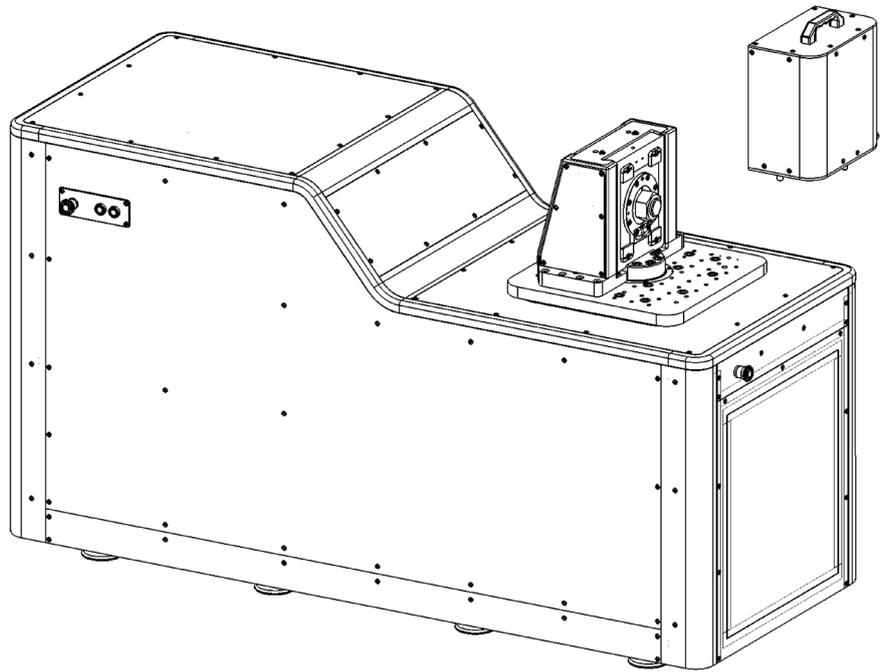


**Operating Manual**  
J600/J900 Fastener Integrity Test Bench



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## Amendments

### Amendments

Revision	Date	Amendment Details	Issued by
1.0	March 2019	Revision 1.0	BT
1.1	March 2019	Editorial clarifications	MS
1.2			

## 1. Introduction

### Overview

Thank you for purchasing a J600/J900 Fastener Integrity 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 if you have selected the optional torque sensor functionality.

Throughout this document, we may refer indiscriminately to the J600/J900 fastener test bench as “J600/J900”, “machine” or “unit”.

### Product description

The Vibrationmaster J600 and J900 are Test Benches designed to analyse and investigate the structural integrity of threaded fastener connections ranging in size from M3 to M30 ISO Metric and from #4 – 1 1/8in UTS whereas the J900 allows analysing fastener connections up to a size of M45 ISO Metric respectively 1 3/4in UTS.

It allows the factual determination of the crucial torque/tension relationship in a bolted joint, which is required to fully understand and analyse the functioning principle of a bolted joint. The clamping force sensor together with the optional analytical torque module and torque sensor enables the detection and display of all input required for an ISO 16047 assessment of the fastener connection, like the friction coefficients (G, K,  $\mu_{Tot}$ ) and axial tension vs. the applied torque, plus the K-factor (Nut Factor) in real-time.

Additionally, the J600/J900 serves as a transversal force and vibration Test Bench, according to the Prof. Gerhard Junker’s principle, to run fasteners and securing elements testing and verification work in full accordance with the German and International standards, norms and regulations such as DIN 65151, DIN 25201-4, ISO 16130 and several OEM specifications for self-loosening of bolted joints under dynamic load.

With its unique patented Variator Technology®, it can electronically control and vary transverse shear force between 0 and 100 kN for J600 respectively 150 kN for J900, displacement [amplitude] between 0 and  $\pm 2$ mm and frequency between 0 and 30Hz in real time during testing under load, enabling a wide range of test regimes to be applied.

A closed-loop system monitors and adjusts the transverse shear force and displacement continuously so that the effective values are maintained at their nominal levels, resulting in exceptional accuracy.

A significant benefit of the inbuilt Variator Technology® with its closed-loop system and electronic shear force and displacement operation is the short test set-up time and more importantly, the ability to quickly reproduce an exact shear force and displacement for enhanced test reproducibility.

The integrated VM Test Control Software includes a range of pre-determined test regimes, including automated reference testing to DIN 25201-4, and enables operators to create and store bespoke testing programs. The IoT based control system and software can generate test reports in HTML format with supporting test data as required by Item B.7 of DIN 25201-4.

The raw test data is recorded in \*.csv file format to your specified file directory for convenient data export to Excel or similar software.

The Test Bench can be equipped with a laptop PC that acts as the onboard computer.

### Features

- A versatile vibration test machine meeting DIN 25201-4, DIN 65151, ISO 16130 and several OEM vibration test standards.
- With the optional torque transducer, the J600/J900 can measure, record and display the torque vs. tension diagram as well as calculate  $\mu_{tot}$  and K (Nut Factor).
- With the optional analytical torque module, the J600/J900 is further able to detect and display coefficient of friction under head and coefficient of friction in threads as well as a number of related analytical data.
- Transverse shear force, displacement and frequency can be varied in real time using electronic controls; the closed-loop system will ensure the set values are maintained at all times.
- Changes of fastener size take 60 seconds, significantly reducing test cycle times.
- Wide, horizontal flatbed test area allows ease of access when testing large fasteners.

## About this Manual

The J600/J900 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 the 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 J600/J900.

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



**Are any items missing? If they are, please contact Vibrationmaster immediately by telephone (+352 24 55 90 68) or email (support@vibrationmaster.com).**

These hints represent general ideas and recommendations from the Vibrationmaster team and may be useful when operating the J600/J900.

## 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 J600/J900:

1. Before beginning the installation of the J600/J900, please check for any external damage. If any damage is found, do not continue with the installation and contact Vibrationmaster immediately.
2. Do not operate or store the machine where it will be exposed to external weather conditions.
3. Do not tamper with the controls or the control system software.
4. 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.
5. Do not tamper with the safety guard protecting the test area of the J600/J900. Wait until all motion has completely stopped before opening the safety guard.
6. To minimise the possibility of electric shock, switch off the machine at its main power switch before attempting any maintenance or cleaning.
7. Follow the machine preparation instructions thoroughly as described on page **Error! Bookmark not defined.** in this manual.
8. Do not apply excessive torque to fasteners resulting in an achieved clamping force above the values specified in the machine specifications.
9. Use appropriate tools to tighten the fasteners.

10. Do not close the browser window of the tablet computer until the test in progress has completely finished.
11. Do not move the computer controlling the machine beyond wireless range until the test in progress has completely finished.
12. Do not shut down the computer until the test in progress has completely finished.

The J600/J900 has been designed for testing and demonstrating fasteners in the size range M3 to M30 ISO Metric and #4 to 1 1/8" UTS whereas the J900 allows analysing fastener connections up to a size of M45 ISO Metric respectively 1 3/4" UTS. Extensive use of only large size fasteners will significantly increase the stress on the J600/J900 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 500 kN (0 to 112400 lbf) with the J600 resp. 0 to 850 kN (0 to 191000 lbf) with the J900 will significantly increase the stress on the J600/J900 and increase wear and tear with the result that the machine's operating life will be reduced.



The J600/J900 has been designed for a peak maximum preload of 500 kN (112400 lbf) for J600 resp. 850 kN (191000 lbf) for J900. Tightening the bolt and nut above the specified clamping force level will result in permanent damage to the J600/J900 and must be avoided.

When conducting a fastener test, proper lubrication of the fastener and nut must be carried out to obtain the appropriate coefficient of friction ( $\mu_{tot}$ ) of 0.11 to 0.14. Not lubricating the fastener and nut will result in increased friction and as a result a higher  $\mu_{tot}$  value. This will significantly increase the stress on the J600/J900 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 torque and vibration 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.

## 2. Before the J600/J900 arrives with you

### Thank you!

Thank you for purchasing a J600 or J900 Fastener Test bench. We have put considerable effort into designing and manufacturing the J600/J900 machines and we hope it will be useful to you in testing bolted joint integrity, the relationship between applied torque and achieved tension and the self-loosening behaviour under vibration conditions.

### Technical requirements

#### Electrical requirements

The J600/J900 is supplied with 4-metres of main power cable and requires the following electrical installation:

3-phase 400...480 V; L1, L2, L3, N; PE  
Maximum current J600: 60 A  
Maximum current J900: 100 A

Optional with an external transformer:  
3-phase 200...240 V; L1, L2, L3, N, PE  
Maximum current J600: 120 A  
Maximum current J900: 200 A

#### Connection to the Internet via RJ45 cable

The J600/J900 requires connection to the Internet via an ethernet RJ45 cable to enable firmware updates to the unit's software and remote online help and service.

#### Connection to the PC user interface

The J600/J900 broadcasts its own secure Wi-Fi network to allow easy wireless connection to the unit's PC user interface and for the operation of the unit.

The J600/J900 can further connect to the unit's PC user interface via an ethernet RJ45 cabled connection.

If required and upon request, the J600/J900 can be delivered without wireless capability.

#### Connection to water supply

The J600/J900 does not require a water supply.

**Connection to gas**

The J600/J900 does not require a gas supply.

**Compressed air**

The J600/J900 does not require connection to compressed air.

**Ventilation**

The J600/J900 does not require ventilation.

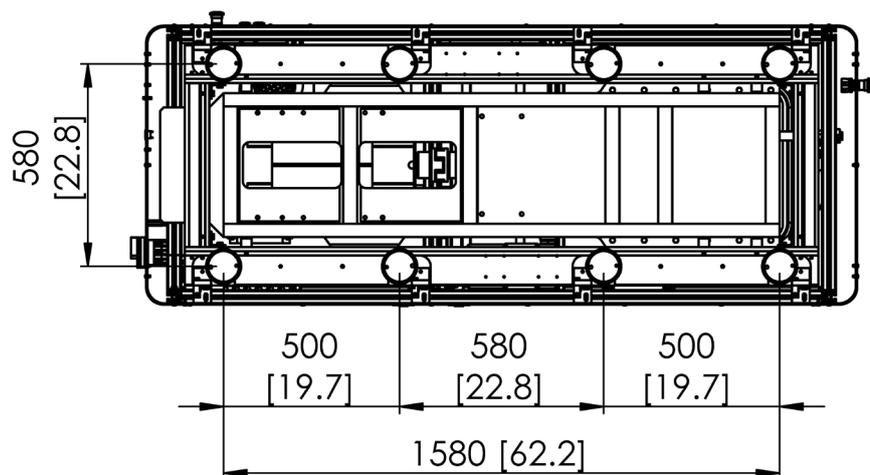
**Preparing the floor space**

Please verify that the following requirements for the machine with respect to floor space and strength are given.

**Floor load**

The operating location of the machine should be a levelled surface strong enough to carry the weight of the machine (1,540 kg [3,395 lbs] for J600 and 1,580 kg [3,493 lbs] for J900).

The machine is supported by eight feet which span over a surface of 1580 mm [62.2"] by 580 mm [22.8"]. The floor load is 17.2 kN/m<sup>2</sup>.

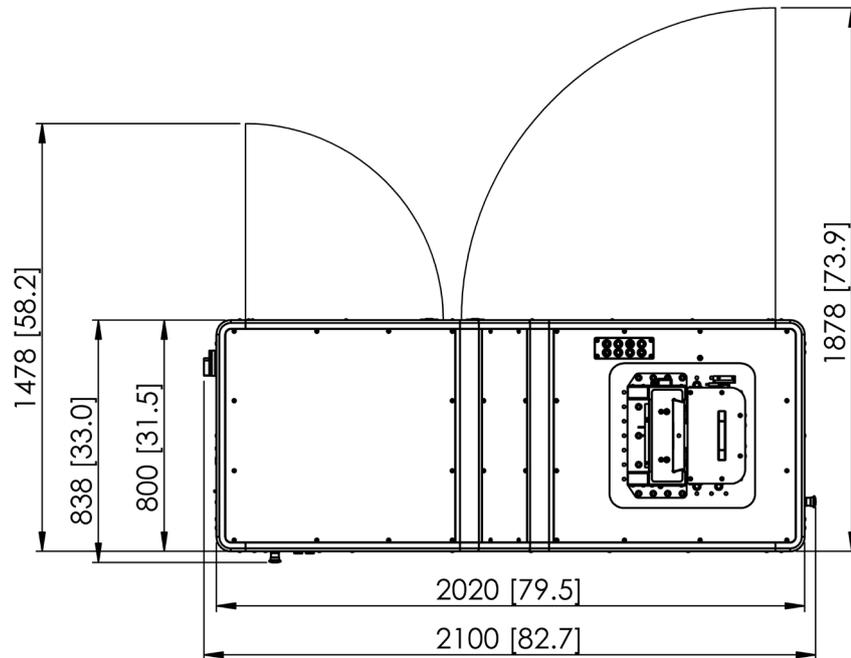


Dimensions in mm [inches]

## Before the J600/J900 arrives with you

### Accessibility from all sides

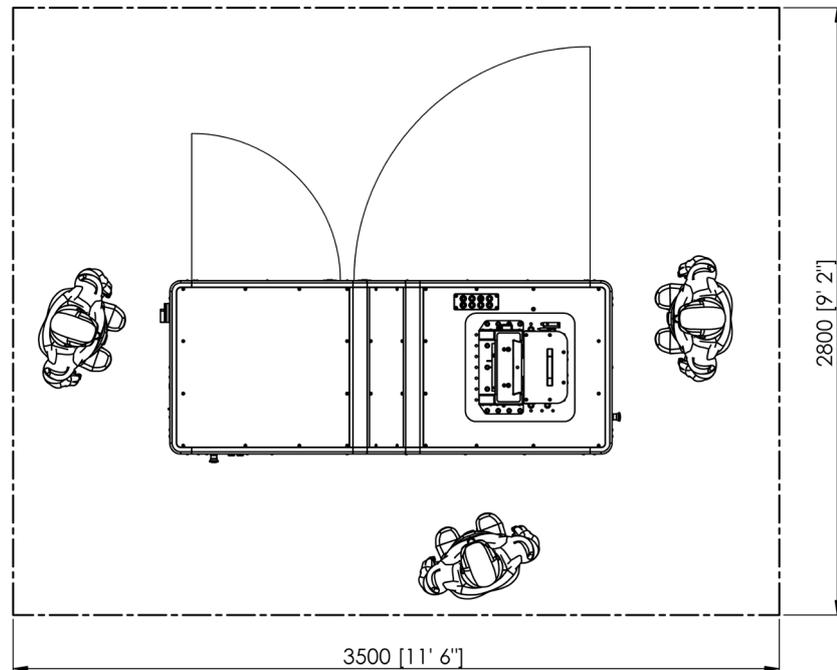
The J600/J900 Fastener Test Bench should be accessible from all sides. Service doors on the back of the machine have to have the necessary space so that they can be opened fully.



Dimensions in mm [inches]

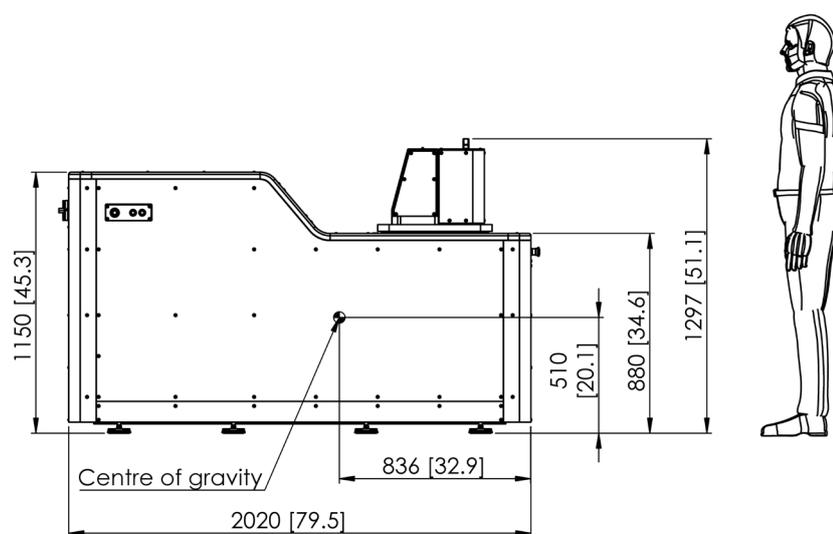
**Recommended working area**

In order to work comfortably around the machine, we recommend allowing for a minimum working area of 3500 mm [11'6"] by 2800 mm [9'2"].



Dimensions in mm [inches]

**Machine height**



Dimensions in mm [inches]

## Before the J600/J900 arrives with you

### Environmental conditions

The J600/J900 are highly precise testing instruments with several temperature-sensitive sensors and measuring devices. Certain precautions need to be considered when choosing the most appropriate location of the J600/J900.

#### Acoustic noise

The maximum level of noise exhibited for the J600/J900 is < 85 dB(A) as measured by a sound level meter in 1-metre distance from the J600/J900.

#### Electrical and magnetic fields (shielding)

The J600/J900 is not known to leak any significant electrical noise that could affect nearby equipment hence no special requirements are needed. As a general rule, however, Vibrationmaster always recommends nearby electronic measuring instrument to be shielded locally and guarded by self-shielding or small screened enclosures.

#### Relative humidity

To ensure utmost measurement accuracy and repeatability from the J600/J900, it's advisable to set-up the unit within a climate-controlled environment according to ISO 17025 with a relative humidity within the range of 35-55% around a regulated temperature of 23°C, which reflects the original calibration environment.

However, operating the J600/J900 outside of these conditions will not cause any noticeable deterioration to the overall measurement accuracy and test result integrity. In fact, the J600/J900 may as well be positioned outside of climate-controlled rooms as long as the relative humidity does not significantly exceed 80% around a regulated temperature of 23°C ±3°C.

Condensation is to be avoided.

#### Temperature

To ensure utmost measurement accuracy and repeatability from the J600/J900, it's advisable to set-up the unit within a climate-controlled environment according to ISO 17025 where the temperature remains within the range of 23 ±1.5°C, which reflects the original calibration environment.

However, operating the J600/J900 outside of these conditions will not cause any noticeable deterioration to the overall measurement accuracy and test result integrity. In fact, the J600/J900 may as well be positioned

## Before the J600/J900 arrives with you

outside of climate-controlled rooms as long as the temperature is kept within the range of 23°C ±3°C.

Exposure to direct sunlight and draft winds must be avoided.

### Vibration

When the J600/J900 operates at a maximal amplitude and load the following residual vibrations may be seen:

Test frequency (HZ)	30	25	20	15	10
External residual vibrations (m/s <sup>2</sup> )	7.1	7.8	7.7	11.9	11.7

## Packaging and shipping

Your J600/J900 will be packed in a wooden box on a pallet suitable for export and conform to ISPM 15.

### J600 shipping dimensions

Length 2240 mm × Width 1070 mm × Height 1630 mm

Net weight 1540 kg / brut weight 1781 kg

Volume 3,91 m<sup>3</sup>

### J900 shipping dimensions

Length 2240 mm × Width 1070 mm × Height 1630 mm

Net weight 1580 kg / Brut weight 1821 kg

Volume 3,91 m<sup>3</sup>

## When the J600/J900 arrives with you

### 3. When the J600/J900 arrives with you

#### Installation equipment and tools needed

Before you begin the installation, please ensure that all equipment's and tools shown in the Bill of Material below are available.

You can make the installation process go faster by gathering the pieces you need for each step prior to starting the step. The assembly can be prepared by one person, but when it comes to handling the J900, you may require assistance from a colleague.

Bill of Material needed for installing the J600/J900:

Item#	Description	Quantity
1	Forklift with 2000 kg [4409 lbs] or more lifting capacity	1
2	Pallet jack with 2000 kg [4409 lbs] or more lifting capacity	1
3	Crowbar	1
4	Set of screwdrivers	1
5	Spirit level	1

#### Unloading the J600/J900

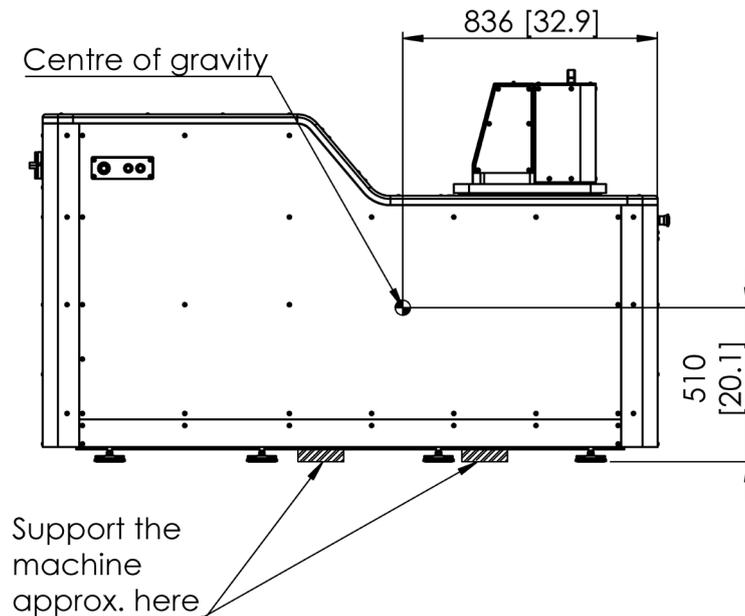
The J600/J900 Fastener Test bench will be delivered in a wooden box on a pallet. Depending on the destination, a waterproof protective film will protect the machine from humidity. The box has to be removed off the truck by using a forklift and should be placed onto solid ground. The forklift capability has to be rated for a load of 2000 kg [4409 lbs] or more.

All safety rules for the equipment used have to be adhered to. Refer to the instruction manual of the lifting equipment.

#### Unpacking the J600/J900

Remove the wooden top and walls with proper tools such as suitable screwdrivers resp. a crowbar.

The machine can now be lifted off the pallet by means of a forklift again and be placed on the ground to its operating location. Should space restrictions not allow for a forklift to manoeuvre, a pallet jack can be used instead. To achieve a good balance, support the machine close to its centre of gravity.



Dimensions in mm [inches]

Remove the plastic wrapping. Do not use cutters or knives because of the risk that the surface of the machine will be scratched.

Please check that all the items ordered are included. As a minimum it should include:

1. J600/J900 Fastener test bench
2. J600/J900 Operating manual (this manual)
3. Wireless password and Calibration certificate
4. Tablet PC including power supply, power cord and manuals
5. Fastener adaptors as ordered.



Are any items missing? If they are, please contact Vibrationmaster immediately by telephone (+352 24 55 90 68) or email (support@vibrationmaster.com).

## Preparing the J600/J900 for use

### Levelling the machine

The J600/J900 rests on eight feet which are individually adjustable in height. Slight unevenness of the ground can be compensated by adjusting the feet. Use a spirit level to adjust the feet and to assure that the J600/J900 is levelled.

## When the J600/J900 arrives with you

For most easy levelling, please turn the four inner feet off the ground and level the machine on the four outer feet only. When levelling is achieved, lower the four inner feet so that they also carry the load.

### Electrical connection to the AC-main supply

The electrical connection must be done only by properly trained and certified personnel.

Connection to the AC-main supply should only be done once the machine is at its operating location and all formerly mentioned tasks are done.

Check and confirm that the supply voltage is correct. Make sure that the main switch of the machine is in position 'Off'.

Check and confirm that the connection is not powered when connecting the electrical supply to the machine.

13. The supplied cable consists of five wires which have to be connected as follows:

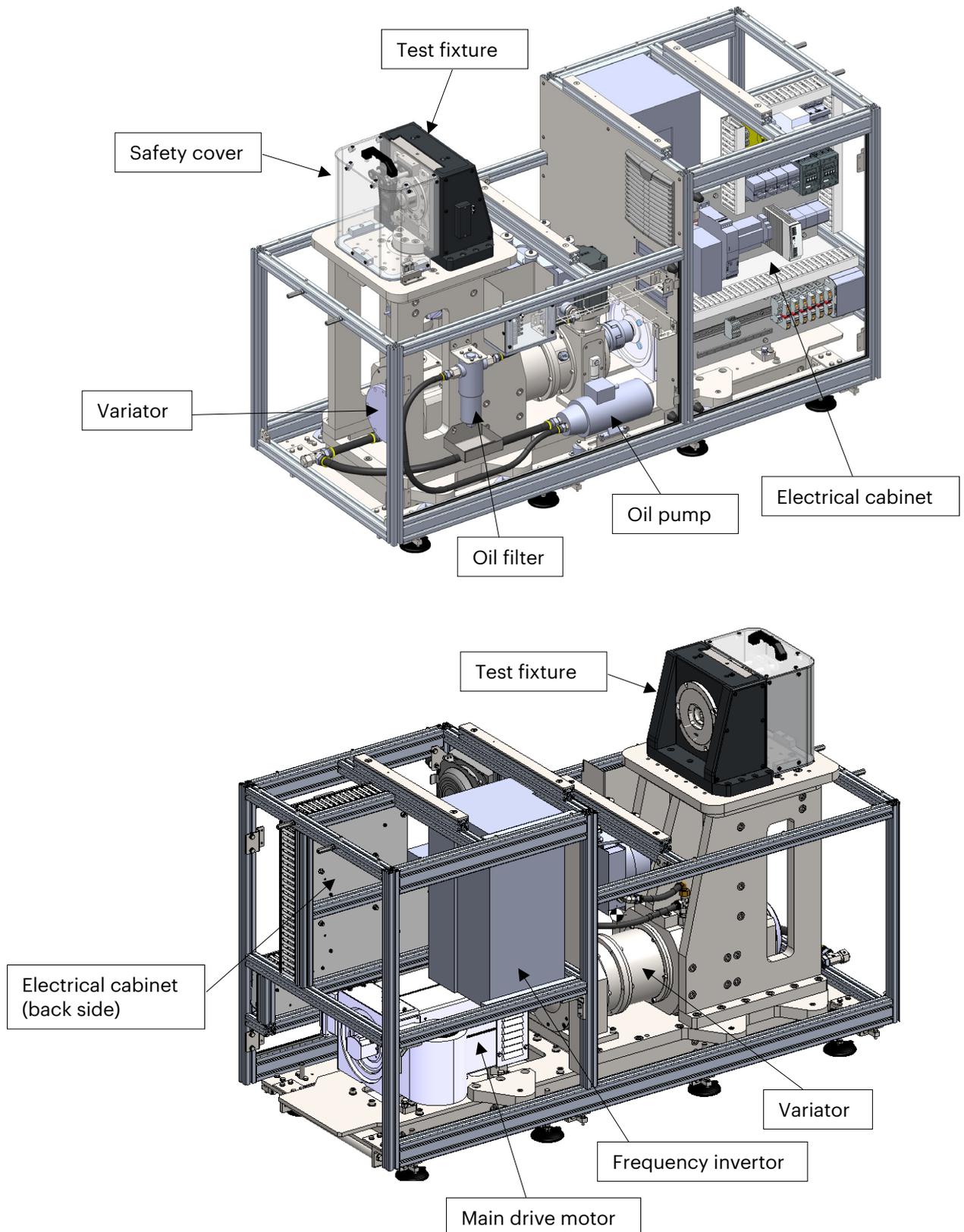
Wire Colour	Description
Brown	L1
Black	L2
Grey	L3
Blue	N
Yellow/green	PE

While in offline mode, the software will periodically try to reconnect to the J600.

## 4. Mechanical System Description

### Mechanical overview

(the machine is shown without housing)



## Mechanical System Description

The J600/J900 consists of several assemblies or parts, and these are briefly described below:

**Chassis:** Vibrations that are created by the machine while tests are performed are de-coupled by the design of the base frame of the machine. Energy absorbing elements reduce the impact of operational vibrations to the surroundings.

**Power supply:** Three-phase 400 to 480 V electrical mains supply and a minimum current rating of 100 A is required.

**Fixtures:** The sub-assembly where the test samples are installed are called 'fixture'. The clamping load sensor is located in the fixture. A wide range of different sizes of fasteners can be tested on this machine. Fasteners to be tested are installed to the fixture by means of adaptors. Depending on the desired test method and fastener configuration, three different families of adaptors are available: Anti-rotation, non-anti-rotation and sleeve with insert. Within each of these families, there are different sizes at hand for different sizes of fasteners. It is important that always the corresponding adaptor size for the test sample is used.

**Safety cover:** The safety cover protects the operator and the surroundings from parts of the fasteners that are tested, and which potentially can break loose. A magnetic switch detects the presence of the safety cover and prevents that the machine is operated should the cover be missing.

**Main drive motor:** The J600/J900 is driven by a 4-pole asynchronous electrical motor controlled by a frequency inverter to allow for variable speed. The motor operate at a base voltage of 400 V and a frequency of 63 Hz. The motor have an integrated fan for forced cooling.

**Frequency inverter:** The frequency inverter controls the speed of the main drive motor. The motor speed is adjusted by frequency variation. The inverter protects the motor against overvoltage, overcurrent, stall, earth current, overheating and other possible malfunctions.

**Linear eccentric actuator (Variator®):** The transformation from the rotational motor drive into a linear oscillating movement is done by a linear eccentric shaft. The eccentricity can be adjusted from 0 to  $\pm 2$  mm while the machine is running. The adjustment of the eccentricity is done by a servo motor and can be set via the test control software.

**Lubrication:** The Variator® is a mechanical device that operates under great loads. Lubrication of the moving components is required to keep wear to a minimum and to increase the lifetime of the machine. The Variator® housing holds lubricating oil which is circulated by an oil pump

## Mechanical System Description

through a filter to all areas that need to be lubricated. The fill level of oil can be checked in a glass. The machine shall not be operated when the oil level is too low or too high. The oil filter is fitted with a clog-sensor which provides a signal to inform the operator when the filter needs to be replaced.

**Machine housing:** The machine housing is made of painted (RAL7016) sheet metal and a wooden frame around the top edges. Two service doors allow for access when maintenance work or repairs have to be done. The door to the Variator® is armed with a safety switch. The machine cannot be operated when this door is open.

**Connector panel:** The connector panel is located on top of the housing next to the test fixture. Any electrical sensor will have to be connected here.

**Machine control system:** The operation of the machine is controlled by a test control software which enables to set different test parameters and therefore run tests of a different kind.

**Optional angle sensor:** An angle sensor can be ordered as an option. The angle sensor measures the rotation (=loosening) of the fastener that is tested. The sensor is working on a magnetic principle, magnets have to be attached to the tested nut or bolt head. Adaptors to hold the magnets are available for a wide range of sizes.



The safety guard prevents direct access to the moving parts of the J600/J900, for the safety of the operator. The power to the main drive motor is shut down when the safety guard is open. Do not tamper with the safety guard protection system.

## Adaptor modules

A wide range of fastener sizes can be tested on the J600/J900. This overall range is divided into three sizes of adaptor modules:

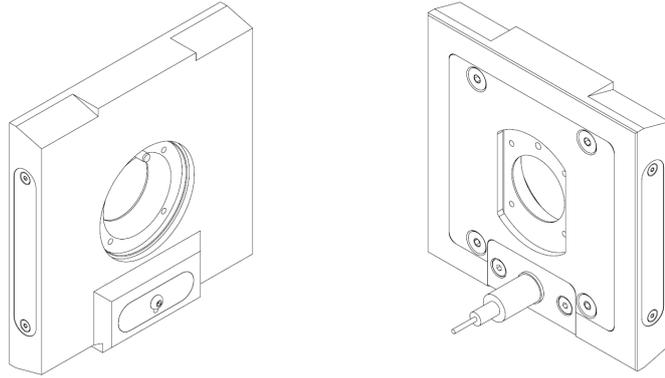
50 kN clamp load: M3 to M12 ISO Metric; #4 to 1/2" UTS

500 kN clamp load: M14 to M30 ISO Metric; 5/8" to 1 1/8" UTS.

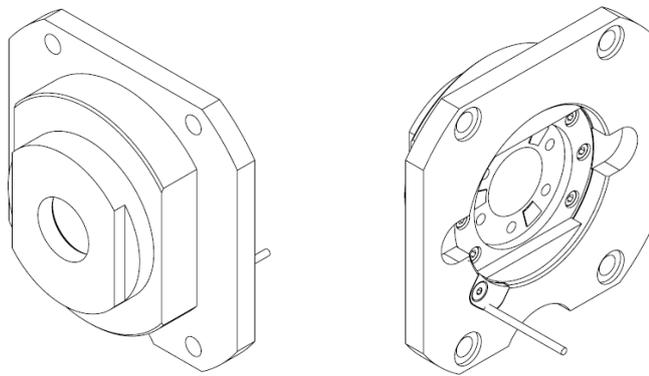
850 kN clamp load (only J900): M33 to M45 ISO Metric; 1 1/4" to 1 3/4" UTS.

The correct size of the adaptor module has to be installed on the stationary side (load cell module) as well as on the moving side (adaptor plate module). Each module is delivered pre-assembled and can be exchanged as a whole.

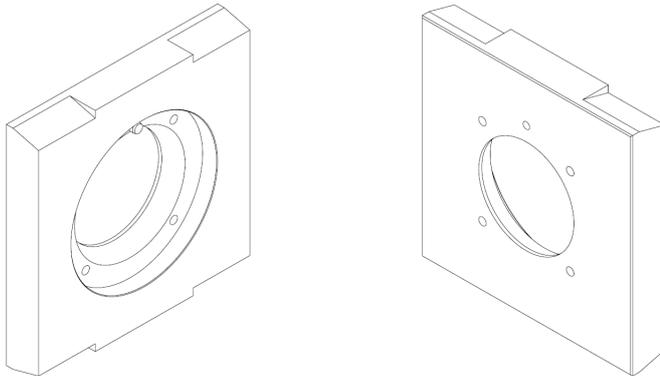
## Mechanical System Description



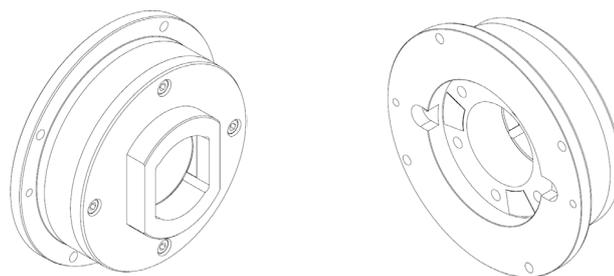
Front and rear side of the adaptor plate module 50 kN.



Front and rear side of the load cell module 50 kN.

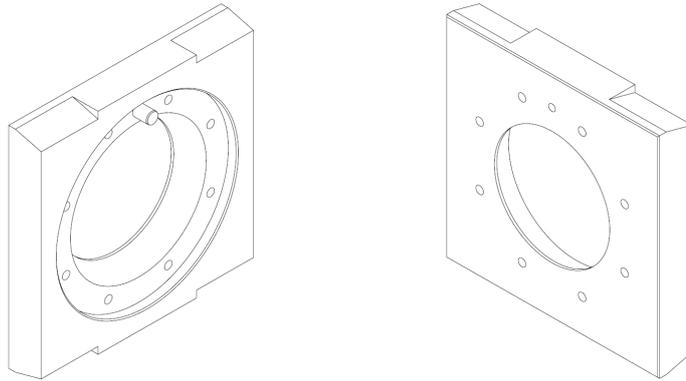


Front and rear side of the adaptor plate module 500 kN.

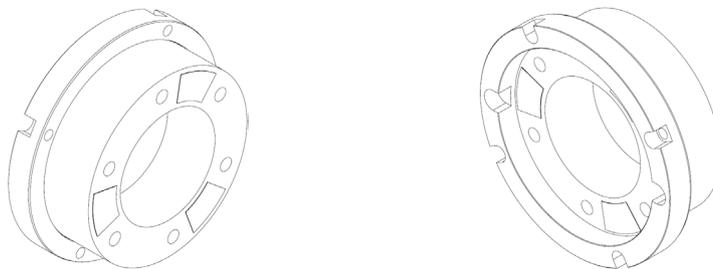


## Mechanical System Description

Front and rear side of the load cell module 500 kN.



Front and rear side of the adaptor plate module 850 kN (J900 only).



Front and rear side of the load cell module 850 kN (J900 only).

The correct sizes of adaptor plate module and the load cell module have to be installed in the machine's test fixture. Adaptor plate module and the load cell module have to be of the same size, they shall not be mixed.

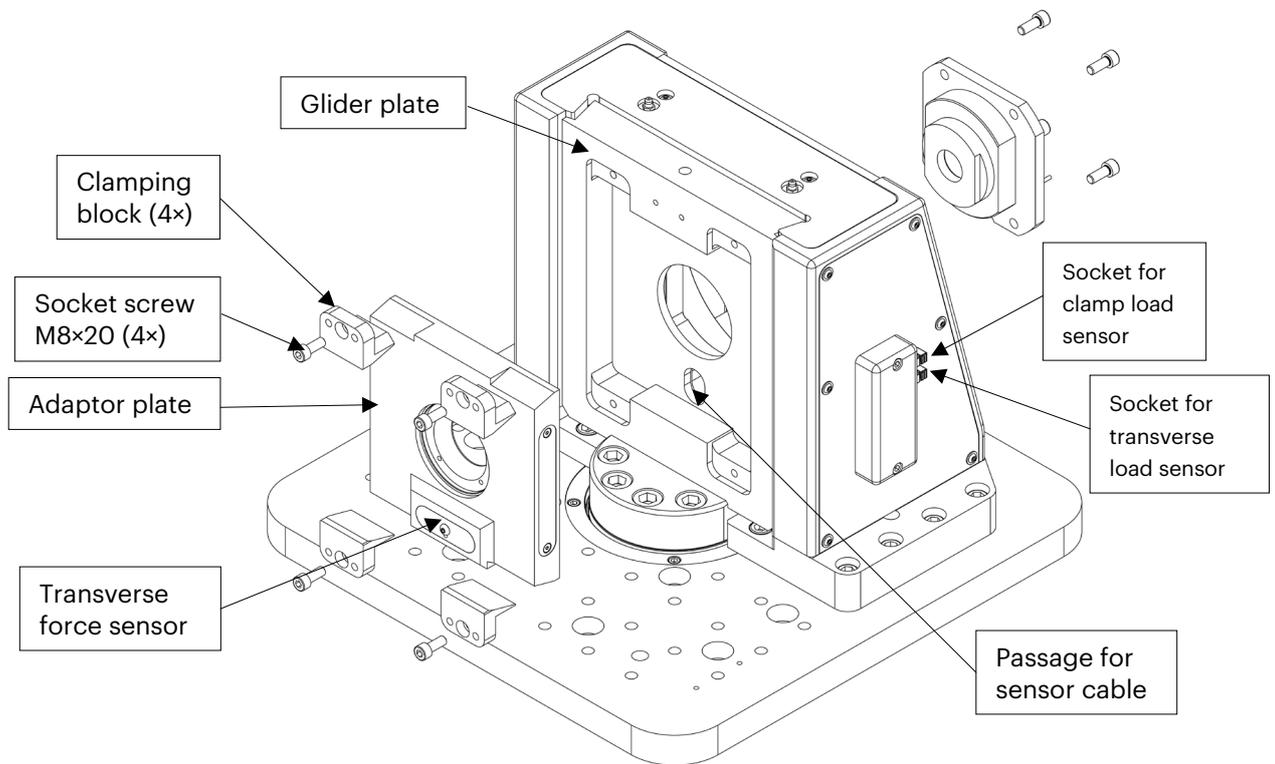
## Installing adaptor modules

### Adaptor plate module 50 kN

The adaptor plate module 50 kN is used for testing fasteners from sizes M3 resp. #4 up to M12 resp. 1/2". The required transverse force to test fasteners of these sizes is relatively small and the sensor that is built-in in the machine would be only measuring at the lower end of its measurement range where the relative accuracy is not optimal. In order to measure the

## Mechanical System Description

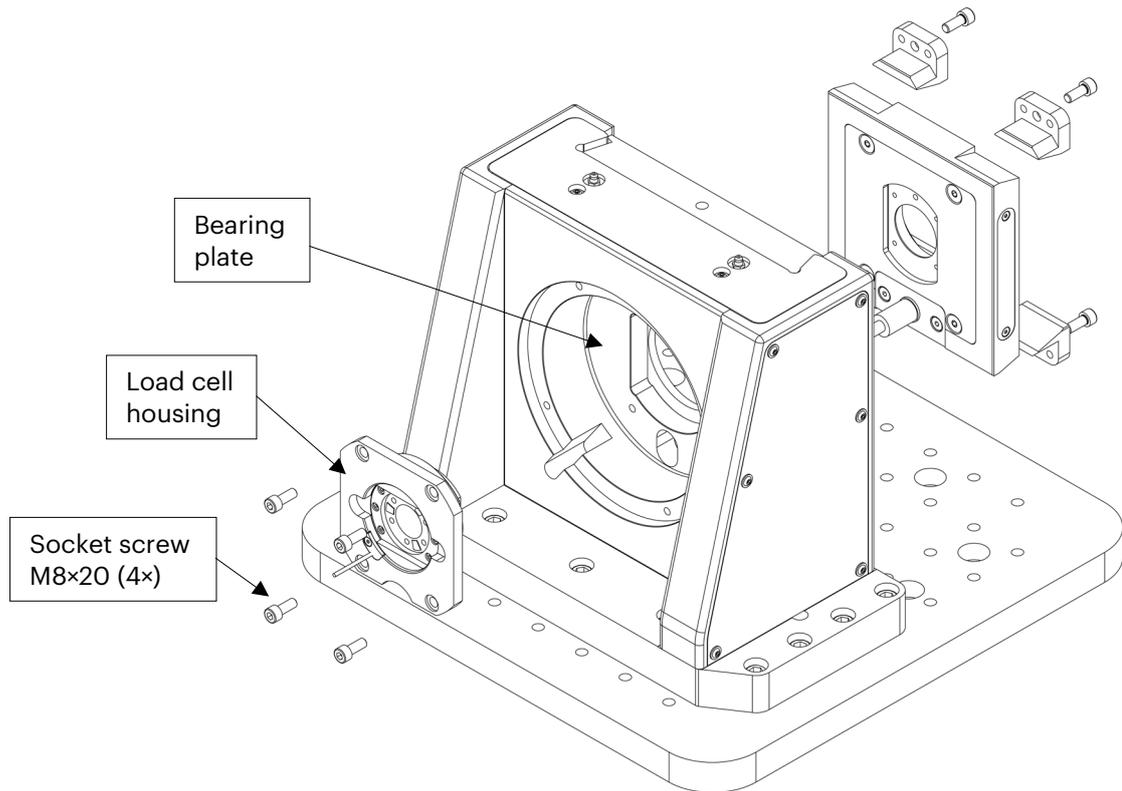
transverse force more accurately, this adaptor plate module has a transverse force sensor built in.



1. Pass the sensor cable through the passage in the glider plate and place the adaptor plate into the glider plate. The sensor has to be at the bottom. Ensure the machine is powered OFF and connect the cable to socket for transverse load sensor marked "TRANSVERSE"
2. Insert four clamping blocks.
3. Insert four socket screws M8x20 and tighten slightly by hand. The adaptor plate will move when the screws are pushing the clamping blocks against it. It is important to tighten the four screws evenly to make sure that the adaptor plate sits straight in the glider plate.
4. Finish by tightening the screws with a torque of 20 Nm.

### Load cell module 50 kN

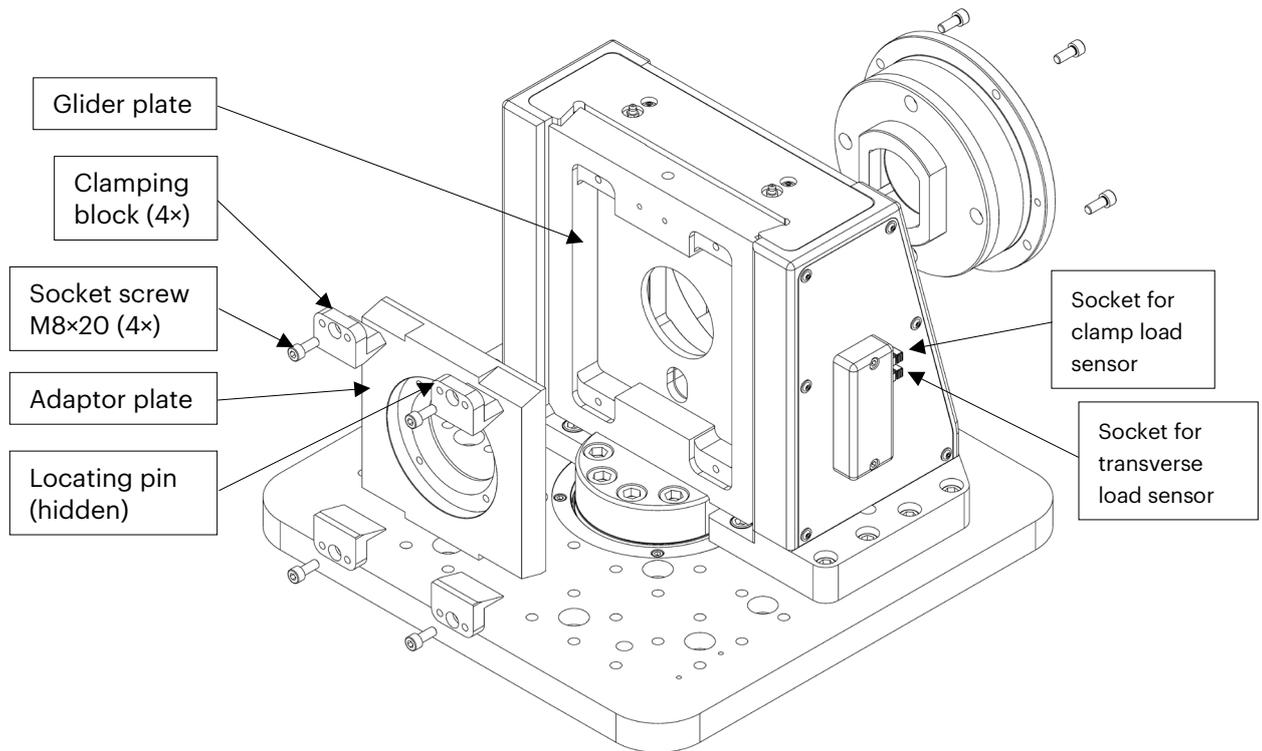
The load cell module contains the clamping force load cell with a measuring range of up to 50 kN.



5. Insert the load cell housing into the bearing plate. The cable from the force sensor has to point to the bottom left. The fitment between the fixture and the adaptor plate module is quite tight and it is necessary that the adaptor plate module is inserted straight to avoid that it jams up against the fixture. Do not use any excessive force when inserting or removing the adaptor plate module.
6. Ensure the machine is powered OFF and connect the load cell sensor cable to the socket marked "CLAMP LOAD".
7. Insert four socket screws M8x20, tighten them with 20 Nm.

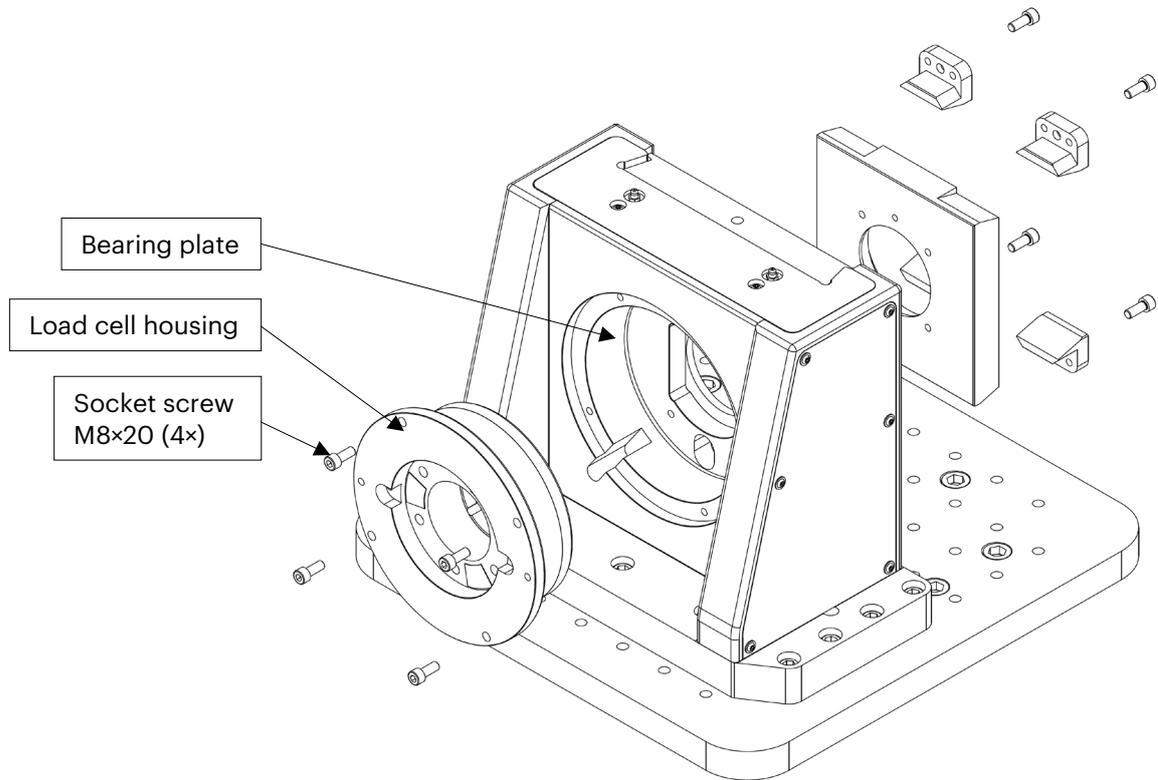
## Mechanical System Description

### Adaptor plate module 500 kN



1. Insert the adaptor plate into the glider plate. Make sure that the locating pin is on the top.
2. Insert four clamping blocks.
3. Insert four socket screws M8x20 and tighten slightly by hand. The adaptor plate will move when the screws are pushing the clamping blocks against it. It is important to tighten the four screws evenly to make sure that the adaptor plate sits straight in the glider plate.
4. Finish by tightening the screws with a torque of 20 Nm.

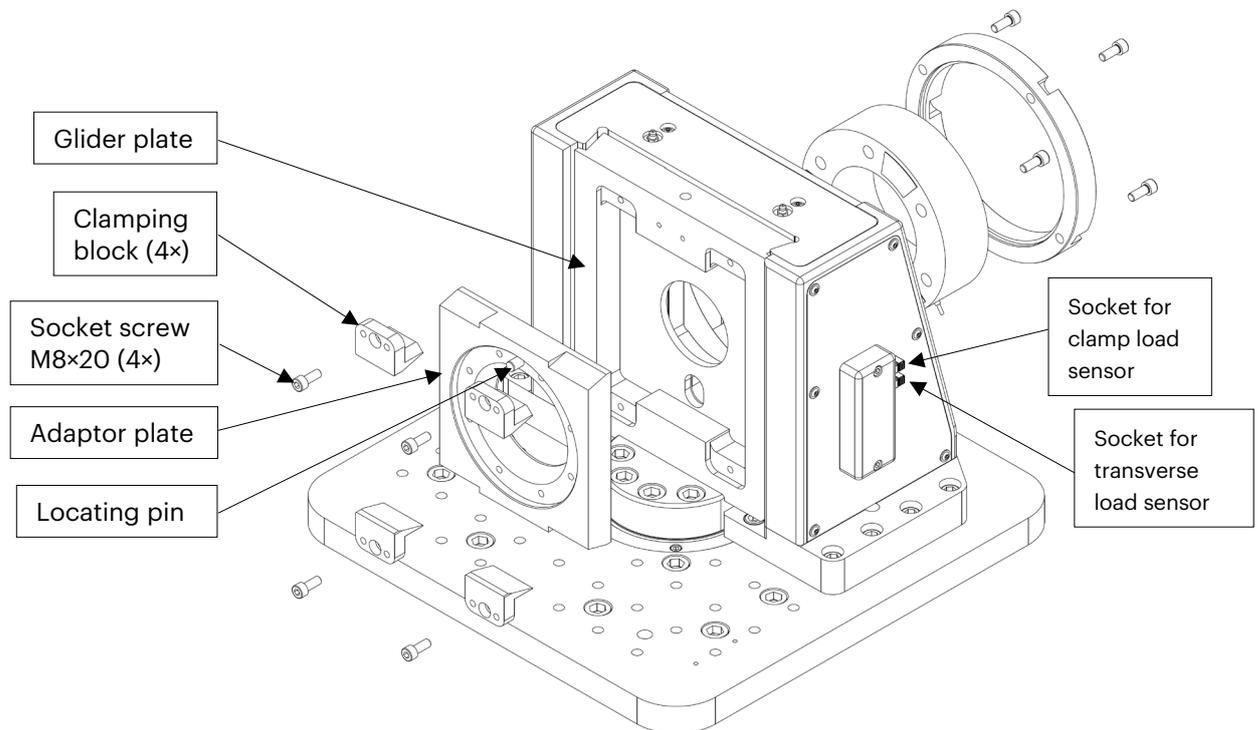
## Load cell module 500 kN



5. Insert the load cell housing into the bearing plate. The cable from the force sensor has to point to the bottom left. The fitment between the fixture and the adaptor plate module is quite tight and it is necessary that the adaptor plate module is inserted straight to avoid that it jams up against the fixture. Do not use any excessive force when inserting or removing the adaptor plate module.
6. Ensure the machine is powered OFF and connect the load cell sensor cable to the socket marked "CLAMP LOAD".
7. Insert four socket screws M8x20 and tighten to a torque of 20 Nm.

## Mechanical System Description

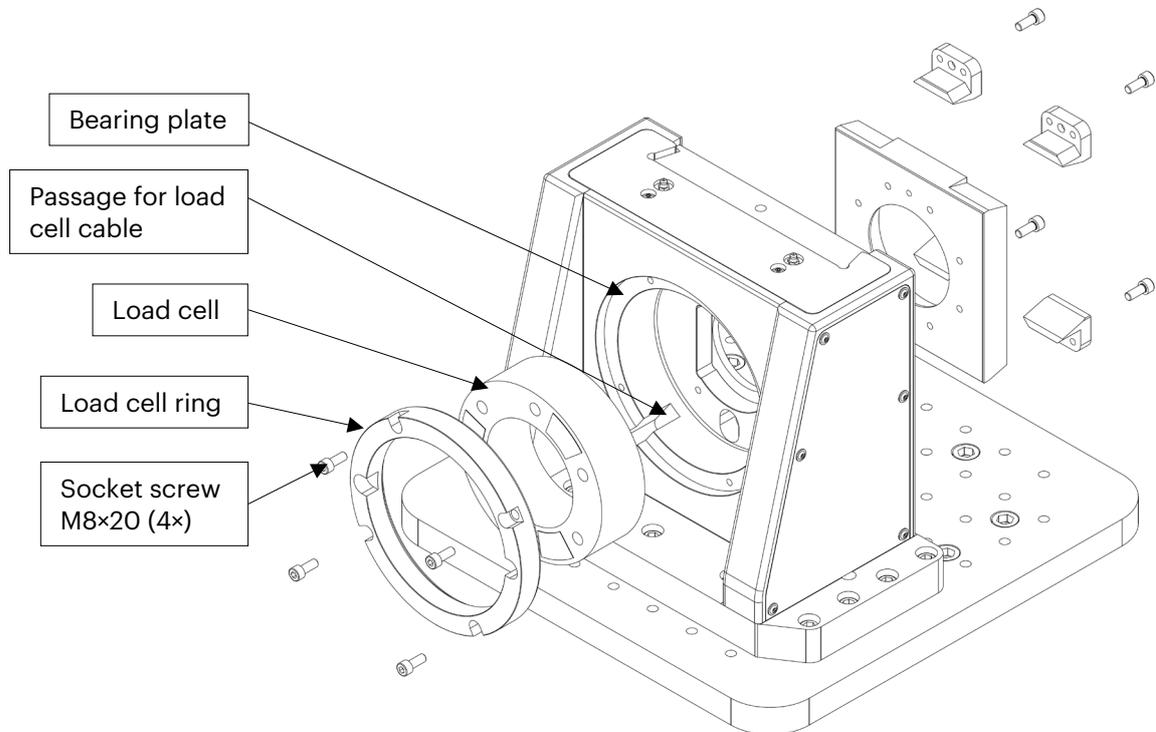
### Adaptor plate module 850 kN (J900 only)



1. Insert the adaptor plate into the glider plate. Make sure that the locating pin is on the top.
2. Insert four clamping blocks.
3. Insert four socket screws M8x20 and tighten slightly by hand. The adaptor plate will move when the screws are pushing the clamping blocks against it. It is important to tighten the four screws evenly to make sure that the adaptor plate sits straight in the glider plate.
4. Finish by tightening the screws with a torque of 20 Nm.

### Load cell module 850 kN (J900 only)

The load cell for measuring the clamping force up to 850 kN is not installed in housing as it is with the smaller modules.



5. Insert the load cell into the bearing plate. The cable from the force sensor has to point to the bottom left and pass through the passage in the bearing plate.
6. Ensure the machine is powered OFF and connect the load cell sensor cable to the socket marked "CLAMP LOAD".
7. Insert the load cell ring into the bearing plate. The fitment between the load cell ring and the bearing plate is quite tight and it is necessary that the load cell ring is inserted straight to avoid that it jams up against the bearing plate. Do not use any excessive force when inserting or removing the load cell ring.
8. Insert four socket screws M8×20 and tighten to a torque of 20 Nm.

### Fastener adaptors

Once the correct sizes of adaptor plate module and force cell module are installed, it is required to mount the correct size of fastener adaptors to match the size of the fastener to be tested. The J600 is designed to test fastener locking elements ranging in size from M3 to M30 ISO Metric and #4 to 1 1/8" UTS. The J900 allows testing of fasteners up to M45 ISO Metric resp. 1 3/4" UTS.

Adaptor plate module & load cell module	Fastener adaptor sizes, metric	Fastener adaptor sizes, imperial
50 kN	M3 to M12	#4 to 1/2"
500 kN	M14 to M30	5/8" to 1 1/8"
850 kN (J900 only)	M33 to M45	1 1/4" to 1 3/4"

A set of fastener adaptors is required for each size of fastener to be tested. To achieve useful test results, you should always use the correct fastener adaptors for your application.

Fastener adaptors have to be installed on both sides of the test fixture: The adaptor plate module and the force cell module.

Fastener adaptors for the adaptor plate module (moving side) are distinguished only by the size of the fastener that is going to be tested.

Fastener adaptors for the force cell module (stationary side) are not only distinguished by size, but there are three different types of adaptor sets:

9. Fastener adaptors with bolt anti-rotation.
10. Fastener adaptors without anti-rotation.
11. Fastener adaptors with a threaded insert.

You can find the description and composition of each set in the next section from [page 34 to 44](#).

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



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

### Fastener adaptors with bolt anti-rotation system

This set of fastener adaptors is most commonly used. It will prevent the hexagonal head bolt (e. g. ISO 4017, ANSI B18.2.1) from rotating during the test (thus *anti-rotation*). Only the nut and locking element placed on the top adaptor (TA) side may rotate which results in loosening of the fastener assembly from rotating during the test.

The stationary side of the test setup consists of the stationary base, the load cell – for measuring the clamp load – and the sleeve with anti-rotation (SA). The size of the SA has to be chosen to match the size of the bolt that has to be tested. The bolt has to be inserted into the SA. The sleeve’s pocket is shaped to match the hexagon head of the bolt and therefore to prevent the bolt from rotating.

The moving side of the test setup consists of the top adaptor plate, the top adaptor (TA) and the test washer (TW). The sizes of TA and TW have to be chosen to match the size of the nut to be tested.



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

### Fastener adaptors without bolt anti-rotation system

This set of fastener adaptors will allow the rotation of both, the bolt as well the nut and locking element. These adaptors are usually used when bolts with a socket head (e. g. DIN 912, DIN 6912, ISO 4762) are tested.

The stationary side of the test setup consists of the stationary base, the load cell – for measuring the clamp load – and the sleeve without anti-rotation (SL). The size of the SL has to be chosen to match the size of the bolt that has to be tested. The bolt has to be inserted into the SL.

The moving side of the test setup consists of the top adaptor plate, the top adaptor (TA) and the test washer (TW). The sizes of TA and TW have to be chosen to match the size of the nut to be tested.

### Fastener adaptors with a threaded insert

In case design does not contain a nut, for example, if a bolt is installed into the thread of some component like a housing or a structural member, the adaptor with threaded insert has to be used. The threaded insert replaces the female thread of the customer’s mechanical design. The set is

## Mechanical System Description

comprised of a Top adaptor (TA) and Test washer (TW) together with Sleeve with insert (SI) and Threaded insert (TI).

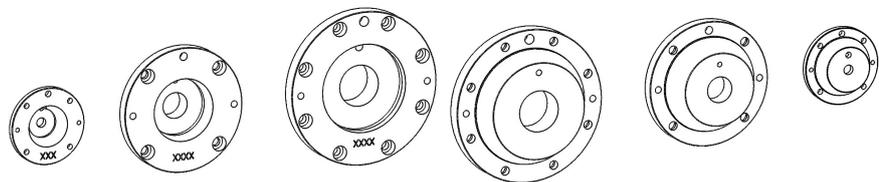
The sleeve with threaded insert is equipped with a shaft-clamping unit to block the threaded insert. It allows the threaded insert to be easily and quickly exchanged.

The threaded insert can be made in the material of your choice such as steel, aluminium or 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.

If required, the adaptor with a threaded insert can be custom designed to reflect as close as possible customer's need.

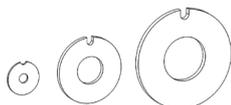
All **adaptor** sets are designed so that a ratio of clamping length to bolt diameter of 1.7:1 is achieved. Adaptor sets for higher ratios (e. g. 1:2.0 or 1:2.5) can be made to order.

### Top adaptor (TA)



Top adaptors 50 kN, 500 kN and 850 kN, front and rear sides shown. The top adaptors are the same for all three types of fastener adaptors: anti-rotation, without anti-rotation and sleeve with threaded insert.

### Test washer (TW)

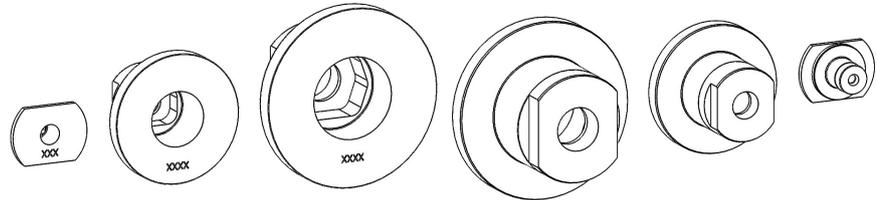


Test washers 50 kN, 500 kN and 850 kN.

The test washer has to be inserted in the top adaptor. The cut-out of the test washer has to be aligned with the locating pin which prevents the test washer from rotating. The purpose of the test washer is to provide a defined friction surface against the nut or locking device. The test washer is a consumable part and should be replaced after every test in order to

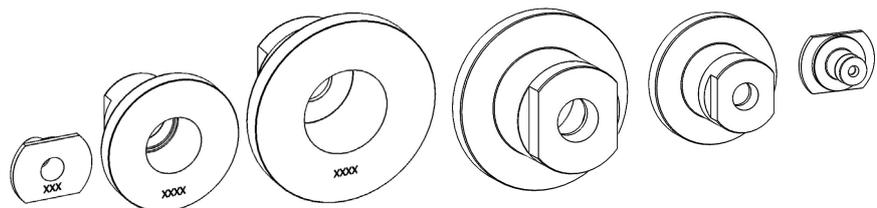
get reproducible results. Another purpose is to protect the top adaptor from surface damages.

### Sleeve with bolt anti-rotation system (SA)



Sleeves with bolt anti-rotation 50 kN, 500 kN and 850 kN, front and rear sides shown. The distinguishing feature of these sleeves is the inner shape that matches the head of the bolt to prevent it from rotating.

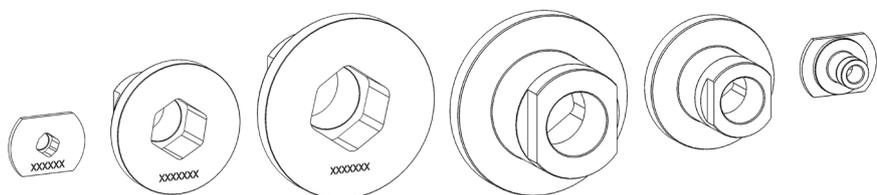
### Sleeve without bolt anti-rotation system (SL)



Sleeves without bolt anti-rotation 50 kN, 500 kN and 850 kN, front and rear sides shown. These sleeves have round pockets for the bolt head and therefore allow for rotation of the bolt.

Because the bolt can rotate in the sleeve, it is recommended to use washers (sleeve washers SW) in order to prevent damages to the inner surface of the sleeve.

### Sleeve with a threaded insert (SI)



Sleeves with the threaded insert 50 kN, 500 kN and 850 kN, front and rear sides shown. These sleeves are used to hold threaded inserts.

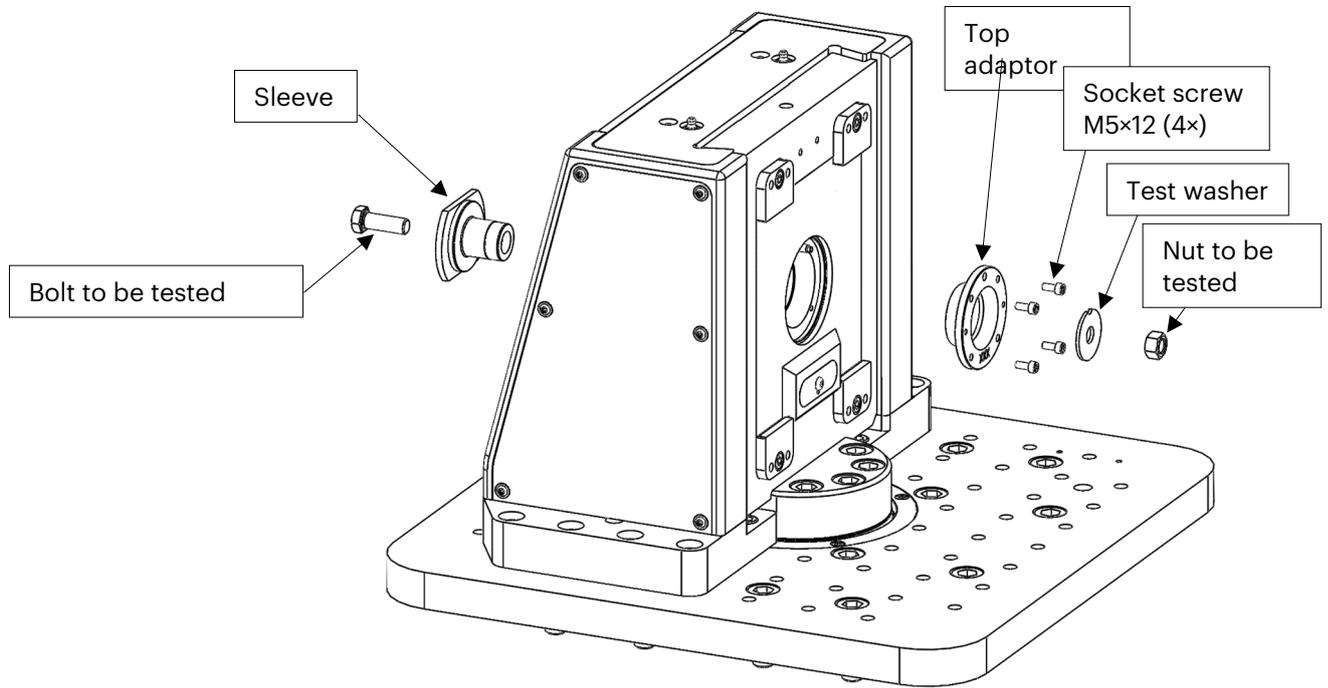
## Mechanical System Description

### Threaded inserts (TI)

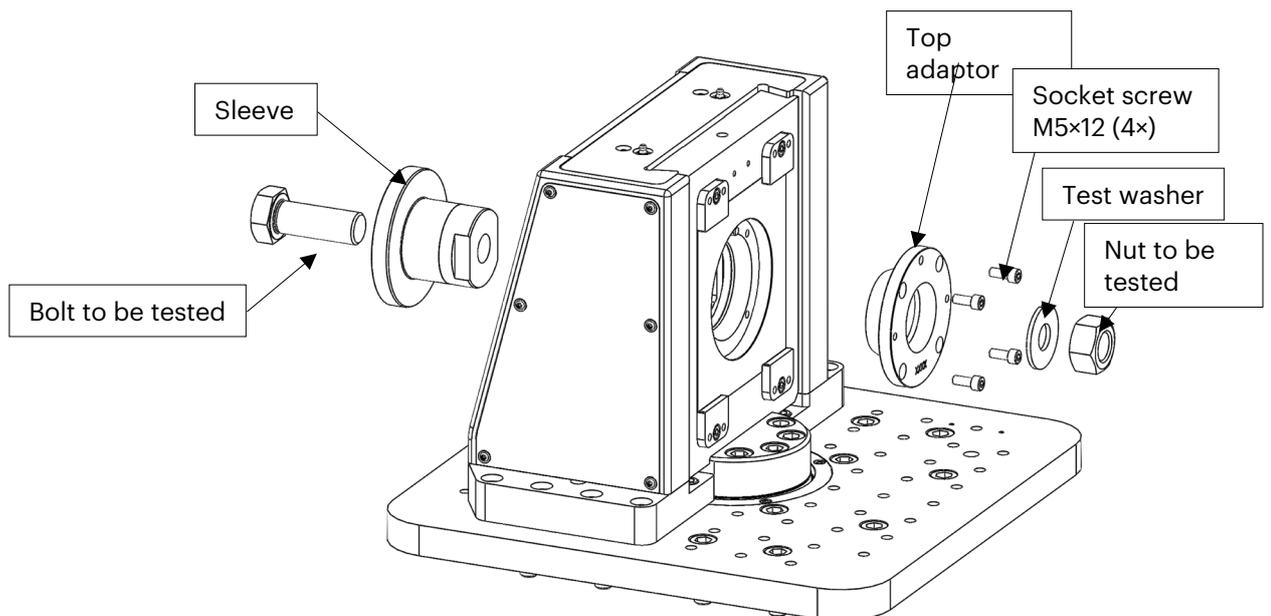


Threaded inserts 50 kN, 500 kN and 850 kN, front and rear sides shown.  
These threaded inserts can be made to meet customer's requirements.

## Installing fastener adaptors in a 50 kN adaptor module

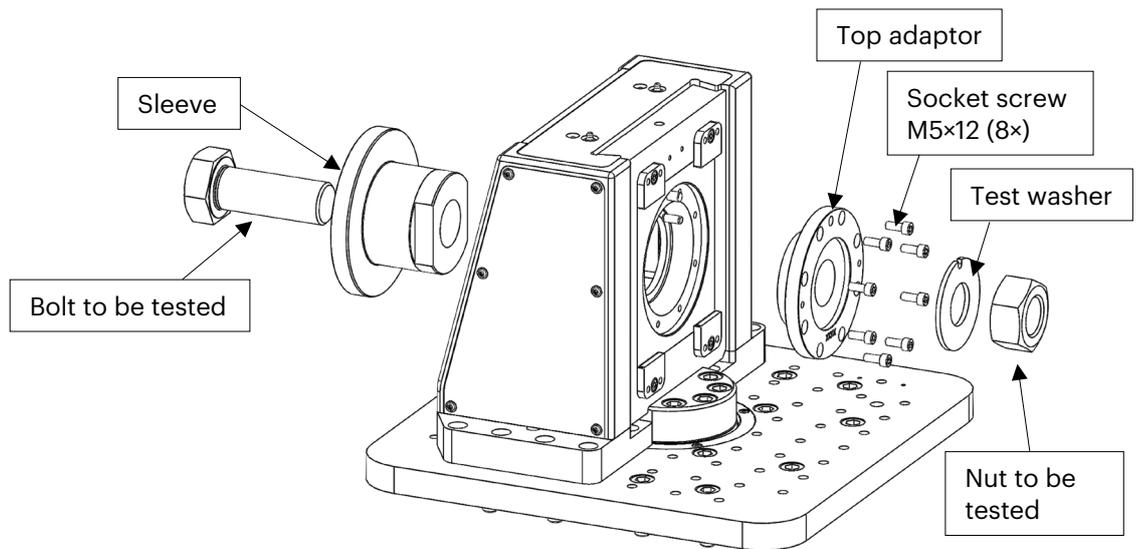


## Installing fastener adaptors in a 500 kN adaptor module



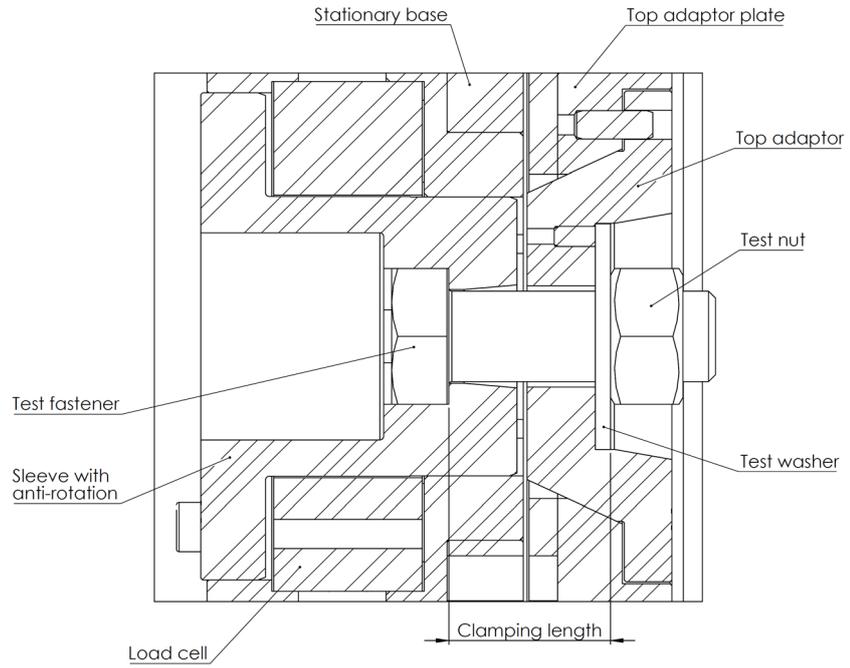
## Mechanical System Description

### Installing fastener adaptors in an 850 kN adaptor module

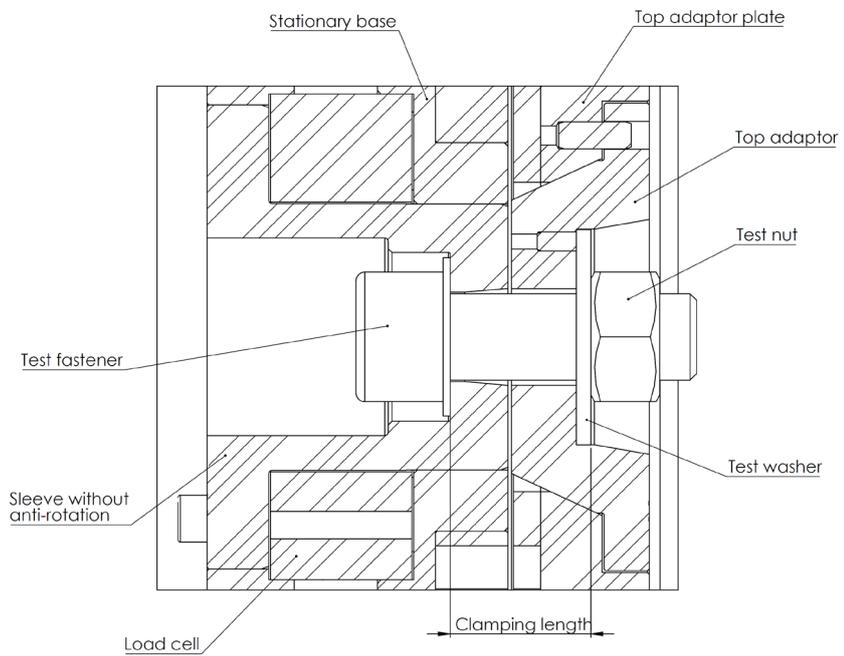


1. Insert the top adaptor into the adaptor plate. The adaptor plate has a locating pin at the upper side and the top adaptor has a corresponding hole.
2. Insert 4 socket screws (8 socket screws for the 850 kN adaptor) M5×12 and tighten slightly by hand.
3. Tighten the screws now evenly, making sure that the top adaptor stays straight in the adaptor plate.
4. Tighten screws to a torque of 20 Nm.
5. Insert a test washer. The test washer has a cut-out which has to be aligned with the locating pin in the top adaptor.
6. On the other side, insert the sleeve into the stationary base. Depending on the type of test, you have to use the sleeve with or without anti-rotation or the sleeve for threaded inserts.
7. Depending on the type of sleeve you are using:
  - a. When using a sleeve with anti-rotation: Insert the lubricated bolt that has to be tested into the sleeve. Install the lubricated nut onto the bolt.
  - b. When using a sleeve without anti-rotation: Insert the lubricated bolt that has to be tested. Install the lubricated nut onto the bolt.
  - c. When using a sleeve with threaded insert: Install the threaded insert that has to be used for the test into the sleeve. The bolt/ screw has to be inserted from the top adaptor side and screwed into the threaded insert.
8. Tighten the test sample to the desired torque or to the desired clamping load.

## Section views of the test fixtures

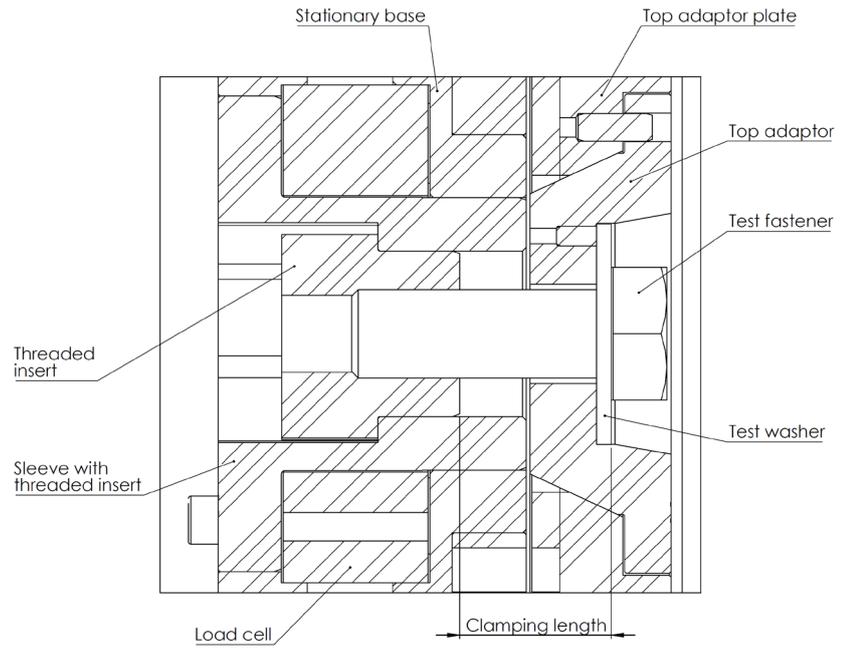


Fastener adaptor with anti-rotation (M24 shown)



Fastener adaptor without anti-rotation (M24 shown)

# Mechanical System Description



Fastener adaptor with a threaded insert (M24 shown)

Fastener adaptors with bolt anti-rotation system – ordering references

Module	Fastener Size	Top adaptor (TA)	Sleeve with bolt anti-rotation system (SA)	Test washer (TW)	“G” Width across flat hex. head (mm)	Clamp length (mm)
50 kN	M3	14TA0001	14SA0001	14TW0001	5.5	5.1
	M4	14TA0002	14SA0002	14TW0002	7.0	6.8
	M5	14TA0003	14SA0003	14TW0003	8.0	8.5
	M6	14TA0004	14SA0004	14TW0004	10.0	10.2
	M8	14TA0005	14SA0005	14TW0005	13.0	13.6
	M10	14TA0006	14SA0006	14TW0006	17.0	17.0
	M12	14TA0007	14SA0007	14TW0007	19.0	20.4
	#4	14TA0018	14SA0018	14TW0018	4.8	4.8
	#8	14TA0019	14SA0019	14TW0019	6.4	7.1
	#10	14TA0020	14SA0020	14TW0020	8.0	8.2
	1/4”	14TA0021	14SA0021	14TW0021	11.2	10.8
	5/16”	14TA0022	14SA0022	14TW0022	12.7	13.5
	3/8”	14TA0023	14SA0023	14TW0023	14.3	16.2
1/2”	14TA0024	14SA0024	14TW0024	19.1	21.6	
500 kN	M14	14TA0035	14SA0035	14TW0035	22.0	23.8
	M16	14TA0008	14SA0008	14TW0008	24.0	27.2
	M18	14TA0036	14SA0036	14TW0036	27.0	30.6
	M20	14TA0009	14SA0009	14TW0009	30.0	34.0
	M24	14TA0010	14SA0010	14TW0010	36.0	40.8
	M27	14TA0011	14SA0011	14TW0011	41.0	45.9
	M30	14TA0012	14SA0012	14TW0012	46.0	51.0
	5/8”	14TA0025	14SA0025	14TW0025	23.8	23.0
	3/4”	14TA0026	14SA0026	14TW0026	28.6	28.0
	7/8”	14TA0027	14SA0027	14TW0027	33.3	32.9
	1”	14TA0028	14SA0028	14TW0028	38.1	43.2
1 1/8”	14TA0029	14SA0029	14TW0029	42.9	48.6	
850 kN (J900 only)	M33	14TA0013	14SA0013	14TW001	50.0	56.1
	M36	14TA0014	14SA0014	14TW0014	55.0	61.2
	M39	14TA0015	14SA0015	14TW0015	60.0	66.3
	M42	14TA0016	14SA0016	14TW0016	65.0	71.4
	M45	14TA0017	14SA0017	14TW0017	70.0	76.5
	1 1/4”	TBD	TBD	TBD	47.6	54.0
	1 3/8”	14TA0031	14SA0031	14TW0031	52.4	59.4
	1 1/2”	14TA0032	14SA0032	14TW0032	57.2	64.8
	1 5/8”	14TA0033	14SA0033	14TW0033	61.9	70.2
	1 3/4”	14TA0034	14SA0034	14TW0034	66.7	75.6

## Mechanical System Description

### Fastener adaptors without anti-rotation – ordering references

Module	Fastener Size	Top adaptor (TA)	Sleeve without bolt anti-rotation system (SL)	Test washer (TW)	Sleeve washer (SW)	Clamp length (mm)
50 kN	M3	14TA0001	14SL0001	14TW0001	14SW0001	5.1
	M4	14TA0002	14SL0002	14TW0002	14SW0002	6.8
	M5	14TA0003	14SL0003	14TW0003	14SW0003	8.5
	M6	14TA0004	14SL0004	14TW0004	14SW0004	10.2
	M8	14TA0005	14SL0005	14TW0005	14SW0005	13.6
	M10	14TA0006	14SL0006	14TW0006	14SW0006	17.0
	M12	14TA0007	14SL0007	14TW0007	14SW0007	20.4
	#4	14TA0018	14SL0018	14TW0018	14SW0018	4.8
	#8	14TA0019	14SL0019	14TW0019	14SW0019	7.1
	#10	14TA0020	14SL0020	14TW0020	14SW0020	8.2
	1/4"	14TA0021	14SL0021	14TW0021	14SW0021	10.8
	5/16"	14TA0022	14SL0022	14TW0022	14SW0022	13.5
	3/8"	14TA0023	14SL0023	14TW0023	14SW0023	16.2
1/2"	14TA0024	14SL0024	14TW0024	14SW0024	21.6	
500 kN	M14	14TA0035	14SL0035	14TW0035	14SW0035	23.8
	M16	14TA0008	14SL0008	14TW0008	14SW0008	27.2
	M18	14TA0036	14SL0036	14TW0036	14SW0036	30.6
	M20	14TA0009	14SL0009	14TW0009	14SW0009	34.0
	M24	14TA0010	14SL0010	14TW0010	14SW0010	40.8
	M27	14TA0011	14SL0011	14TW0011	14SW0011	45.9
	M30	14TA0012	14SL0012	14TW0012	14SW0012	51.0
	5/8"	14TA0025	14SL0025	14TW0025	14SW0025	23.0
	3/4"	14TA0026	14SL0026	14TW0026	14SW0026	28.0
	7/8"	14TA0027	14SL0027	14TW0027	14SW0027	32.9
	1"	14TA0028	14SL0028	14TW0028	14SW0028	43.2
1 1/8"	14TA0029	14SL0029	14TW0029	14SW0029	48.6	
850 kN (J900 only)	M33	14TA0013	14SL0013	14TW0013	14SW0013	56.1
	M36	14TA0014	14SL0014	14TW0014	14SW0014	61.2
	M39	14TA0015	14SL0015	14TW0015	14SW0015	66.3
	M42	14TA0016	14SL0016	14TW0016	14SW0016	71.4
	M45	14TA0017	14SL0017	14TW0017	14SW0017	76.5
	1 1/4"	14TA0030	14SL0030	14TW0030	14SW0030	54.0
	1 3/8"	14TA0031	14SL0031	14TW0031	14SW0031	59.4
	1 1/2"	14TA0032	14SL0032	14TW0032	14SW0032	64.8
	1 5/8"	14TA0033	14SL0033	14TW0033	14SW0033	70.2
	1 3/4"	14TA0034	14SL0034	14TW0034	14SW0034	75.6

Fastener adaptors with threaded insert – ordering references

Module	Fastener Size	Top adaptor (TA)	Sleeve with threaded insert (SI)	Test washer (TW)	Clamp length (mm)
50 kN	M3	14TA0001	14SIO001	14TW0001	5.1
	M4	14TA0002	14SIO002	14TW0002	6.8
	M5	14TA0003	14SIO003	14TW0003	8.5
	M6	14TA0004	14SIO004	14TW0004	10.2
	M8	14TA0005	14SIO005	14TW0005	13.6
	M10	14TA0006	14SIO006	14TW0006	17.0
	M12	14TA0007	14SIO007	14TW0007	20.4
	#4	14TA0018	14SIO018	14TW0018	4.8
	#8	14TA0019	14SIO019	14TW0019	7.1
	#10	14TA0020	14SIO020	14TW0020	8.2
	1/4"	14TA0021	14SIO021	14TW0021	10.8
	5/16"	14TA0022	14SIO022	14TW0022	13.5
	3/8"	14TA0023	14SIO023	14TW0023	16.2
1/2"	14TA0024	14SIO024	14TW0024	21.6	
500 kN	M14	14TA0035	14SIO035	14TW0035	23.8
	M16	14TA0008	14SIO008	14TW0008	27.2
	M18	14TA0036	14SIO036	14TW0036	30.6
	M20	14TA0009	14SIO009	14TW0009	34.0
	M24	14TA0010	14SIO010	14TW0010	40.8
	M27	14TA0011	14SIO011	14TW0011	45.9
	M30	14TA0012	14SIO012	14TW0012	51.0
	5/8"	14TA0025	14SIO025	14TW0025	23.0
	3/4"	14TA0026	14SIO026	14TW0026	28.0
	7/8"	14TA0027	14SIO027	14TW0027	32.9
	1"	14TA0028	14SIO028	14TW0028	43.2
1 1/8"	14TA0029	14SIO029	14TW0029	48.6	
850 kN (J900 only)	M33	14TA0013	14SIO013	14TW0013	56.1
	M36	14TA0014	14SIO014	14TW0014	61.2
	M39	14TA0015	14SIO015	14TW0015	66.3
	M42	14TA0016	14SIO016	14TW0016	71.4
	M45	14TA0017	14SIO017	14TW0017	76.5
	1 1/4"	14TA0030	14SIO030	14TW0030	54.0
	1 3/8"	14TA0031	14SIO031	14TW0031	59.4
	1 1/2"	14TA0032	14SIO032	14TW0032	64.8
	1 5/8"	14TA0033	14SIO033	14TW0033	70.2
	1 3/4"	14TA0034	14SIO034	14TW0034	75.6

## 5. Software

### Establishing connection between J600/J900 and the operating device

The J600/J900 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 J600/J900 and the desired operating device such as a laptop PC must be established.

#### Connection with an ethernet cable

Connect an RJ45 ethernet cable (not included) between the user's computer and one of the two Ethernet ports found at the back end of the J600/J900 next to the machine name plate and main power switch. Both Ethernet ports offer same connectivity to the J600/J900.

The user's device will normally automatically detect and establish connection between the computer and the network of the J600/J900.

#### Wireless connection

The J600/J900 is equipped with an 802.11n capable wireless chip, enabling connection to any Wi-Fi capable device. To establish connection between the J600/J900 and the operating device, turn on the J600/J900 and allow approximately 60 seconds for the operating system to boot.

Once ready, the J600/J900 will spawn a WPA-protected Wi-Fi network named Jx00.x.xxxx where the x.xxxx is equal to the unit's unique serial number. The unique password allowing connection to the J600/J900 has been predefined before delivery by Vibrationmaster and cannot be changed. The password can be found on the unit's nameplate located at the back end of the J600/J900 next to the main power switch.



**The unique password to connect to the J600/J900's operating system can be found on the machine nameplate.**

**The password cannot be changed by the operator.**

**Forgot the Wi-Fi password?**

**No problem, please contact Vibrationmaster immediately by telephone (+352 24 55 90 68) or send an email to [support@vibrationmaster.com](mailto:support@vibrationmaster.com).**



**When connecting to the J600/J900 through its Wi-Fi network, try to minimize radio interference from other devices using the radio in frequencies close to the 2.4 GHz bands, such as cordless keyboard and mouse.**

In the event the computer is connected to the J600/J900 with both Wi-Fi signal and the ethernet cable, the user's device will determine which connection will prevail and prevent any conflict.

## Establishing connection between J600/J900 and the internet

The J600/J900 can be connected to the internet to allow for convenient remote access by Vibrationmaster to perform software upgrades and remote diagnostics and services. To establish connection between the J600/J900 and the Vibrationmaster service team, please connect an RJ45 Ethernet cable (not included) between one of the two Ethernet ports found at the back end of the J600/J900 and your internet router or company network.

## Launching Vibrationmaster Test Suite software

Once connected to the J600/J900'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 J600/J900 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 J600/J900 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 J600/J900 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 J600/J900 and the operating device is established.

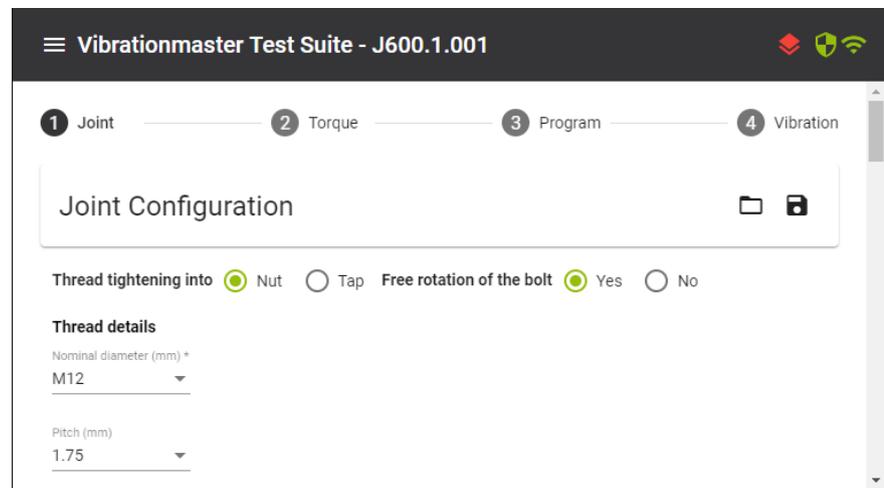
Passing the cursor over the network strength symbol, or tapping the symbol on a mobile device, will display a detailed status notification.

### 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, a Title area showing machine model and serial number and a notification area.



### Notifications

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

- Connectivity
- Machine state
- Initialization

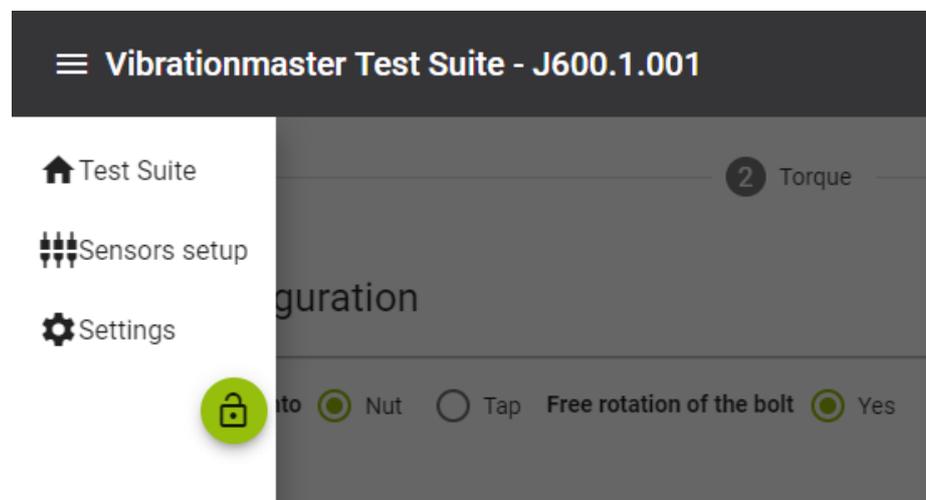
Category	Icon	Description
Connectivity		<b>Connection</b> between the J600/J900 and Vibrationmaster Test Suite on an operating device is established
Connectivity		There is <b>No connection</b> between the J600/J900 and Vibrationmaster Test Suite software
Machine state		The machine is in <b>Uninitialized</b> state and must be initialized before operation is possible
Machine state		The machine is ready in <b>Idle</b> state and waiting for user input.

Category	Icon	Description
Machine state		The machine is in <b>Busy</b> state while performing an operation
Machine state		The machine is performing <b>Vibration</b> test procedure
Machine state		The machine is performing a <b>Torque</b> test procedure
Machine state		The machine is in an <b>Error</b> state and corrective action are required before operation
Initialization		The machine has been successfully <b>Initialized</b> .
Initialization		Clicking this red icon will <b>Start the initialization</b> process and the icon turns green once initialised

### 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
<b>Test Suite</b>	Access to all the test related functions of the machine. The Test Suite is the default loaded page
<b>Sensors setup</b>	Access to the Sensor setup page
<b>Settings</b>	Access to general Settings

## Software



Two icons representing a lock and an unlock key, separated by a slash.	Unlock or lock the main menu to be visible on the screen at any time (Lock) or disappear (Unock)
--	--

## Machine Initialization

Upon switching ON the J600/J900, the machine status is Uninitialized per default and the initialization icon in the Title bar is red.



To initialise the machine and make it ready for testing, please close all machine covers and place the protective cover in its place on the Test Fixture and click on the initialisation icon which starts the initialisation process. The machine can't be operated during the initialising process.

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 configuration
- Torque Test
- Program Configuration
- Vibration Test

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



## Joint Configuration page

In the Joint Configuration 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 for our measurements. The third setup that can be taken into consideration is for the material we use.

**Bolt specific parameters**

Grade	Material	Yield strength (MPa)
8.8	Steel	640
Young modulus (MPa)	Necked-down $\phi$ (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 our 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 our 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, we have to set the specific parameters of it.

**Joint specific parameters**

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

For the help of the user, we have implemented the torque/ clamping force calculator. We can set % of proof load to have some limits on our later comparison.

**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	

In the torque section, the user can set the fastener dimension and pitch that he wants to test. The software uses these parameters to automatically calculate the total coefficient of friction ( $\mu_{tot}$ ) and nut factor (K), and displays those values real-time in the measurement section.

**Torque Test**

Before the user setup a new fastener, the user must prove the protective cover is installed, and start a zero alignment - first button in the toolbar.



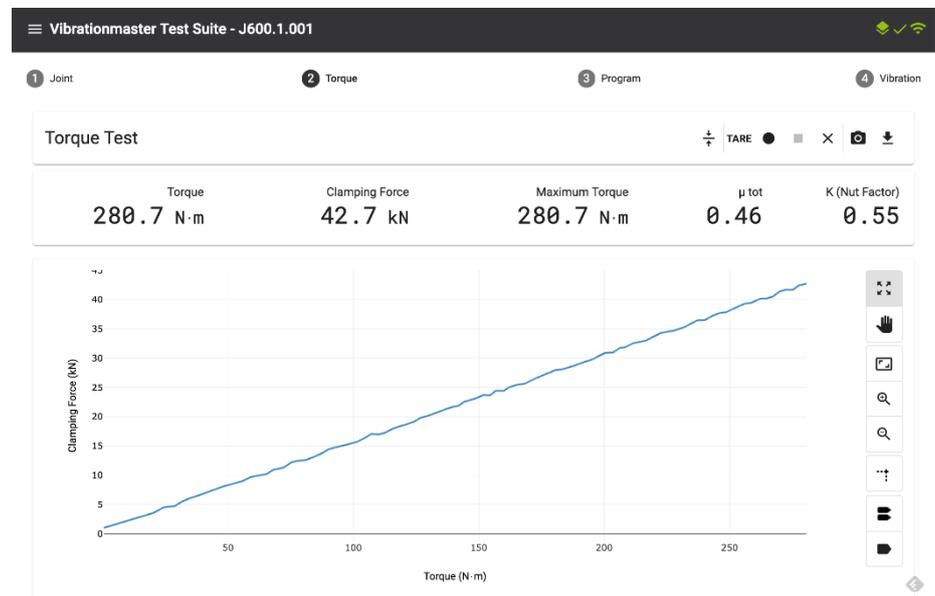
After the zero alignment is finished the user will make a tare - second button in the toolbar.



The user can set up now the new fastener to be tested, the protective cover must be installed.

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 ( $\mu_{tot}$ ) 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.



### Cockpit section

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



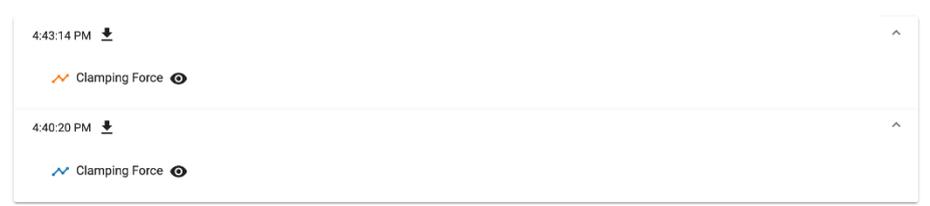
When performing a torque/tension test with the optional torque sensor, the display section shows in real-time the torque and clamping force curve and displays the following data:

- Current clamping force [*kN* or *lbf*]
- Torque [*N · m*]
- Maximum torque [*N · m*]

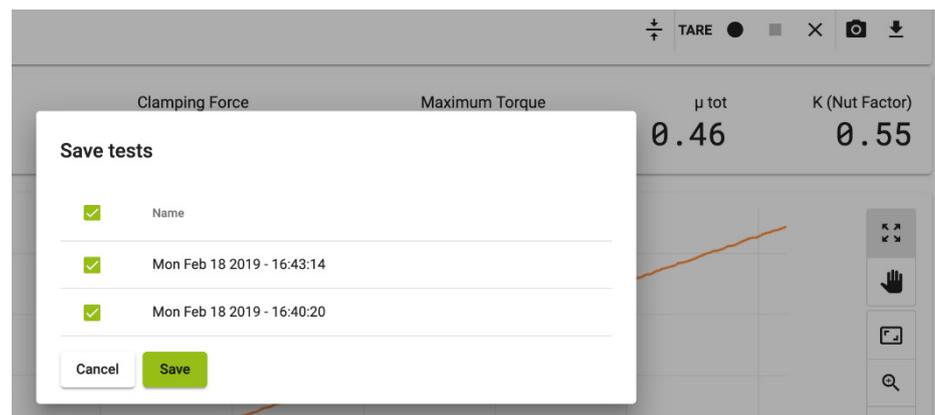
## Software

- Total coefficient of friction ( $\mu_{tot}$ )
- Nut factor ( $K$ )

The user can stop the measurements with a click on the stop button. The user can work now with the saved every torque tests measurements individual in the working area and download every measurement.



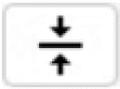
The user can save all the tests made for a fastener setup with a click on the general save button - the last in the toolbar. This will open a dialogue window where he can set all or filter torque test measurements and save this.



### 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	

Field	Name	Description	Comments
	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 program steps, a target value that defines when the test program is automatically stopped.

On the first section, we have values from our last tightening. The user can use a different calculation for the marginal slip, as stiff joint (Junker), soft joint or customer.

🗨️ 📄

**Program Configuration**

---

**Output from tightening**

Tightening torque (Nm)	Clamping Force (kN)	Total Friction Factor (µm)
721.22	108.79	0.46

Customer program configurations

% of bolt yield strength	% of joint proof load	Underhead friction factor	Transverse load to slip(kN)
201.72	224.12	0.46	50.04

**Marginal slip calculation**

Calculation method: Marginal Slip displacement (mm)  
 Soft joint ▼ 1.46

**Transverse load**

Minimum %	Minimum value (kN)	Maximum %	Maximum value (kN)
20	10.01	120	60.05

**Marginal slip displacement**

Minimum %	Minimum value (mm)	Maximum %	Maximum value (mm)
20	0.29	120	1.75

Max displacement geometry(mm)  
1.04

Very important for user tests is the maximum displacement calculated on geometry - the last field on the first section. The application uses this field as a reference to the displacement setup in the program section

### Program section

Every individual step can be of 2 different types, fixed displacement or fixed transverse force.

**Program**

Type	Displacement (mm)
Fixed displacement	50.04
Fixed transverse force	12.5
	200

+

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**

Type Transverse force (kN)  
 Fixed transverse force ▼ 1.04

---

Frequency (Hz) Cycles +  
12.5 200

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

**Program**

Type Displacement (mm)  
 Fixed displacement ▼ 1.5

---

Frequency (Hz) Cycles +  
1.5 30

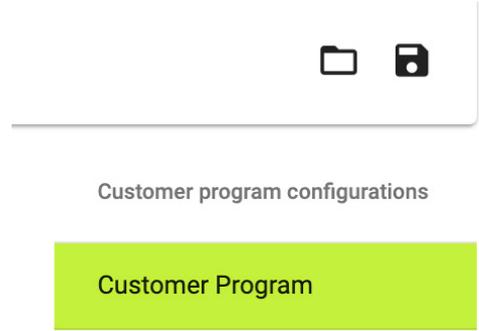
**We recommend to set your displacement under 1.04 mm!!**

The individual steps configured will be added to the overall program in list form. The maximum total number of cycles for one program is 2500 cycles in one or several steps.

Program			No.	Frequency (Hz)	Cycles	Displacement Force	Delete
Type	Displacement (mm)						
Fixed displacement ▼	<u>0.4</u>						
Frequency (Hz)	Cycles	+					
<u>1.5</u>	<u>30</u>		1	12.5	20	1.04 mm	—
			2	1.5	30	1.04 mm	—
			3	1.5	30	10 kN	—
			4	1.5	30	0.4 mm	—

*Program section with four individual steps to form one program; First the machine will run 20 cycles at 12.5 Hz with a 1.04 displacement, then 30 cycles at 1.5 Hz, then 30 cycles at 1.5 Hz with the transverse force of 10 kN and finally 30 cycles at 1.5 Hz with a .04 displacement.*

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.



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

## Vibration Test

Before the user setup a new fastener, the user must prove the protective cover is installed, and start a zero alignment - first button in the toolbar.



The user can set up now the new fastener to be tested, the protective cover must be installed.

On the vibration test view on the left side, we have the program loaded for this test.

### Vibration Test

Frequency (Hz)	Cycles	Displacement Force
12.5	200	1.04 mm

When performing a vibration test, the measuring section shows the real-time evolution of the Clamping force, transverse force (optional) and displacement. In addition, it displays the following data:

- Current clamping force [kN or lbf]
- Start clamping force [kN or lbf]
- Remaining clamping force [%]
- Duration [Cycles]
- Frequency [Hz]
- Displacement [mm]
- Transverse force [kN] (optional transverse load sensor required)

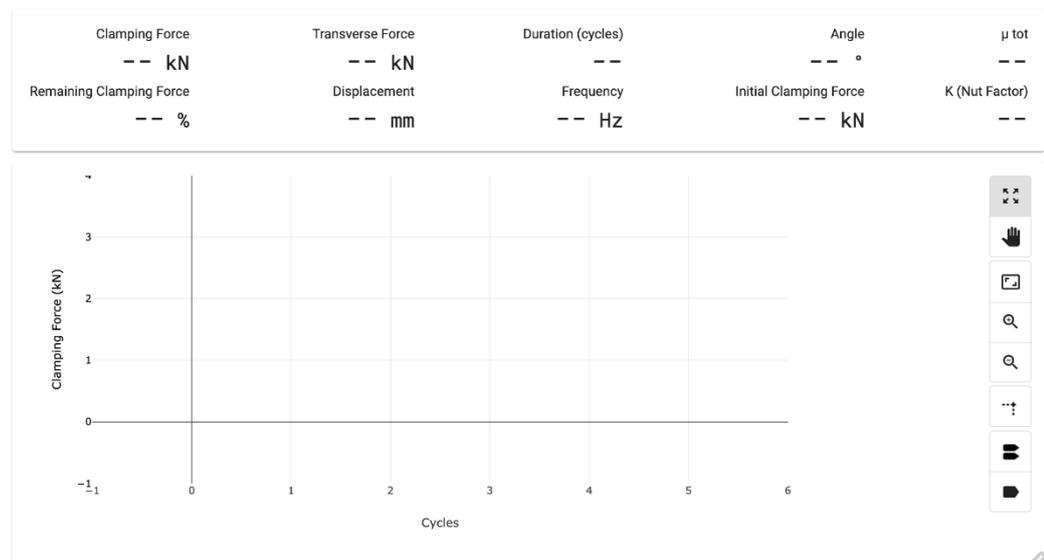
## Software



- Maximum torque [Nm] (optional torque sensor required)
- Total coefficient of friction ( $\mu_{tot}$ ) (optional torque sensor required)
- K (Nut Factor) (optional torque sensor required)

Clamping Force	Transverse Force	Duration (cycles)	Angle	$\mu_{tot}$
-- kN	-- kN	--	-- °	0.44
Remaining Clamping Force	Displacement	Frequency	Initial Clamping Force	K (Nut Factor)
-- %	-- mm	-- Hz	-- kN	0.52

On the last section after the user made a vibration test measurement he can see the results in the graph section.



The display section shows the following data:

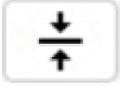
Field	Description	Units	Comments
<b>Current clamping force</b>	Displays the current preload value reported by the clamping force sensor	kN or lbf	If a filter is applied to the clamping force sensor, the displayed value is the filtered value
<b>Start clamping force</b>	Displays the clamping force value registered at the time the user presses the START button	kN or lbf	
<b>Remaining clamping force</b>	Displays the % of remaining clamping force from the start of the vibration test	%	It is calculated using the "Start clamping force" and the current displayed "Clamping force" (filtered value if a filter has been selected)

<b>Duration</b>	Displays the number of cycles elapsed since the starting of the test	Cycles	
<b>Frequency</b>	Displays the current frequency of the test step	Hz	The frequency level is also drawn on the graphics
<b>Displacement</b>	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
<b>Transverse force</b>	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
<b>Maximum torque</b>	Displays the maximum torque registered during the tightening process	Nm	Optional torque sensor required.
<b>Total coefficient of friction (<math>\mu_{tot}</math>)</b>	Displays the real-time total coefficient of friction calculated during the tightening process		Optional torque sensor required.
<b>K (Nut Factor)</b>	Displays the real-time nut factor calculated during the tightening process		Optional torque sensor required.

**Tool Bar explained**



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

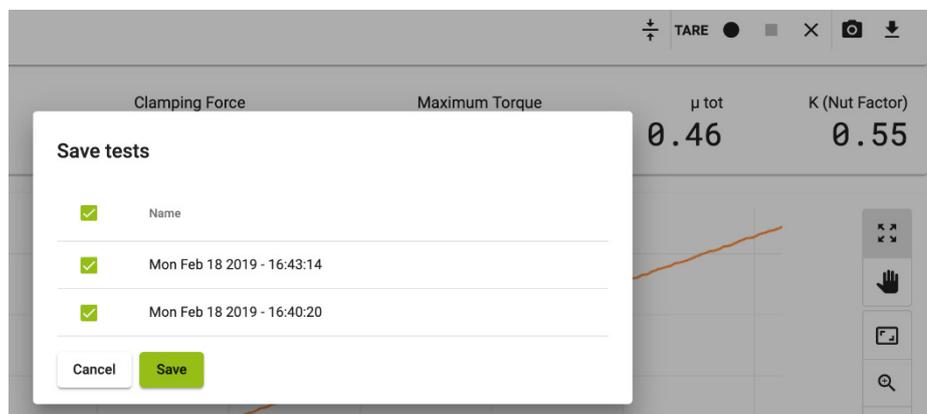
Field	Name	Description	Comments
	Align	Will align the Top Adaptor to the centre of the sleeve	The ALIGN button is only active before starting a test.

## Software

	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

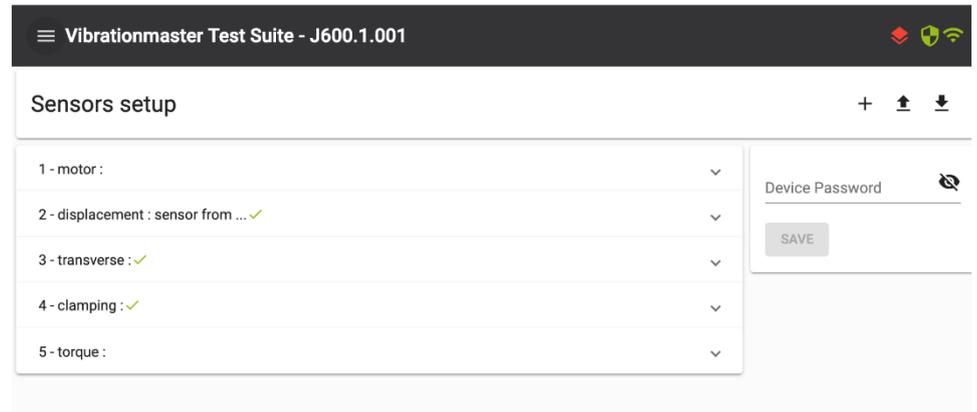
The user can save all the tests made for a fastener setup with a click on the general save button - the last in the toolbar. This will open a dialogue window where he can set all or filter torque test measurements and save this.



Frequency (Hz)	Cycles	Displacement Force
12.5	2000	0.5 mm
12.5	2000	1 mm
12.5	2000	15 kN

## Software Sensors Setup

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 for sensors following parameters: port, type of measurement, communication protocol and an optional description of the sensor module.

On the top we can see the type of the saved sensor and the optional description, this helps the user to find the sensor.



The second element allows the user to enable or disable the sensor:



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

Field	Description	Comments
Port	Set the port used by the sensor module	
Measurement	Set the measurement type of the sensor	
Communication protocol	Set the type of communication protocol.	Allows the user to set a VARSig or SSI
Optional Description	Allow the user to set more information about the sensor	
Calibration Points	Set the cloud points for calibration	
Unit	Allow the user to set the unit	The calculation is made automatically from the VAR controller
Zero Reading		

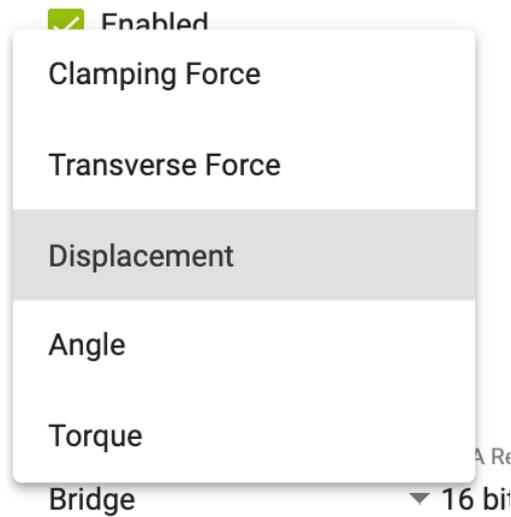
## Software

<b>Nominal</b>	The real physical value applied to the sensor	Input field
<b>Sensor</b>	The raw value measured by the sensor	Input field
<b>Multiplier</b>	The correction factor	The correction factor calculated with the formula: $Multiplier = \frac{Nominal}{Sensor}$
	Delete point	
	Add new point	
	Delete Sensor	

### Type of sensors measurement

Allows the user to set for sensors following measurements:

- Clamping force
- Transverse force
- Displacement
- Angle
- Torque



### Communication Protocol

Allows the user to set for sensors the communication protocol: VARSig and SSI. On VARSig will have this configuration:



Field	Description	Comments
<b>PGA Mode</b>	Set the PGA Mode	Allows the user to set a Bridge or Single-Ended mode
<b>PGA Resolution</b>	Set the resolution	Allows the user to set a 16 or 24 bits resolution
<b>Amplification Gain</b>		
<b>Control Voltage</b>		

### Calibration Points

Allows the user to set for sensors the calibration points, in raw or voltage modus.

**Calibration points** +

Unit Zero reading  
Volts ▼ 2.5

---

Nominal	Sensor	Multiplier	
0	0		
10	5	2.0000e+0	

### Save sensors setup on machine section

Allows the user to save all sensors setup direct on the machine. For this, the user needs a device password.

**Device Password** 

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## 6. Vibrationmaster Test Suite - Tests

### Performing a torque/tension test

**Before turning on the J600/J900 and starting a torque/tension test, the user must:**

1. Perform the “Before every use” maintenance operations and the “periodic” maintenance operations if required (see section “Periodic maintenance” page 80)
2. Install the appropriate set of fastener adaptors (see section “Installing fastener adaptors” page 38)
3. Install the optional angle sensor (see the section “installing the angle rotation sensor” page 85)

**To perform a torque/tension test:**

1. Connect the mains cable and turn on the J600/J900
2. Connect to the J600.2.XXX network, then open a web browser ( \*\* recommended Google Chrome) to the IP address: http://10.0.0.1
3. Check the signal symbol in the upper right corner of the Vibrationmaster Test Suite software that indicates whether connectivity to the J600/J900 device is achieved.



4. Check the initialization symbol in the notification section of the status bar. If the symbol is red the machine must be initialized.



5. Click on the red notification symbol to initialize the machine.
6. After the initialisation step, the initialization symbol will become green and the machine state status symbol will change to state IDLE, now the machine is ready to start the activity.



7. Select the fastener parameters in the *Joint Configuration* section. First select if you want to test a bolt and a nut or just a bolt (using a tap). When using a nut, you can also select if the bolt rotation is free or blocked.

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

8. Set the fastener nominal diameter size, pitch and flank angle for the thread to be tested.

**Thread details**

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

Optional description

---

9. If the displacement sensor is enabled in the settings menu, press the "ALIGN" button. The machine will automatically position the glider plate in order to align the centre of the top adaptor with the centre of the adaptor sleeve.



After the adaptor alignment, the machine state status symbol will change to state IDLE to confirm the operation was successful.



Make sure that no fastener is mounted in the adaptors during the alignment process.  
On all operations, the *machine protective cover* must be mounted.

10. Install the fastener to be tested into the fastener adaptors without tightening it. Press the RECORD button to start the test.



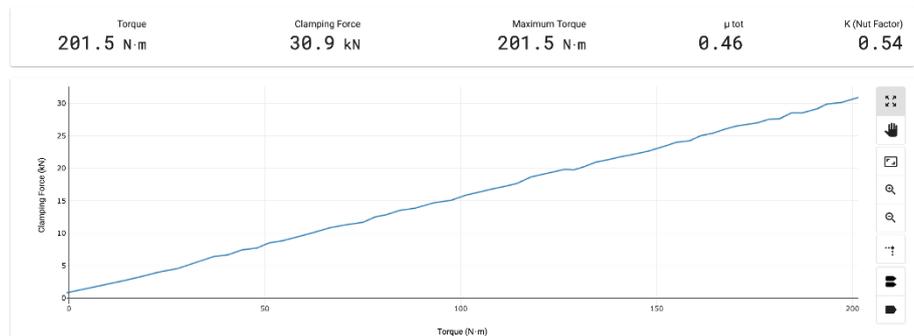
11. After the RECORD button was pushed, the machine state status symbol will change to state *TORQUE* to confirm the operation was successful.



12. The STOP RECORD button becomes active.



13. The *Vibrationmaster Test Suite* software displays now the real-time clamping force and torque in the measurement section



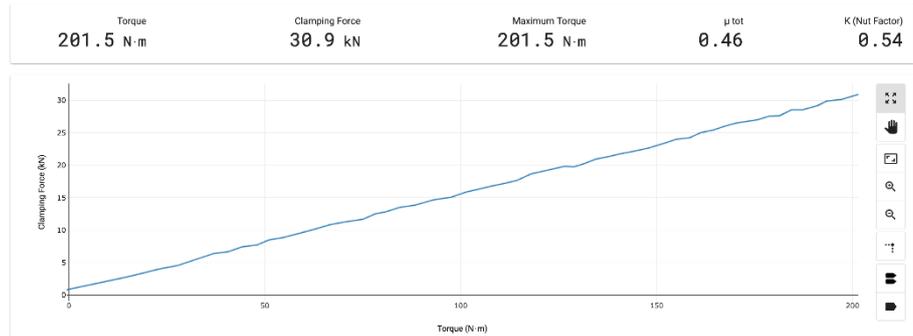
14. If needed, tare the clamping force sensor by clicking on the *TARE* button.



15. After the TARE button was pushed, the machine state status symbol will change to state *BUSY* to confirm the operation was successful.



16. Tighten the fastener up to the desired clamping force or torque. The software displays the real-time clamping force, torque, calculate in real-time the total coefficient of friction ( $\mu_{tot}$ ) and K (nut factor). It also displays the maximum torque registered during the tightening process and draws the torque and tension curve on the torque graphics section.



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



18. The user can now 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

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

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

21. To record multiple tightening and untightening processes, repeat the previous steps 10 to 19 as many times as needed.

22. To record multiple tightening processes, repeat previous steps 10 to 15. Then untighten the fastener without recording the data and repeat the same steps as many times as needed.

23. When the test is complete, the user can save it by clicking on the SAVE button. Please notice that the SAVE button is only selectable when the recording is stopped.



24. To delete a test, click on the DELETE button. Please notice that the DELETE button is only selectable when the recording is paused.





Make sure that no fastener is mounted in the adaptors during the alignment process.

On all operations, the machine protective cover must be mounted.

## Vibrationmaster Test Suite - Tests

### Performing a vibration test

**Before turning on the J600/J900 and starting a vibration test, the user must:**

1. Perform the “Before every use” maintenance operations and the “periodic” maintenance operations if required (see section “Periodic maintenance” page 80)
2. Install the appropriate set of fastener adaptors (see section “Installing fastener adaptors” page 38)
3. Install the optional angle sensor (see the section “installing the angle rotation sensor” page 85)

**To perform a vibration test:**

1. Connect the mains cable and Turn on the J600/J900
2. Connect to the J600.2.XXX network, then open a web browser ( \*\* recommended Google Chrome ) to the IP address: <http://10.0.0.1>
3. Check the signal symbol in the upper right corner of the Vibrationmaster Test Suite software that indicates whether connectivity to the J600/J900 device is achieved.



4. Check the initialization symbol in the notification section of the status bar. If the symbol is red the machine must be initialized.

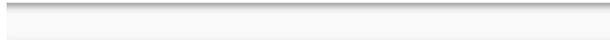


5. Click on the red notification symbol to initialize the machine.
6. After the initialisation step, the initialisation symbol will become green and the machine state status symbol will change to state idle, now the machine is ready to start the activity.



7. Check the parameters defined in the settings menu. Make sure to disable the sensors which are not connected to the machine.

4 - clamping : ✓



5 - torque :

Enabled

8. Set at least one program step in the vibration section

No.	Frequency (Hz)	Cycles	Displacement Force	Delete
1	12.5	200	1.04 mm	—

9. \*\* If required, set the additional parameters to automatically stop the program at a target value or to start the test with a delay.

Stop when clamping force reaches [%, lbf or kN]

Start delay (0-2880) [min]

10. If the displacement sensor is enabled in the settings menu, press the ALIGN button. The machine will automatically position the glider plate in order to align the centre of the top adaptor with the centre of the adaptor sleeve.



11. Install the fastener to be tested into the fastener adaptors without tightening it. Press the RECORD button to start the test.



12. After the RECORD button was pushed, the machine state status symbol will change to state VIBRATION to confirm the operation was successful.



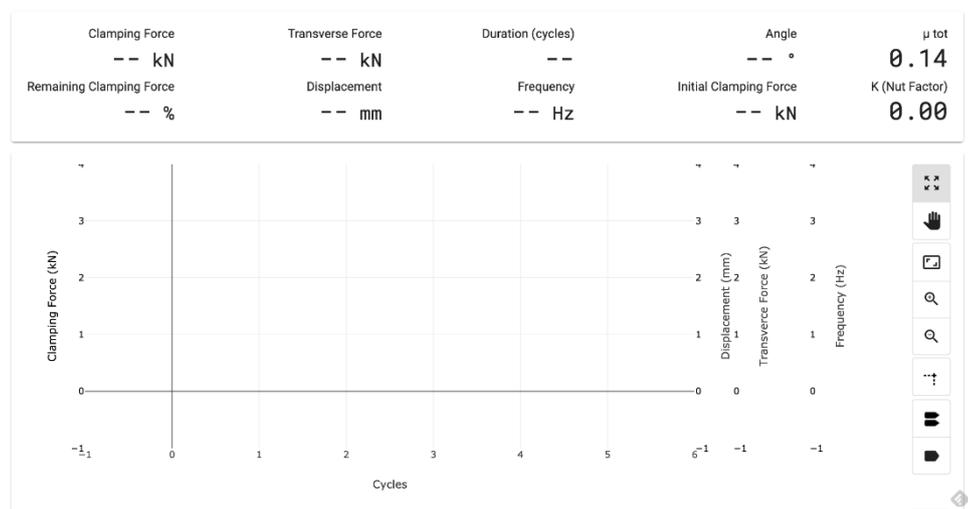
13. The STOP RECORD button becomes active.



14. The Vibrationmaster Test Suite software displays now the real-time parameters in the measurement section

Clamping Force -- kN	Transverse Force -- kN	Duration (cycles) --	Angle -- °	$\mu$ tot 0.14
Remaining Clamping Force -- %	Displacement -- mm	Frequency -- Hz	Initial Clamping Force -- kN	K (Nut Factor) 0.00

15. The software displays the real-time clamping force, transverse force, displacement and calculated the total coefficient of friction ( $\mu$ tot) and K (nut factor). It also displays the remaining clamping force and draws the clamping force curve per cycles on the vibration graphics section.

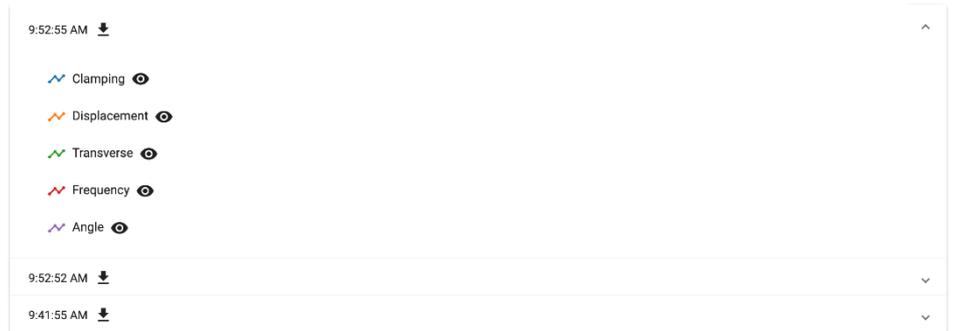


16. Once the vibration process is completed, press the STOP RECORD button to stop the recording



## Vibrationmaster Test Suite - Tests

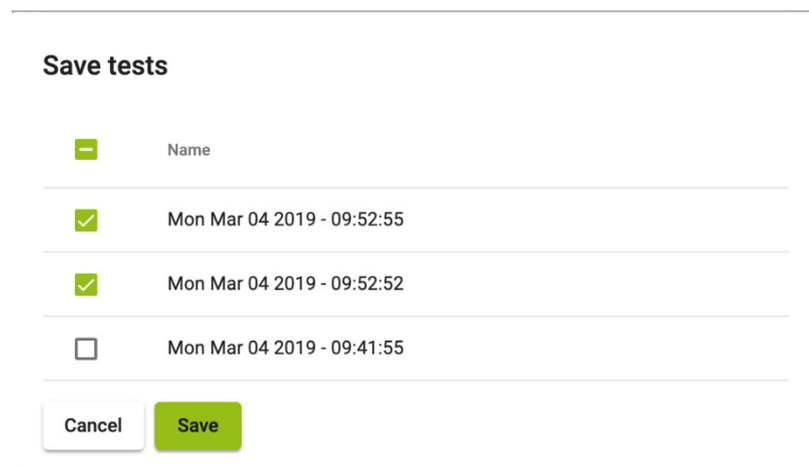
17. To record multiple vibration programs, repeat the previous steps 8 to 15 as many times as needed.
18. When the test is complete, the user can save it by clicking on the SAVE button direct in the list of vibration test. Please notice that the SAVE button is only selectable when the recording is stopped.



19. When all vibrations tests are complete, the user can save it by clicking on the SAVE button in the toolbar. Please notice that the SAVE button is only selectable when the recording is stopped.



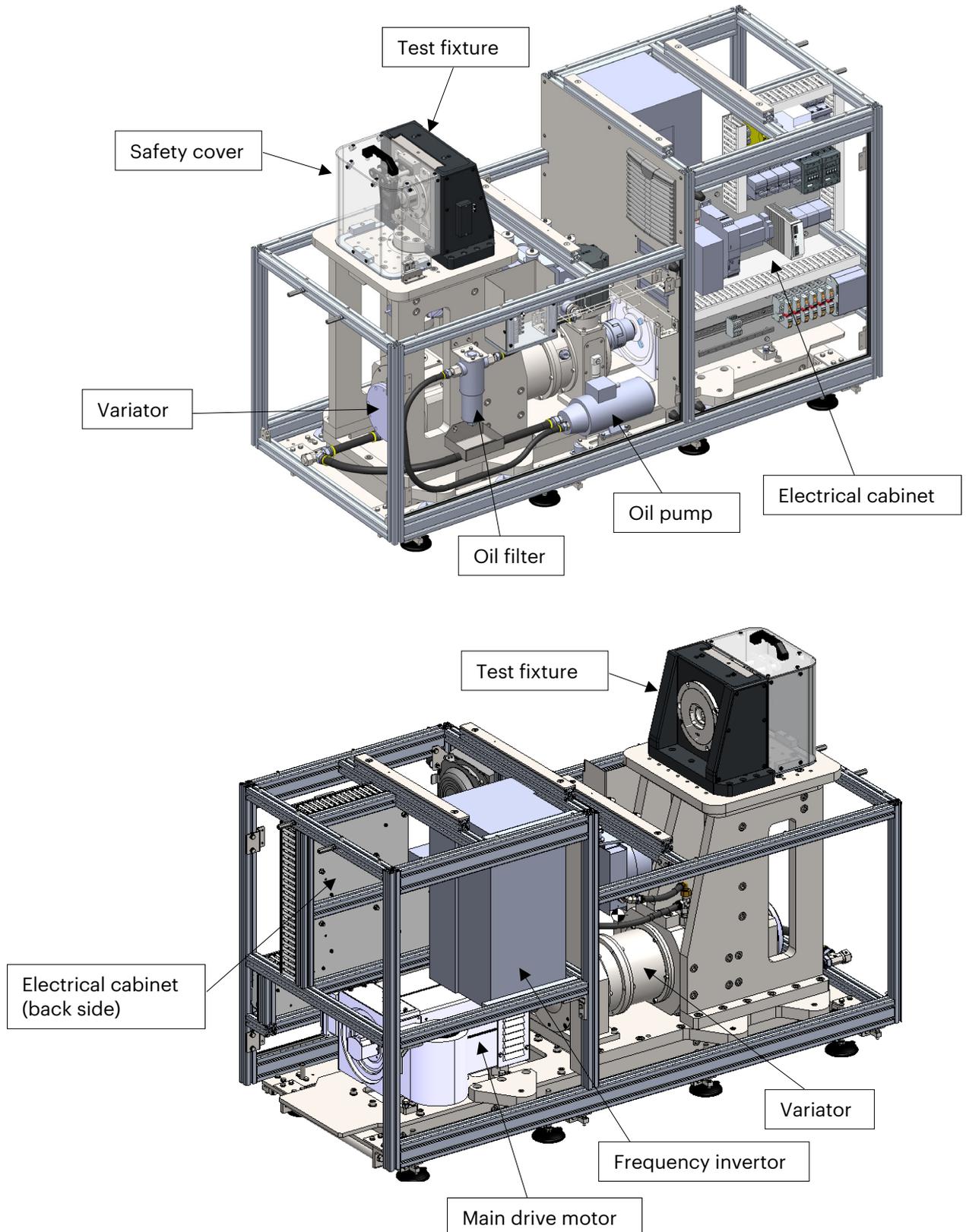
20. Choose your vibration tests from the Save tests dialogue box and save it.



## 7. Maintenance of the J600/J900

### Mechanical system overview

(the machine is shown without housing)



The J600/J900 consists of several assemblies or parts, and these are briefly described below:

**Chassis:** Vibrations that are created by the machine while tests are performed are de-coupled by the design of the base frame of the machine. Energy absorbing elements reduce the impact of operational vibrations to the surroundings.

**Power supply:** Three-phase 400 to 480 V electrical mains supply and a minimum current rating of 100 A is required.

**Fixtures:** The sub-assembly where the test samples are installed are called 'fixture'. The clamping load sensor is located in the fixture. A wide range of different sizes of fasteners can be tested on this machine. Fasteners to be tested are installed to the fixture by means of adaptors. Depending on the desired test method and fastener configuration, three different families of adaptors are available: Anti-rotation, non-anti-rotation and sleeve with insert. Within each of these families, there are different sizes at hand for different sizes of fasteners. It is important that always the corresponding adaptor size for the test sample is used.

**Safety cover:** The safety cover protects the operator and the surroundings from parts of the fasteners that are tested, and which potentially can break loose. A magnetic switch detects the presence of the safety cover and prevents that the machine is operated should the cover be missing.

**Main drive motor:** The J600/J900 is driven by a 4-pole asynchronous electrical motor controlled by a frequency inverter to allow for variable speed. Both the motors operate at a base voltage of 400 V and a frequency of 63 Hz. The motors have an integrated fan for forced cooling.

**Frequency inverter:** The frequency inverter controls the speed of the main drive motor. The motor speed is adjusted by frequency variation. The inverter protects the motor against overvoltage, overcurrent, stall, earth current, overheating and other possible malfunctions.

**Linear eccentric actuator (Variator®):** The transformation from the rotational motor drive into a linear oscillating movement is done by a linear eccentric shaft. The eccentricity can be adjusted from 0 to  $\pm 2$  mm while the machine is running. The adjustment of the eccentricity is done by a servo motor and can be set via the test control software.

**Lubrication:** The Variator® is a mechanical device that operates under great loads. Lubrication of the moving components is required to keep wear to a minimum and to increase the lifetime of the machine. The Variator® housing holds lubricating oil which is circulated by an oil pump

## Maintenance of the J600/J900

through a filter to all areas that need to be lubricated. The fill level of oil can be checked in a glass. The machine shall not be operated when the oil level is too low or too high. The oil filter is fitted with a clog-sensor which provides a signal to inform the operator when the filter needs to be replaced.

**Machine housing:** The machine housing is made of painted (RAL7016) sheet metal and a wooden frame around the top edges. Two service doors allow for access when maintenance work or repairs have to be done. The door to the Variator® is armed with a safety switch. The machine cannot be operated when this door is open.

**Connector panel:** The connector panel is located on top of the housing next to the test fixture. Any electrical sensor will have to be connected here.

**Machine control system:** The operation of the machine is controlled by a test control software which enables to set different test parameters and therefore run tests of a different kind.

**Optional angle sensor:** An angle sensor can be ordered as an option. The angle sensor measures the rotation (=loosening) of the fastener that is tested. The sensor is working on a magnetic principle, magnets have to be attached to the tested nut or bolt head. Adaptors to hold the magnets are available for a wide range of sizes.



The safety guard prevents direct access to the moving parts of the J600/J900, for the safety of the operator. The power to the main drive motor is shutdown when the safety guard is open. Do not tamper with the safety guard protection system.

### Periodic maintenance

To ensure the continued safe and reliable operation of the J600/J900, certain maintenance operations need to be carried out on a periodic basis.

#### Before every use:

1. Clean any dirt or foreign bodies from the machine and fixture surface
2. Make sure that the mains cable is not damaged

#### Periodic:

Certain maintenance operations need to be carried out on a periodic basis to ensure the continued safe and reliable operation of the Vibrationmaster J600/J900.

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 through grease nipples	Apply recommend lubricant	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 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		

## Maintenance of the J600/J900

WEAR PARTS: replace the bearings	Contact Vibratiomaster for bearing replacement kit	Yearly	Every 2 years	Every 5 years
-------------------------------------	--	--------	---------------	---------------



**Always turn off the J600/J900 and shutdown power to the mains cable before removing the covers.**

### Corrective maintenance

If experiencing problems when trying to use the J600/J900, it may be necessary to carry out tests and perform corrective maintenance.

#### Laptop PC does not connect to the J600/J900:

1. Check that the J600/J900 is plugged in and turned ON (both at the mains socket and on the J600/J900 on/off switch)
2. Check the laptop PC is turned ON and operating correctly
3. Check the strength of the wireless connection between the J600/J900 and the laptop PC. If required, move the laptop PC closer to the J600/J900 to get a stronger wireless signal

#### Bolt clamping force values not seen / not updated on laptop screen:

1. Check the strength of the wireless connection between the J600/J900 and the laptop PC. If required, move the laptop PC closer to the J600/J900 to get a stronger wireless signal
2. Check for faulty or damaged cable connections and wiring from the clamping force sensor to the load amplifier ensuring the connection cable is undamaged
3. Check the clamping force sensor mounting on the fixture: the clamping force sensor contact surface should always be parallel to the adaptor sleeve surface
4. 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 the test:

1. Check that the J600/J900 is plugged in and turned ON (both at the mains socket and on the J600/J900 on/off switch)
2. Check the test sample clamping force values. Reduce the clamping force if it is higher than the specifications and then restart the test
3. Check if any foreign body has become trapped in the guide slots or drive mechanism
4. 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:

1. Check the strength of the wireless connection between the J600/J900 and the laptop PC. If required, move the laptop PC closer to the J600/J900 to get a stronger wireless signal
2. Remove the front cover
3. Clean the top face of the sensor with a soft cloth.
4. Reassemble the front cover

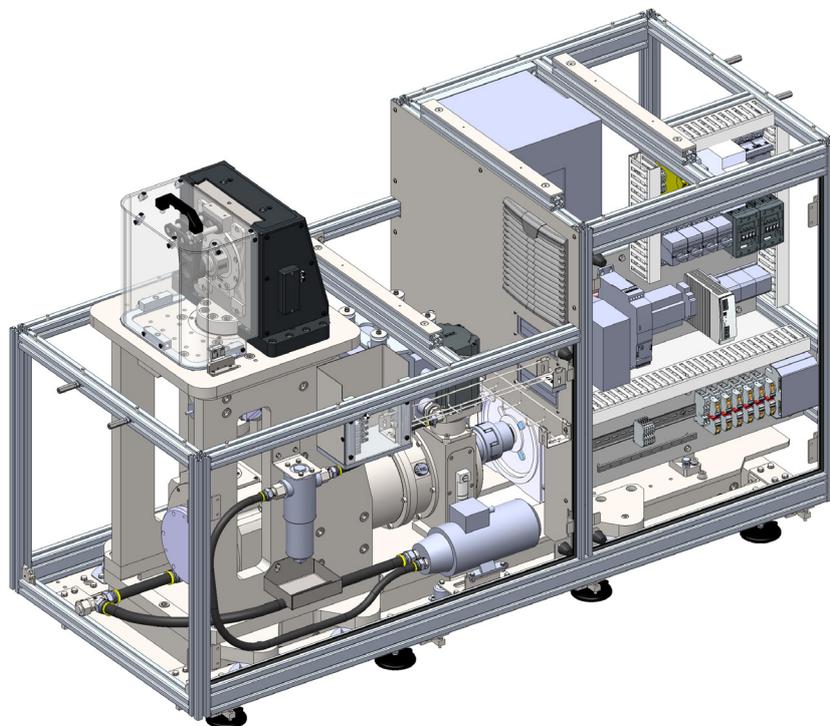


Always turn off the J600/J900 and shutdown power to the mains cable before removing the covers.

### 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 J600/J900 and disconnect the mains cable before removing the covers.



- Remove the main front cover by unscrewing and removing the fasteners

## Maintenance of the J600/J900

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



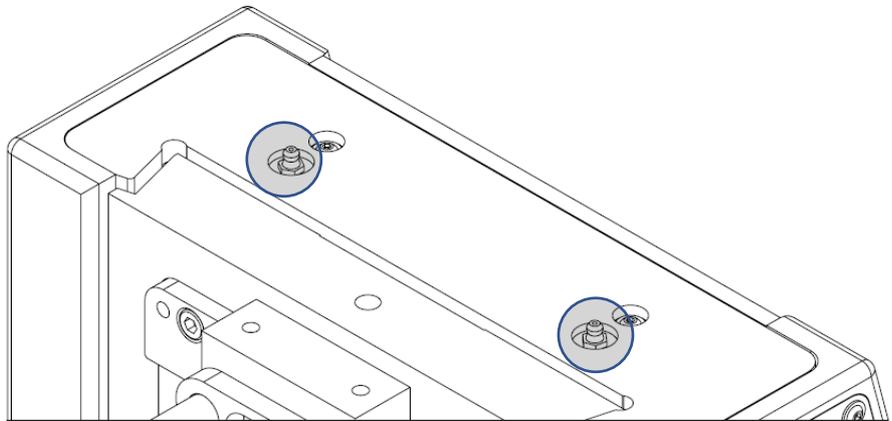
Always turn off the J600/J900 and shutdown power to the mains cable before removing the covers.

### Lubrication of Roller Bearings in the fixture

The roller bearings on the J600/J900 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.

#### To lubricate the test fixture bearings:

1. Turn off the J600/J900 and shutdown the mains cable power supply
2. Apply lubrication to both areas indicated in the diagram below



**Always turn off the J600/J900 and shutdown power to the mains cable before removing the covers.**

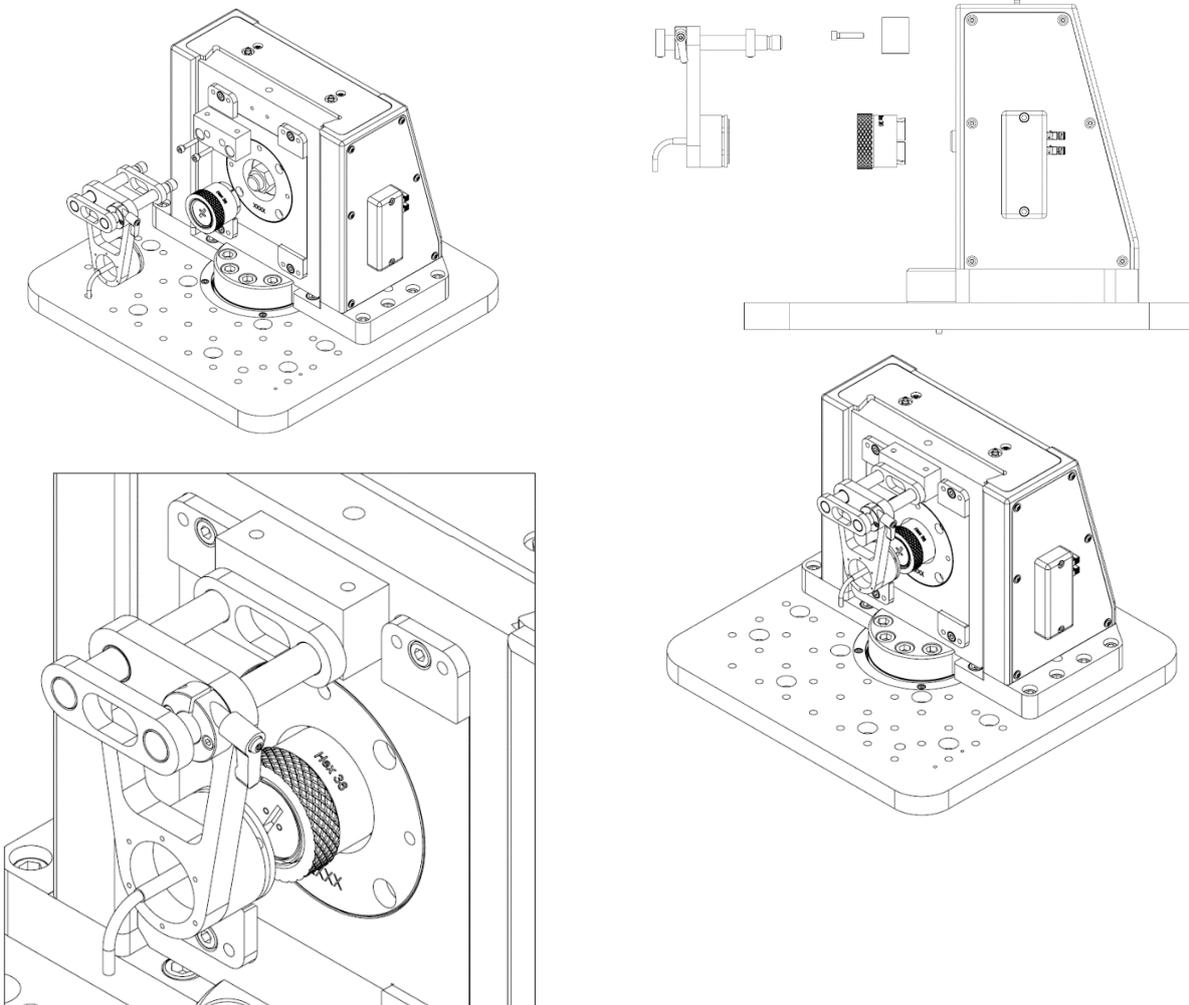
## Maintenance of the J600/J900

### Installing the Angle Rotation Sensor

To install the angle rotation sensor on the J600/J900 follow the steps below. In the diagram, we have an exploded view of how the sensor is positioned prior to installation. The second diagram details via the side view how the angle sensor shall be mounted prior to assemble on the J600/J900 test fixture.

#### To install the angle rotation sensor:

1. Turn off the J600/J900 and shutdown the mains cable power supply
2. Install angle rotation sensor as outlined below
3. Connect the RJ 45 connector of the sensor into the plug "angle" on the connector panel

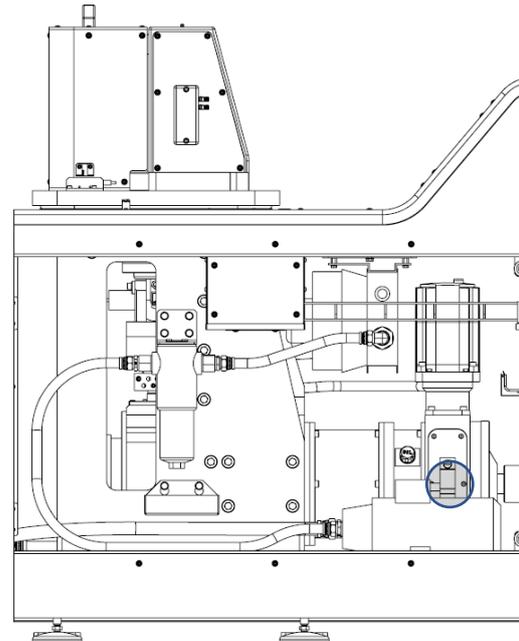
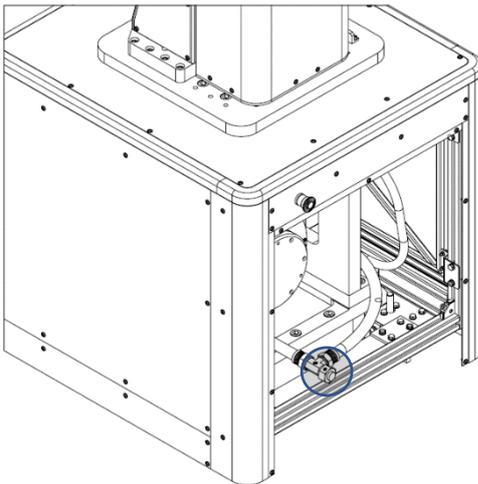


### Oil Replacement

To perform the oil replacement for the J600/J900 one needs to locate the drain plug shown in diagram 1. To carry out the oil fill Vibrationmaster recommends using hydraulic oil ISO VG 46.

#### To perform an oil replacement:

1. Turn off the J600/J900 and shutdown the mains cable power supply
2. Remove end cover as seen in diagram 1
3. Locate the drain plug shown in diagram 1 marked area
4. To complete the oil fill, remove the side panel as indicated in diagram 2
5. Oil should be supplied until midway of the level glass area shown in diagram 2



**Always turn off the J600/900 and shutdown power to the mains cable before removing the covers.**

## EU Declaration of Conformity

### Appendix A: EU Declaration of Conformity

#### EU Declaration of Conformity for Machinery

Manufacturer:

Vibrationmaster Technology Centre s.à r.l.  
Rue du Commerce  
3895 Foetz  
Luxembourg

Phone: +352 24 55 90 68  
Email: info@vibrationmaster.com  
Web: www.vibrationmaster.com

Hereby declares that the product:

Type: J-Series  
Name: J600/J900 Fastener test bench  
Serial number: Jx00.2.xxxx

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

The following harmonised standards have been applied:



Foetz  
December 4, 2018

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

Morten Schiff  
CEO

Wire colours

Name	Colour	Alternative Color
L1	Brown	
L2	Black	Red
L3	Grey	
N	Blue	
PE/Chassis Ground	Green/Yellow	
+24VDC	Orange	
Signal Ground	Purple	

## Data Cables and Connectors

### Appendix C: Data Cables and Connectors

#### Connector types

Data cables are using Industrial Mini I/O Connectors Type I.

For more information about Industrial Mini I/O connectors, please refer to *Appendix E: Industrial Mini I/O Connectors* (page 94).

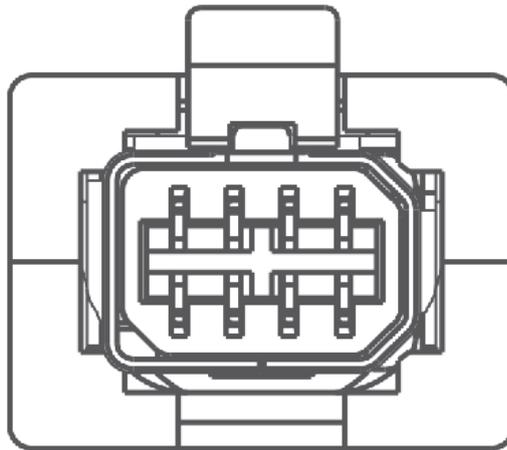


Figure 1: Type I Cable Plug Front View

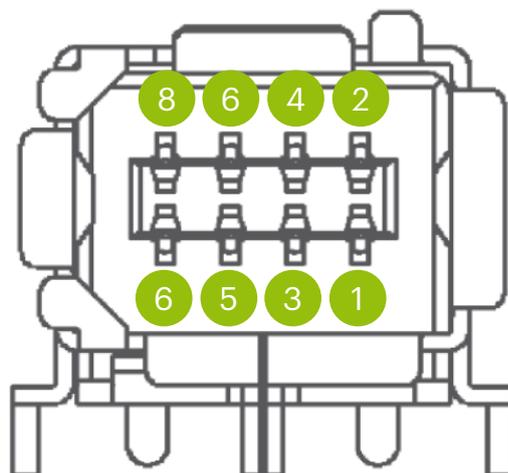


Figure 2: Type I Board Connector Front View

#### Pinout

Data cables follow the standard pinout of Ethernet cables (T568A or T568B).

Cables provided by Vibrationmaster are straight T568B cables.

## Data Cables and Connectors

Pin	Colour (T568A)	Colour (T568B)
1	White/Green	White/Orange
2	Green	Orange
3	White/Orange	White/Green
4	Blue	Blue
5	White/Blue	White/Blue
6	Orange	Green
7	White/Brown	White/Brown
8	Brown	Brown

## Sensor Cables and Connectors

### Appendix D: Sensor Cables and Connectors

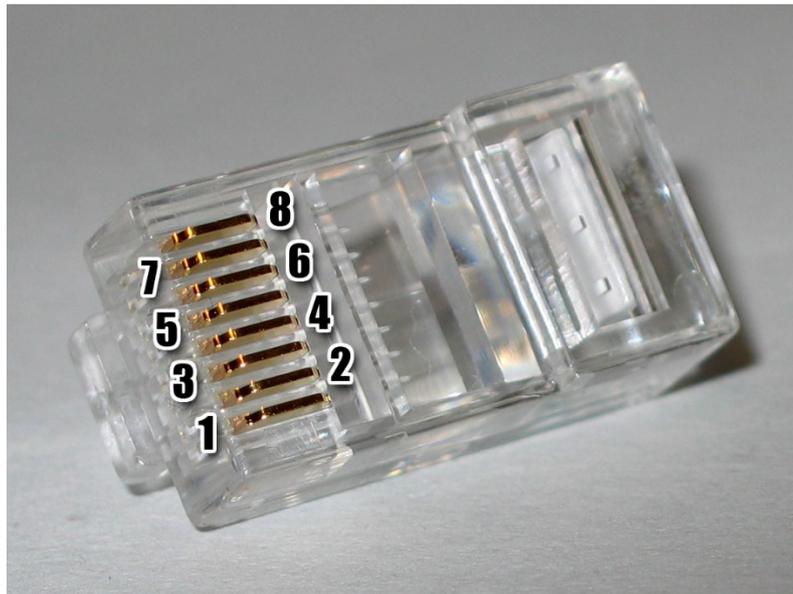
#### Connector types

Sensors can have 2 types of connectors:

- RJ45 Connector (8P8C Modular Connector)
- Industrial Mini I/O Connector Type II

For more information about Industrial Mini I/O connectors, please refer to *Appendix E: Industrial Mini I/O Connectors* (page 94).

#### RJ45 (8P8C) pinout



#### Industrial Mini I/O Connector Type II

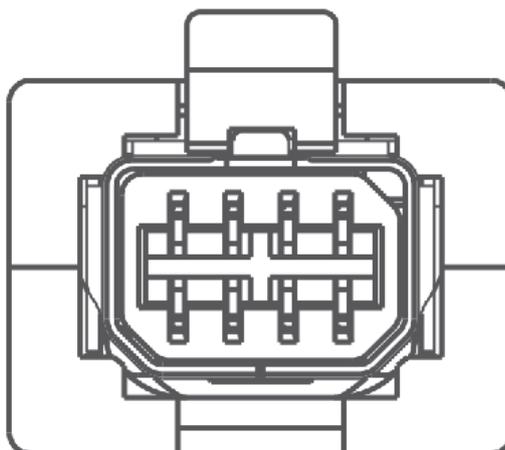


Figure 3: Type II Cable Plug Front View

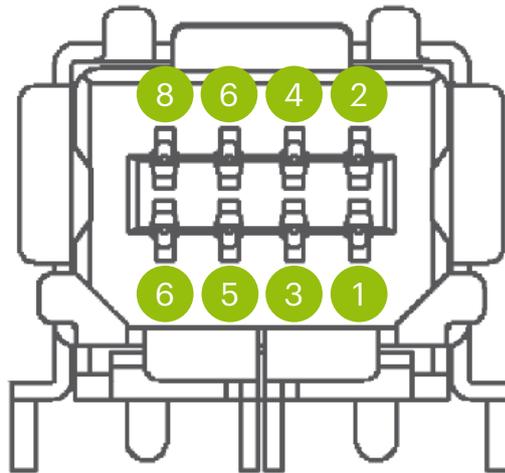


Figure 4: Type II Board Connector Front View

### Pinouts for sensors

The J600/J900 Fastener Test Bench can work with 3 types of sensors:

- Full-bridge sensors, such as strain gauges
- Single-ended sensors, with a  $\pm 10$  V range
- Synchronous Serial Interface (SSI) sensors

Please note that even if the Test Bench can accept multiple sensor interfaces, each sensor input has been configured to accept only one of the 3 possible interfaces. Connecting the wrong type of sensor on an input may cause permanent damage to the sensor and/or the input.

The pinout for each interface is described below. The colour code is only given as an indication to help associate pins and pairs, and it is used mainly for extension cables as sensors cables generally do not follow this colour scheme.

#### Bridge sensor

Pin	Name	Colour	Description
1	V +	White/Orange	Bridge excitation positive voltage.
2	V –	Orange	Bridge excitation negative voltage.
3	S +	White/Green	Bridge signal positive voltage.
4	S –	Green	Bridge signal negative voltage.
5	Reserved	White/Blue	
6	Reserved	Blue	
7	Reserved	White/Brown	
8	Reserved	Brown	

## Sensor Cables and Connectors

### Single-ended sensor

Pin	Name	Colour	Description
1	Reserved	White/Orange	
2	<b>GND</b>	Orange	Ground.
3	Reserved	White/Green	
4	Reserved	Green	
5	Reserved	White/Blue	
6	Reserved	Blue	
7	<b>Signal</b>	White/Brown	Signal from sensor ( $\pm 10V$ ).
8	<b>Power</b>	Brown	Sensor supply voltage ( <b>12V</b> , <b>15V</b> or <b>24V</b> ) <sup>1</sup> .

It is possible to connect single-ended sensors using a BNC connector/coaxial cable. In this case it is necessary to use a RJ45/BNC adapter with pin 2 connected to the outer conductor and pin 7 connected to the inner conductor (core).

### SSI sensor

Pin	Name	Colour (T568B)	Description
1	Reserved	White/Orange	
2	Reserved	Orange	
3	<b>CLK +</b>	White/Green	Clock signal positive voltage.
4	<b>+VDC</b>	Blue	Sensor supply voltage ( <b>24V</b> ).
5	<b>GND</b>	White/Blue	Ground.
6	<b>CLK –</b>	Green	Clock signal negative voltage.
7	<b>DATA +</b>	White/Brown	Data signal positive voltage.
8	<b>DATA –</b>	Brown	Data signal negative voltage.

SSI cables follow the T568B colour scheme.

<sup>1</sup> The selected voltage is defined in hardware on a per sensor basis.

Appendix E: Industrial Mini I/O Connectors

Parts

The table below list some references of compatible connectors. More connector references are available on TE Connectivity<sup>2</sup> and Amphenol ICC<sup>3</sup> websites.

Description	Insulation diameter (mm)	Manufacturer	Manufacturer Ref.
Type II Plug (Male)	0.93–1.05	Amphenol ICC	10137239-0021LF
		TE Connectivity	1-2201855-2
	1.05–1.15	Amphenol ICC	10137239-0020LF
		TE Connectivity	1-2201855-1
Type II Receptacle (Female)	0.93–1.05	Amphenol ICC	10137851-0021LF
		TE Connectivity	1-2201864-2
	1.05–1.15	Amphenol ICC	10137851-0020LF
		TE Connectivity	1-2201864-1

Cable specification

- Cable type: Shielded twisted-pair cable
- Number of conductors: Up to 8
- Maximum diameter: 6.7 mm
- Conductor size: AWG 30–26 (0.0509–0.129 mm<sup>2</sup>)
- Conductor type: Stranded (7–60)

Most Cat 5e cables should work if they have a stranded conductor and not a solid conductor.

We recommend using good quality cables. Cheap cables can result in poor shielding and/or poor connections.

Assembly

Please follow the procedure described in the document 114-5506 Application Specification<sup>4</sup> from TE Connectivity. This procedure is also applicable to Amphenol parts.

The quality of the final cable assembly depends on how the connector was assembled. Not following the documented procedure can result in brittle cables with poor connectivity and bad shielding.

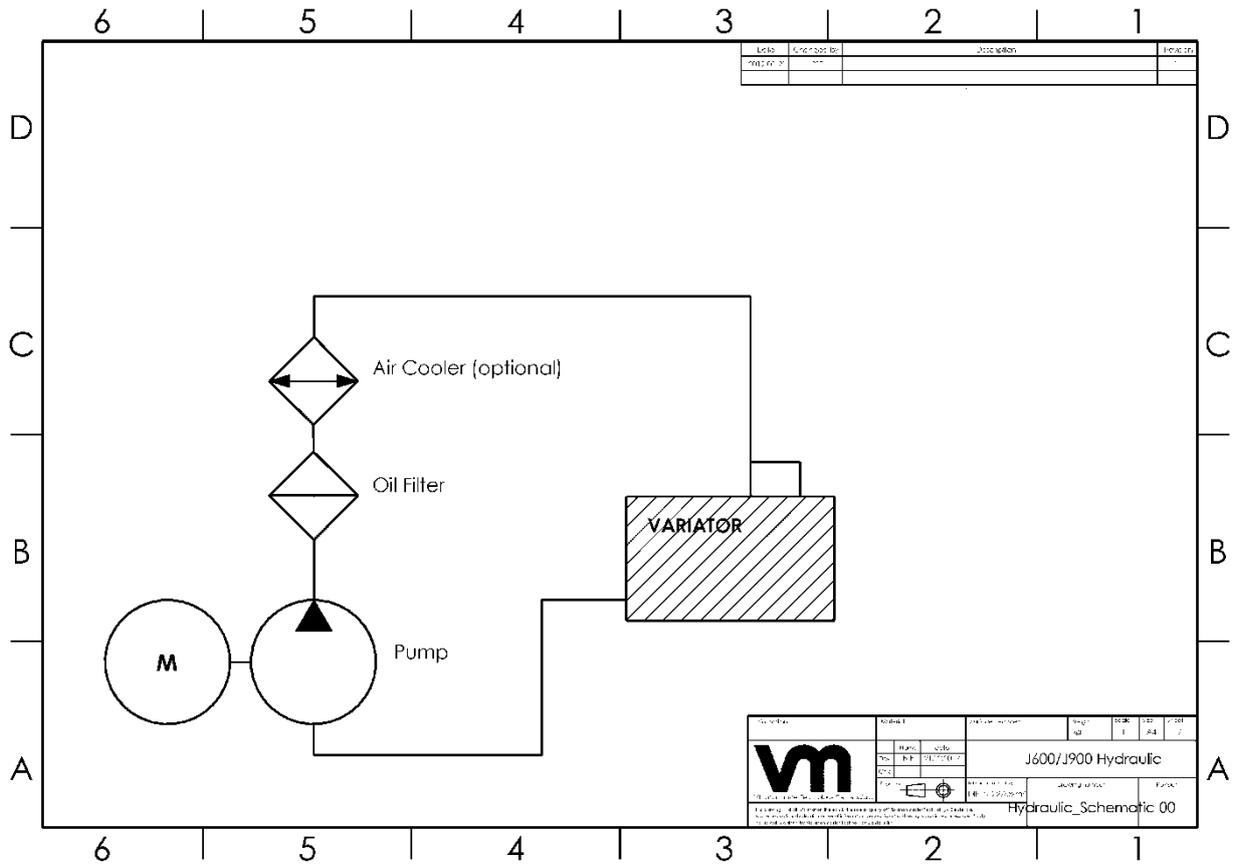
TE Connectivity sells a hand tool (2229737-1) for crimping the connectors. It may be useful, but it is not strictly necessary as the connector can be assembled using standard tools and pliers.

<sup>2</sup> <https://www.te.com/global-en/products/connectors/modular-jacks-plugs/industrial-mini-i-o-connectors.html>

<sup>3</sup> <https://www.amphenol-icc.com/product-series/industrial-mini-io.html>

<sup>4</sup> <https://www.te.com/commerce/DocumentDelivery/DDEController?searchfor=114-5506&searchby=document&Action=selcritrslt>

Appendix F: Hydraulic



## Appendix G: Software EULA

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- b) Make a back-up copy insofar as it is necessary for the use of the Vibrationmaster Test Software; and
- c) Install the Vibrationmaster Test Software on only one single device.

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#### **5. Trademarks**

## Software EULA

The User acknowledges and agrees that all existing and future trademarks and/or intellectual property rights which relate to the Vibrationmaster Test Software are owned by Vibrationmaster Technology Centre s. à r. l or its suppliers irrespective of whether they have been or have not been registered or in any other way protected. Furthermore, the User agrees that all trademarks and/or intellectual property rights will remain the property of Vibrationmaster Technology Centre s. à r. l or its suppliers on cancellation of this Agreement irrespective of the cause of the cancellation.

### 6. Disclaimer of warranty

To the maximum extent permitted by applicable law, Vibrationmaster Technology Centre s. à r. l and its suppliers provide the Vibrationmaster Test Software and any (if any) support services AS IS, and hereby disclaim all warranties and conditions, either express, implied or statutory, including, but not limited to, any (if any) implied warranties or conditions of merchantability, of fitness for a particular purpose, of accuracy or completeness of responses, of results, and of lack of gross negligence or lack of workmanlike effort, all with regard to the Vibrationmaster Test Software, and the provision of or failure to provide support services.

By using the Internet and/or the Software and/or the Service and/or the Content, the User may be exposed to eavesdropping, electronic trespassing, hacking and other harmful acts or consequences that might lead to unauthorised invasion of privacy, loss of data and other damages.

**THE ENTIRE RISK AS TO THE QUALITY OF OR ARISING OUT OF USE OR PERFORMANCE OF THE SOFTWARE PRODUCT AND SUPPORT SERVICES, IF ANY, REMAINS WITH THE USER.**

The User expressly acknowledges and agrees that the use of the Software is solely at the User's risk.

### 7. Limitation of liability

To the maximum extent permitted by applicable law, in no event shall Vibrationmaster Technology Centre s. à r. l or its suppliers be liable for any special, incidental, indirect or consequential damages whatsoever, including but not limited to damages for loss of profits or confidential or other information, for business interruption, for personal injury, except from personal injury suffered as a consequence of product liability, for loss of privacy, for failure to meet any duty, for gross negligence, and for any other pecuniary or other loss whatsoever arising out of or in any way related to the use of or inability to use the Vibrationmaster Test Software, the provision of or failure to provide support services or otherwise under or in connection with any provisions of this Licence Agreement, even in the event of tort, strict liability, breach of contract or breach of warranty of Vibrationmaster Technology Centre s. à r. l or any supplier, and even if Vibrationmaster Technology Centre s. à r. l or any supplier has been advised of the possibility of such damages.

Notwithstanding any damages that the User might incur for any reason whatsoever, including, without limitation, all damages referred to above and all direct or general damages, the entire liability of Vibrationmaster and any of its suppliers under any provision of this Licence Agreement and the User's exclusive remedy for all of the foregoing shall be limited to the greater of the amount actually paid by the user for the Vibrationmaster Test Software. The foregoing limitations, exclusions and disclaimers shall apply to the maximum extent permitted by applicable law, even if any remedy fails its essential purpose.

## 8. Governing Law and Venue

Any dispute arising out of or in connection with this Licence Agreement shall be settled by Luxembourgish courts in accordance with Luxembourgish law.

## Contact information

Vibrationmaster Technology Centre s.à r.l.  
Rue du Commerce  
3895 Foetz  
Luxembourg

Telephone: [+352 24 55 90 68](tel:+35224559068)  
Web: [www.vibrationmaster.com](http://www.vibrationmaster.com)  
E-mail: [support@vibrationmaster.com](mailto:support@vibrationmaster.com)