41)
4. Disconnect the sensor's cable connector from the sensor amplifier
5. Extract the clamping force sensor (item 36) carefully from its housing.

To install the sensor, reassemble the parts in the reverse order.



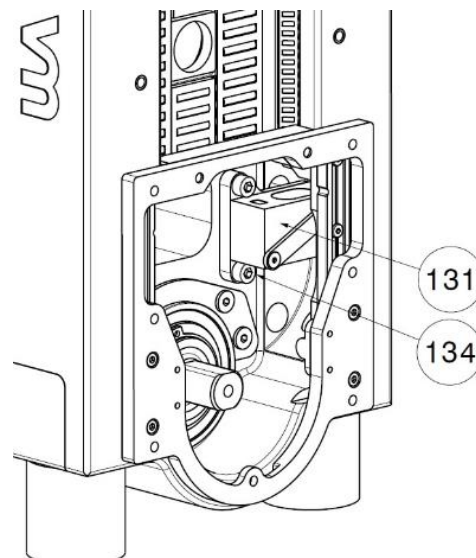
Always turn off the J160 and disconnect the mains cable before connecting or disconnecting the clamping force sensor cable.

Remove / install the displacement sensor

The displacement sensor measures the transverse displacement of the fixture's moving parts. It can give you the real-time eccentricity applied to the tested fastener.

To remove the displacement sensor:

1. Turn off the J160 and disconnect the mains cable
2. Remove the top adaptor and sleeve from the fixture
3. Remove the top cover assembly (item 72) by unscrewing and removing the eight M5 fasteners (item 16).
4. Carefully lift the top cover assembly taking care of the wiring and the LED lights mounted inside the handle assembly
5. Remove the end piece top (item 92) by unscrewing and removing the four M4 screws (item 41)
6. Remove the front cover (item 73) by unscrewing and removing the seven M5 fasteners (item 15)
7. Remove the circlips (item 16)
8. Push back and remove pin (item 71) from the connecting rod (item 80) and glider plate (item 100)
9. Lift the glider plate (item 100)
10. Remove the glider plate and the connecting rod
11. Remove the end piece top (items 92) by unscrewing and removing the four M4 screws (item 41)
12. Remove the displacement sensor (item 131) by unscrewing and removing the two M5 screws (item 134)



To install the displacement sensor:

Reassemble the parts in the reverse order. Use the through hole in the frame to route the cable up to the control system



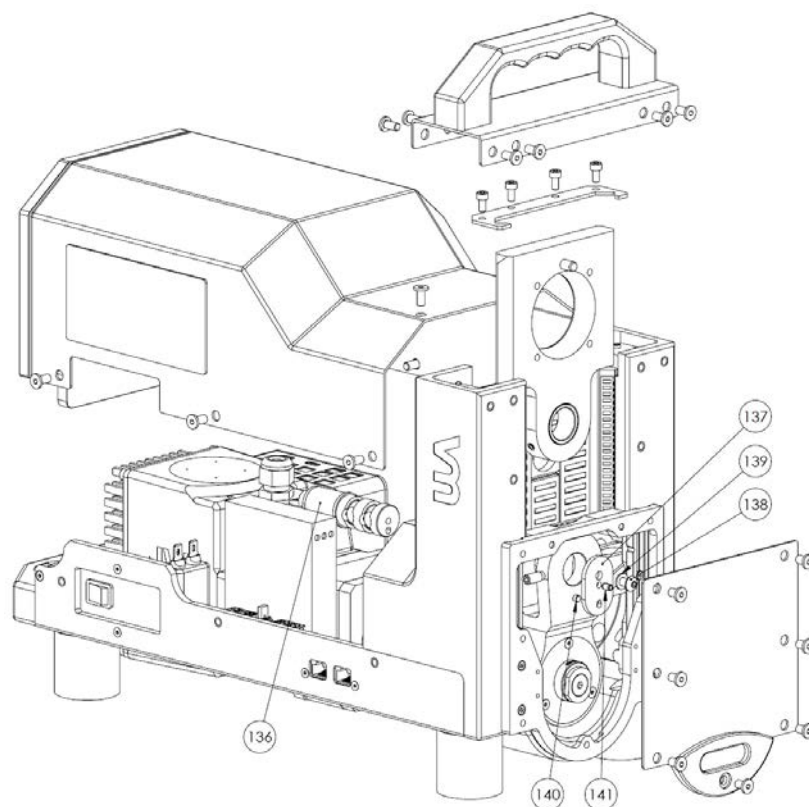
Always turn off the J160 and disconnect the mains cable before connecting or disconnecting the displacement sensor cable.

Remove / install the transverse load sensor (optional)

The transverse load sensor replaces the standard pin to link the connecting rod to the glider plate. It measures the transverse load applied to the tested fastener. To carry out some maintenance operations, it is necessary to remove this sensor.

To remove the transverse load sensor:

1. Turn off the J160 and disconnect the mains cable
2. Remove the main cover and the front cover (see section "remove the covers")
3. Remove the load pin fixation (item 137) by unscrewing and removing the M5 screw and washer (item 138 and 139). Be careful to not lose the anti-rotation spring pin (item 141) from the load pin
4. Push back and remove the transverse load pin (item 136) from the connecting rod and glider plate



To install the transverse load sensor:

Reassemble the parts in the reverse order. If there is no anti-rotation dowel (item 140) in the connecting rod, install it first.



Always turn off the J160 and disconnect the mains cable before connecting or disconnecting the transverse force sensor cable.

Replace the fuses

The machine contains a 5 x 20 mm slow fuse rated at 15A between the external power supply and the voltage phase of the servo-motor.

The fuse is installed inline into the machine, below the main cover. To replace this fuse:

5. Turn the machine OFF
6. Unplug the machine's power cord
7. Remove the main cover (see "open the covers" section) and locate the inline fuse holder on the motor power cable.
8. Open the fuse holder by unscrewing it
9. Remove and replace the faulty fuse
10. Close the fuse holder by screw it and refit the main cover
11. Reconnect the power cord
12. Turn the machine ON.

Maintenance of the J160

Adjust the glider plate

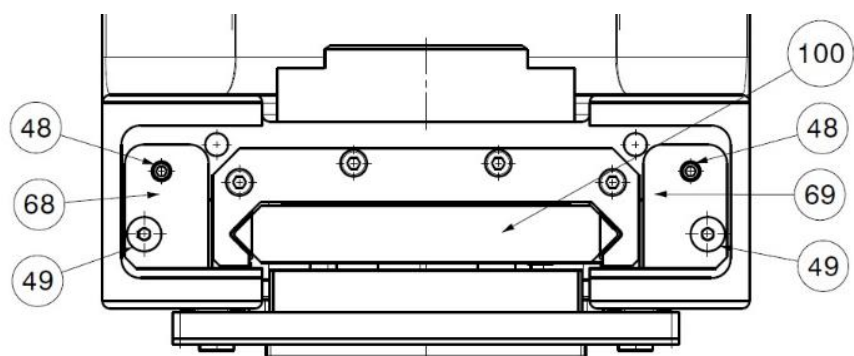
It is possible to adjust the glider plate (item 100) sideways to ensure it remains correctly centred in relation to the fastener being tested. The adjustment is completed using the wedge key adjustment system and the glider plate centring tool (optional) (see section "Use the glider plate centring tools").

To adjust the glider plate to the right-hand side (as seen from the front side of the J160) please follow these steps:

1. Untighten the M5 screw (item 49) on the right-hand side
2. Tighten the M5 grub screw (item 48) on the right-hand side
3. Untighten the M5 grub screw (item 48) on the left-hand side
4. Tighten the M5 screw (item 49) on the left-hand side until the desired adjustment is achieved
5. Ensure the glider plate is moving freely but firmly
6. Ensure both M5 screws (item 49) and both grub screws (item 48) are safely tightened.

To adjust the glider plate to the left-hand side (as seen from the front side of the J160) please follow these steps:

1. Untighten the M5 screw (item 49) on the left-hand side
2. Tighten the M5 grub screw (item 48) on the left-hand side
3. Untighten the M5 grub screw (item 48) on the right-hand side
4. Tighten the M5 screw (item 49) on the right-hand side until the desired adjustment is achieved
5. Ensure the glider plate is moving freely but firmly
6. Ensure both M5 screws (item 49) and both grub screws (item 48) are safely tightened.



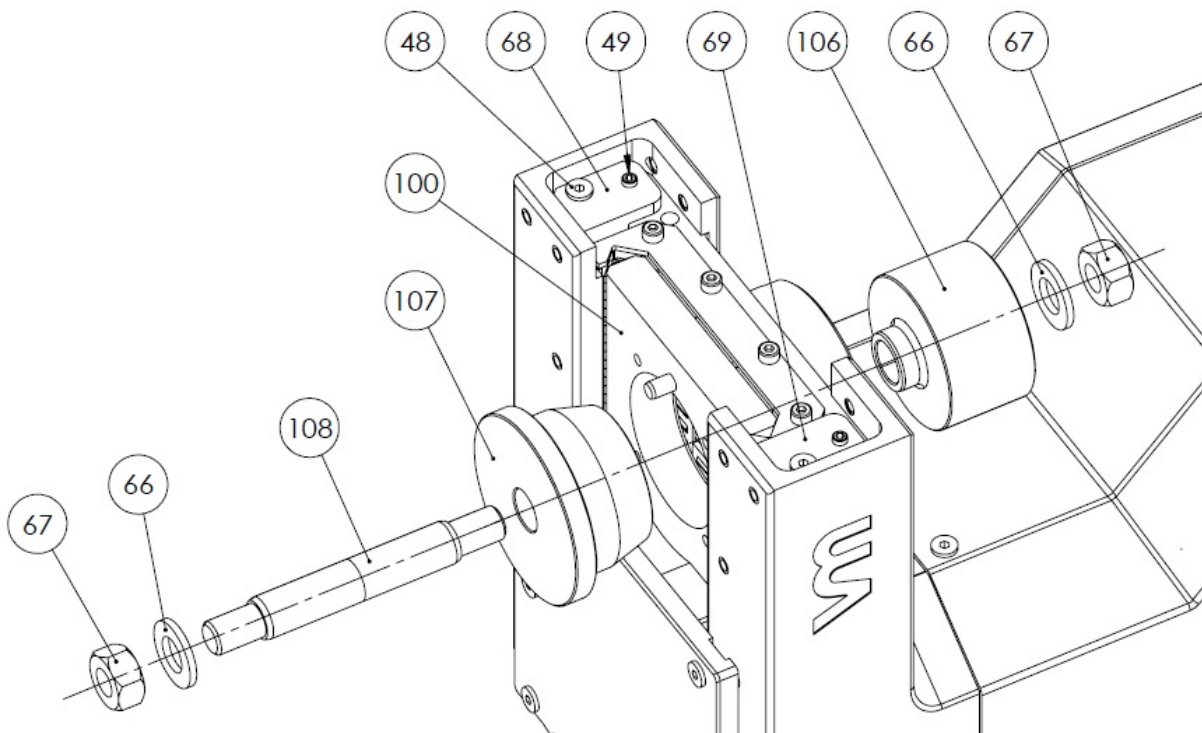
Use the glider plate centring tools (optional)

To perform certain maintenance operations, it is necessary to remove the glider plate. The glider plate centring tools are made to facilitate the position adjustment of the glider when reassembling it.

To adjust the glider plate using the tools:

1. Remove the top adaptor and sleeve
2. Remove the top cover (see section “remove the covers”)
3. Remove the clamping force sensor and reassemble the clamping force sensor cover plate (see section “remove / install the clamping force sensor”)
4. Untighten the two M5 screw (item 49) on the right-hand side and left-hand side
5. Tighten the two M5 grub screw (item 48) on the right-hand side and left-hand side
6. Remove the eccentric bushing (see section “variable eccentricity”)
7. Ensure the glider plate (item 100) is moving freely sideways and vertically
8. Insert the centring tool sleeve side (item 106) into the clamping force sensor cover plate
9. Tighten one M12 nut and washer (item 66 and 67) on one side of the centring axle (item 108)
10. Insert the centring axle into the centring tool sleeve side from the back of the machine until the M12 nut and washer are in contact with the centring tool sleeve side
11. Insert the centring tool top adaptor side (item 107) into the glider plate

12. Tighten firmly the second M12 nut and washer (item 67 and 66) on the centring axle



13. Loosen the two M5 grub screw (item 49) on the right-hand side and left-hand side
14. Tighten the two M5 screw (item 48) on the right-hand side and left-hand side. When the screw head is touching the wedge key, continue to tighten them a quarter of turn.
15. Then tighten the two M5 grub screw (item 49) on the right-hand side and left-hand side
16. Remove the centring tools (item 66, 67, 106, 107, 108)
17. Ensure the glider plate is moving freely but firmly
18. Reassemble the parts in the reverse order to disassembly

Calibrating the sensors in the J160

To ensure continued measuring accuracy, it is recommended to calibrate the clamping force sensor and its amplifier, the optional torque sensor and the optional transverse load sensor and its amplifier at least yearly (see the periodic maintenance table).

It is recommended to conduct the calibration at a laboratory certified according to DIN EN ISO/IEC 17025, equipped with a compression test bench and a torque/tension test bench able to reach the maximum range of the sensors.

Please contact Vibrationmaster to obtain a quotation for calibration or further information and software enabling for third party calibration.

Appendix A: EU Declaration of Conformity

Appendix A: EU Declaration of Conformity

EU Declaration of Conformity for Machinery

Manufacturer:

Vibrationmaster s.à r.l.
28, route de Capellen
8279 Holzem
Luxembourg

Phone: +352 24 51 30 19

Email: info@vibrationmaster.com

Web: www.vibrationmaster.com

Hereby declares that the product:

Type: J-Series

Name: J160 Fastener test bench

Serial number: J160.1.xxxx

Is in conformity with all relevant requirements of the Machinery Directive (Directive 2006/42/EC).

The following harmonised standards have been applied:



Holzem

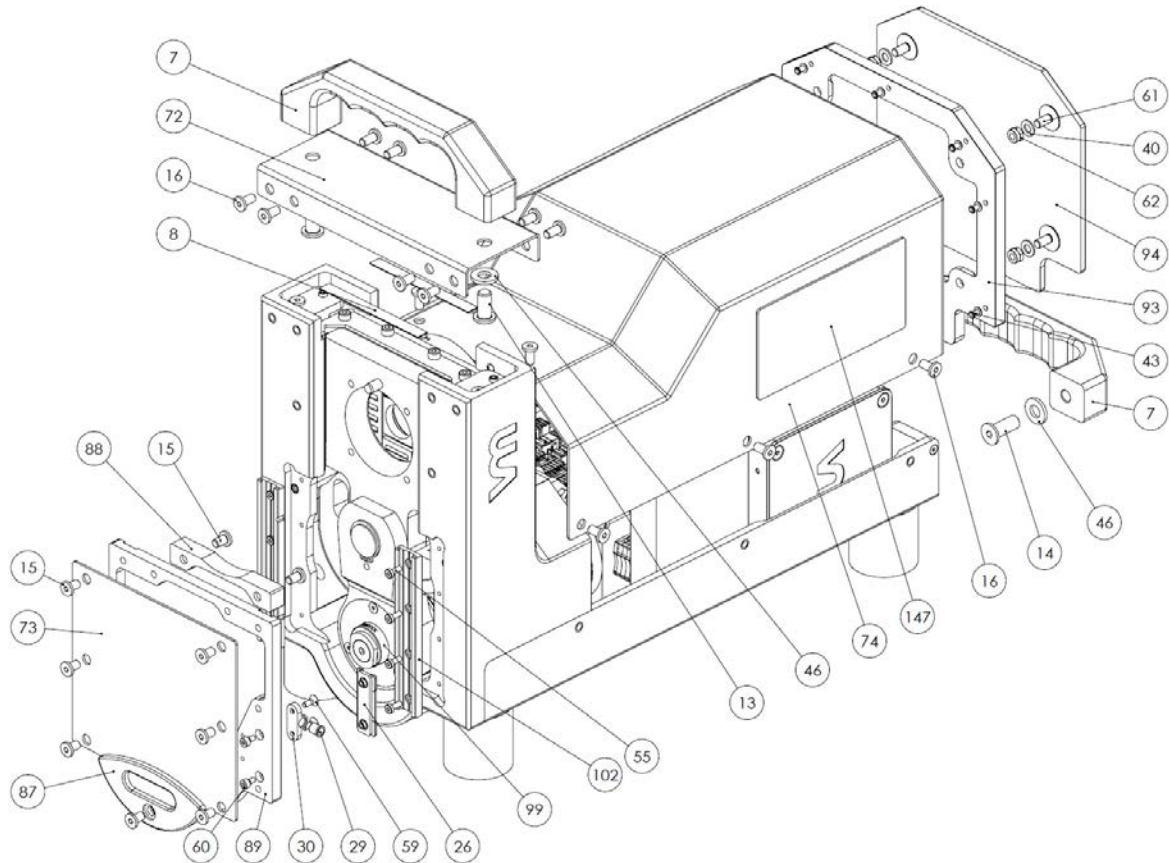
April 2022

A handwritten signature in blue ink, appearing to read 'M. Schiff'.

Morten Schiff
Managing Director

Appendix B: Spare Parts List

External Items: Protections (Covers)

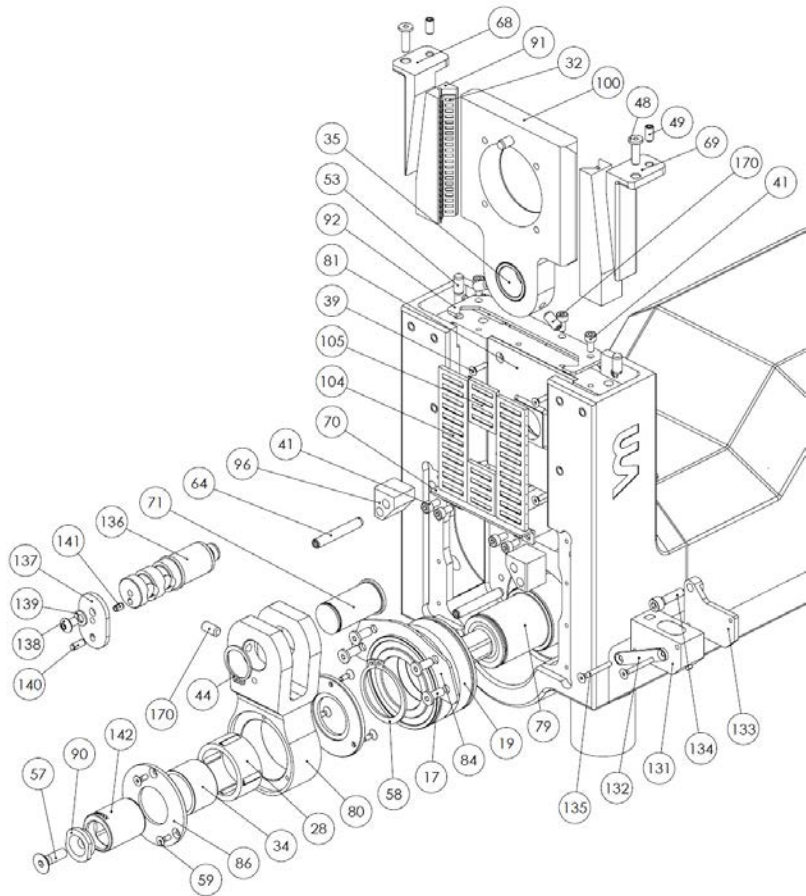


External Items - Parts List:

Item	Description	Part no.	Qty	Item	Description	Part no.	Qty
7	Handle	01HA0001	2	60	M3x6 Socket Head Cap Screw	01SC0014	4
8	Led strip	01LI0001	2	61	M5x10 Slotted pan head screw	01SC0015	4
13	M8x16 Extra low head SHCS	01SC0006	2	62	M5 Nylon lock nut	01NU0001	4
14	M8x20 Extra low head SHCS	01SC0001	2	72	Top cover	11PA0005	1
15	M5x8 Extra low head SHCS	01SC0002	9	73	Front cover	11PA0006	1
16	M5x10 Extra low head SHCS	01SC0003	16	74	Main Cover	11PA0007	1
26	Linear guide double carriage	01LG0001	2	87	Front cover handle	12PA0027	1
29	Smooth ball spring plungers	01IE0001	2	88	Lip	12PA0028	1
30	Holder for spring plungers	01IE0002	2	89	Front cover sliding plate	12PA0029	1
40	M5 Plain washer	01WA0004	4	93	Back cover frame	12PA0033	1
43	D3x6 Blind rivet	01RI0001	7	94	Back cover	12PA0034	1
46	M8 Plain washer	01WA0001	4	99	Dummy eccentric bush	12PA0039	1
55	M3x8 Low head SHCS	01SC0011	8	102	Linear guide rail	12RW0002	2
59	M3x8 Countersunk head cap screw	01SC0013	4	147	Name plate (optional)	12PA0046	2

Appendix B: Spare Parts List

Internal Items:

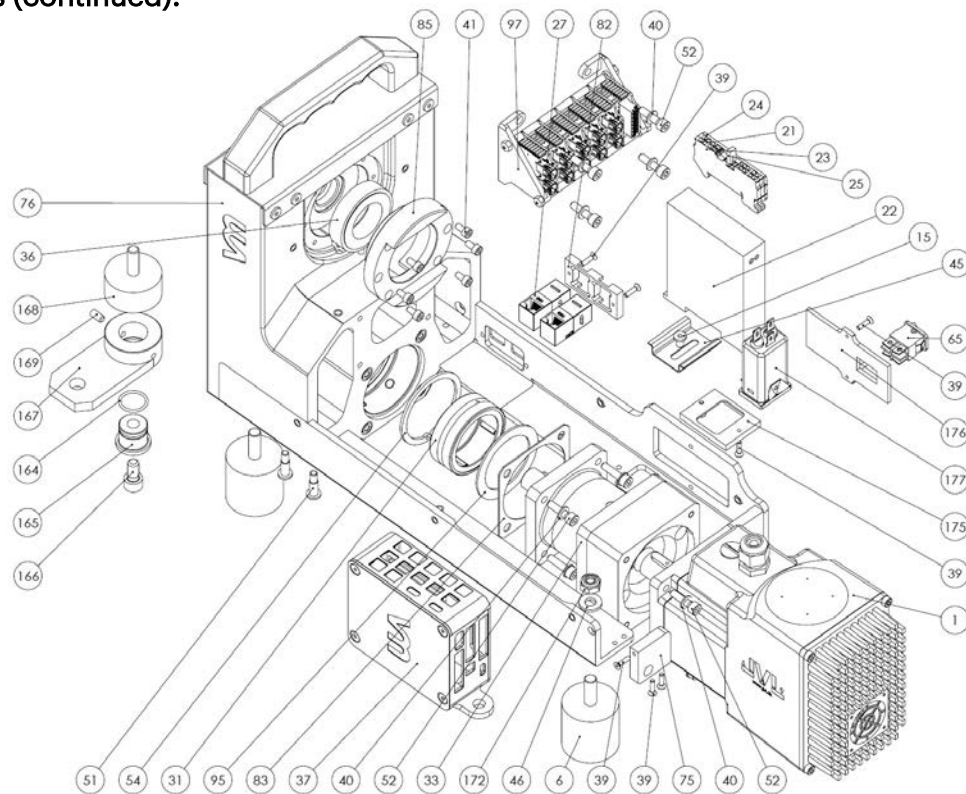


Internal Items - Parts List:

Item	Description	Part no.	Qty	Item	Description	Part no.	Qty
17	M5x12 Extra low head SHCS	01SC0004	4	81	Bearing plate	12PA0018	1
19	Cylindrical roller bearing SL045007-PP	01BE0001	1	84	Axle fixation	12PA0022	1
28	Needle roller and cage assemblies K30X40X18	01BE0002	1	86	Connecting rod cover	12PA0026	2
32	Angled needle roller flat cage L86	01BE0007	2	90	Eccentric bush sleeve	12PA0030	1
34	Bearing inner ring IR25x30x20-xl	01BE0004	1	91	M guide	12RW0010	2
35	Plain cylindrical bearing 20x25x15	01BE0006	1	92	End piece top	12PA0032	1
39	M3x12 Countersunk head cap screw	01SC0021	4	96	M guide pad	12PA0036	2
41	M4x8 Socket Head Cap Screw	01SC0020	8	100	Glider plate	12RW0001	1
44	D20x1.2 Retaining ring	01RR0001	1	104	Needle roller flat cage L87	12RW0004	2
48	M5x16 Extra low head SHCS	01SC0005	2	105	Needle roller flat cage L30	12RW0006	2
49	M5x10 Socket set screw flat point	01SC0007	2	131	Laser displacement sensor	01SE0002	1
53	D6x12 dowel pin	01PI0001	2	132	Displacement sensor fixture plate	12PA0024	1
57	M6x20 Countersunk head cap screw	01SC0012	1	133	Sensor fixture	12PA0020	1
58	D35x1.5 Retaining ring	01RR0003	1	134	M5x20 Socket Head Cap Screw	01SC0009	2
59	M3x8 Countersunk head cap screw	01SC0013	6	135	M3x25 Countersunk head cap screw	01SC0010	2
64	D6x40 dowel pin with inner thread	01PI0002	2	136	Transverse load force pin sensor (*)	01SE0001	1
68	Wedge key left hand	11PA0001	1	137	Load pin fixation (*)	12PA0037	1
69	Wedge key right hand	11PA0002	1	138	M5x8 Button Head Socket Cap Screw (*)	01SC0016	1
70	End piece bottom	11PA0003	1	139	M5 Plain washer (*)	01WA0004	1
71	Pin	11PA0004	1	140	D4x10 dowel pin	01PI0003	1
79	Axle	12PA0015	1	141	D4x8 dowel pin (*)	01PI0004	1
80	Connecting rod	12PA0017	1	142	Eccentric bush	-	-
				170	M6x12-45H DIN 913 pressure screw	-	3

(*) optional parts

Internal Items (continued):



Internal Items - Parts List (continued):

Item	Description	Part no.	Qty	Item	Description	Part no.	Qty
1	Servo-motor	01MO0002	1	52	M5x20 Socket Head Cap Screw	01SC0009	8
3	Power input switch	01CO0004	1	54	D55X2 Retaining ring	01RR0002	1
6	Antivibration mount D40x40mm	01DE0001	4	65	Power switch 16A / 250V AC	01 st 0001	1
15	M5x8 Extra low head SHCS	01SC0002	5	75	End plate	11PA0008	2
21	Terminal block red	01TE0003	2	76	Tower	12PA0012	1
22	Power supply 1.25A 24Vdc	01PS0001	1	82	RJ45 fixture	12PA0019	1
23	Terminal block black	01TE0001	2	83	Gearbox seal	12PA0021	1
24	Terminal end cover	01TE0002	1	85	Load cell cover plate	12PA0001	1
25	Terminal connector	01TE0005	2	95	Stop washer	12PA0035	1
27	Coupler RJ45 right angle	01CO0008	1	97	Sensor amplifier bracket	12PA0038	1
31	Needle roller bearing RNA4907-2rsr-xl	01BE0003	1	164	D17.17 x 1.78 O-ring (*)	01OR0001	2
33	Gearbox	01GE0002	1	165	Foot sleeve (*)	12PA0007	2
36	Clamping force transducer	01SE0006	1	166	M8x16 Socket Head Cap Screw (*)	01SC0019	2
37	Control system	12SB0010	1	167	Foot (*)	12PA0008	2
39	M3x12 Countersunk head cap screw	01SC0021	10	168	Antivibration mount D40x20mm (*)	01DE0002	2
40	M5 Plain washer	01WA0004	8	169	M5x10 Socket set screw flat point (*)	01SC0007	2
41	M4x8 Socket Head Cap Screw	01SC0020	12	172	M8 plain nut	01NU0007	1
45	L35x7.5 DIN rail	12RW0008	2	175	Power inlet mounting plate	12PA0005	1
46	M8 plain washer		1	176	Power switch mounting plate	12PA0006	1
51	M5x12 Shoulder screws with collar	01SC0008	4	177	IEC filter 15A / 250V AC	01FI0001	1

(*) optional parts

Appendix B: Spare Parts List

Not shown Items - Parts List:

Item	Description	Part no.	Qty
-	Fuse 15A class RK5	-	1
118	Inline fuse holder	01FU0002	1
5	Power supply cord	01CA0001	1
12	J160 transport trolley case	12PA0011	1
-	Electrical wires	-	-
127	Torque sensor (*)	-	-
144	Wooden case for 25 eccentric bushes (*)	12PA0010	-

(*) optional parts

Tool Items - Parts List:

Item	Description	Part no.	Qty
66	M12 Plain washer (*)	01WA0002	2
67	M12 Nut (*)	01NU0003	2
106	Glider plate centering tool sleeve side (*)	12PA0041	1
107	Glider plate centering tool top adaptor side (*)	12PA0042	1
108	Glider plate centering tool axis (*)	12PA0043	1
145	Eccentric bush puller	12PA0025	1
146	Star grip screw M8	12PA0040	1
160	Transverse force sensor calibration tool CR (*)	12PA0050	1
161	Transverse force sensor calibration tool GP (*)	12PA0051	1

(*) optional parts

Bearings replacement kit:

Item	Contains	Description	Part no.	Qty
160	123	Grease tube 35g	01GR0001	1
	19	Cylindrical roller bearing SLO45007-PP	01BE0001	1
	28	Needle roller and cage assemblies K30X40X18	01BE0002	1
	31	Needle roller bearing RNA4907-2rsr-xl	01BE0003	1
	32	Angled needle roller flat cage L86	01BE0007	2
	34	Bearing inner ring IR25x30x20-xl	01BE0004	1
	35	Plain cylindrical bearing 20x25x15	01BE0005	1
	104	Needle roller flat cage L87	12RW0004	2
	105	Needle roller flat cage double rowL30	12RW0006	1

Appendix C: Software EULA

End-User Licence Agreement (EULA) for the Vibrationmaster Test Software

This Licence Agreement is a legal agreement between you the User (either an individual or a legal entity) and Vibrationmaster s. à r. l and its suppliers regarding the Vibrationmaster Test software product identified above. The product includes computer software and may include associated media, printed materials, and online or electronic documentation (hereinafter referred to as "Vibrationmaster Test Software"). By installing, copying, or otherwise using the Vibrationmaster Test Software, you accept the terms of this Licence Agreement. If you do not agree to the terms of this Licence Agreement, you may not install, copy or in any other way use the Vibrationmaster Test Software.

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