

Mecmesin

testing to perfection

Vortex-d

Motorised Torque Stand

Torque Test Solutions

Operating Manual



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The Vortex-d

Introduction

Thank you for choosing Mecmesin's Vortex-*d* motorised torque test frame. With correct use it will provide many years of accurate and reliable service.

The Vortex-*d* has been specifically designed as an easy-to-use torque testing solution within a broad range of industries. It is an ideal system for testing bottle closures, child-resistant closures and all other torque applications.

Before Use

Upon receiving the unit, and before installation, please do the following:

Before moving the test stand, refer to the safety advice given in Appendix 1.

Check that no obvious physical damage has been sustained by the packaging material or the test stand itself. If any damage is evident please notify Mecmesin or their authorised distributor immediately.

Appendix 2 lists the items, which should be included with your test stand. If any item is missing, please notify Mecmesin or their authorised distributor immediately.

We strongly recommend that all the packaging and fixings are retained for any further transit requirements. When using the Vortex-*d*, please ensure that the ventilation holes situated on the back of the unit are not obstructed.

Maintenance

When cleaning the keypad care must be taken to avoid liquids, especially alcohols, seeping around the edge of the membrane. Therefore, we recommend the use of a lightly dampened cloth to avoid liquid spillage onto the membrane.

General Information

Mecmesin are proud to introduce the *Vortex-d*, our new motorised torque measurement system. The *Vortex-d* provides a versatile and accurate method of applying torque at an affordable price.

The *Vortex-d* is a twin-column motorised torque measurement system with a load rating of up to 10 newton metres (N.m), and a speed range of 0.1 to 20 revolutions per minute (rpm). It must not be used with load ratings above 10N.m. Complemented by a Mecmesin AFTI (Advanced Force/Torque Indicator) display unit, 'smart' static torque transducer, and (if purchased) upper and lower mounting tables, it constitutes a key component in torque measurement systems suitable for accurately testing a wide range of products. The *Vortex-d* enables a repeatable and constant test speed to be set, thus reducing variability in test results which can arise from operators manually performing tests at different speeds.

There is one standard model of the *Vortex-d*.

The dimensions, speed range and capacity have been carefully optimised to cover the most common test procedures and specimen sizes used by quality departments throughout the manufacturing industry.

The *Vortex-d* has been designed and manufactured in a controlled system to ensure compliance with all relevant European Community Directives.

Before operating ensure that the *Vortex-d* has been assembled as described on the next page entitled, 'Installing the Machine'.

Installing the Machine

Please refer to the test stand image shown on page 10 for further guidance.

- Slide the AFTI swivel mounting bracket (G) onto one of the pillars.
- Tighten the central adjuster knob (C) to secure.
- Slacken off the side adjuster knobs (B).
- Ensure that the loading dish (A) is facing upwards and, the central adjuster knob (C) faces forward (as illustrated)
- Align the holes in the crosshead with the pillars of the base unit, and ensuring that the crosshead remains horizontal, gently slide the crosshead down onto the pillars.
- Tighten both side adjuster knobs (B).

The system is now ready to install any extra components which have been purchased:

- Using an appropriate Allen key, attach a 'smart' static torque transducer to the transducer holding plate (D) using the four M6 bolts supplied.
- Attach an AFTI to the swivel mounting bracket (G) using the two M5 bolts supplied.
- Connect the static torque transducer cable to the AFTI and Static Torque Transducer.
- If the lower mounting plate option has been supplied, attach the lower mounting plate to the lower platen turntable spacer (F) using the 4 M4 countersunk screws supplied.
- If the upper mounting plate option has been supplied, fit the upper mounting plate onto the square drive of the torque transducer and secure with the two grub screws located in the mounting plate.

Using the Vortex-d



Mains Inlet Connector

Connecting-up

Check voltage selected is correct.

The required power supply voltage (110-120V or 220-240V) is indicated by the value shown in the black panel within the fuse cartridge housing. Your local Mecmesin representative will already have checked that the fuse cartridge has been installed correctly for the supply voltage of your country.

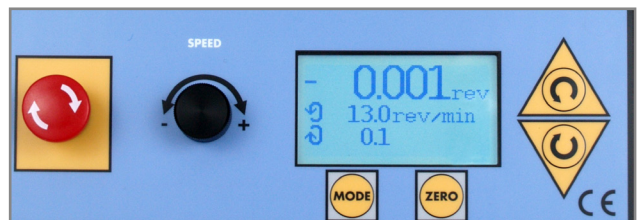
It is possible to modify your Vortex-d for operation in a country with a different supply voltage by: turning off the power, removing the fuse cartridge housing, checking that both fuses are fitted, rotating the cartridge through 180°, then reassembling and reinstalling.

The new voltage rating will now be displayed in the black panel.

Connect your Vortex-d to an appropriate mains supply; turn on the power switch at the bottom of the Mains Inlet Connector and the display will illuminate indicating **“Vortex-d.”**

Front Panel Control

The front control panel of the Vortex-d is designed with a digital display for ease-of-use.





Emergency Stop



Direction

Pressing the red **Emergency Stop** button will, at any time, cut power to the motor and stop the lower fixture rotating. 'Emergency Stop' is displayed on the screen. To disengage the stop button turn clockwise and then release.

It is advisable to check and become familiar with the operation of the Emergency Stop once the system is connected to the appropriate mains supply.

Rotating the Lower Fixture

To rotate the lower mounting table, or any other base fixture that is attached to the drive shaft adaptor (see (E), page 10), press '**Clockwise**' or '**Counter-clockwise**' with the direction control key and hold in this position. The base fixture will continue to rotate until one of the following occurs:

- a) The direction control key is released
- b) The power is disconnected
- c) A pre-set break/limit is reached
(see 'Measuring & Displaying Torque', page 8)

Pressing the **clockwise direction** key will drive the turntable clockwise at the speed indicated by the front panel display. Pressing the **counter-clockwise direction** key will drive the turntable counter-clockwise at the speed indicated by the front panel display. While the turntable is moving, the display will show the current speed set with the other direction hidden.

The turntable will continue to move in the appropriate direction all the time the **Direction** key is pressed. Releasing the **Direction** key will stop turntable movement. The current speed the turntable is travelling at may be changed using the **Speed** controller. When the stand stops the speed will revert to the pre-set speed.

Speed Setting and Rotation Display



Control knob

The Vortex-*d* has a rotary speed controller for both clockwise and counter-clockwise rotations. Speed is set and controlled by the control knob on the front panel and indicated on the digital display.

The digital display on the control panel will allow actual speed (in revolutions per minute, i.e rpm) to be displayed. Speed values displayed are distinguished between clockwise and counter-clockwise rotation. If the platen is rotated one revolution clockwise, then half a revolution counter-clockwise, 180° will be displayed, i.e. *it is the absolute rotation which will be displayed.*



Mode

The Vortex-*d* can be run in manual mode only. To set-up speed, press the **Mode** key for 2 seconds until the speed indicator starts to flash on the digital display. Change the speed by moving the control knob clockwise or counter-clockwise in increments of 0.1rpm.

Press the **Mode** key again to move down on the digital display and change the speed by moving the control knob clockwise or counter-clockwise in increments of 0.1rpm. Press the **Mode** key once more and the displacement unit will flash; then select the displacement unit desired (rev or deg) by moving the control knob clockwise or counter-clockwise.

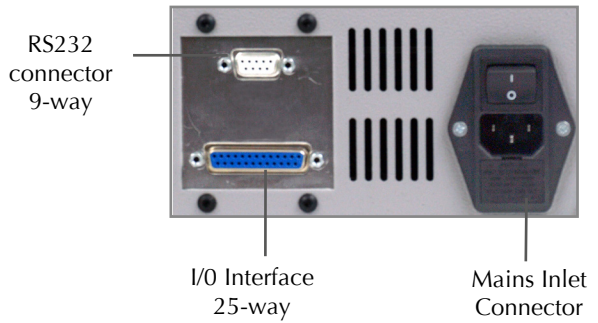


Zero

To save time when setting the speed to a minimum or maximum level, turn the control knob quickly to reach the maximum speed of 20rpm or minimum speed of 0.1rpm. Press the **Zero** key to store settings and exit.

Pressing the **Zero** key will reset degrees or revs displayed to zero.

Communication



Stand Stop with AFTI

A 25-Way Female D-type Connector is fitted at the back of the stand (I/O Interface), containing connections for the stand stop and RS232 connection to a Mecmesin AFTI.

The stand will respond to the appropriate stand stop signal from an AFTI via a connection at the back of the stand using cable 351-074, which will stop the turntable (for any further information, please refer to the AFTI Operating Instructions).

A 9-Way Female D-type Connector is fitted at the back of the stand and contains RS232 connection to a PC.

When the I/O Interface, including RS232 connection, is plugged into the AFTI and the 9-Way RS232 connection is plugged into the computer, Emperor™ Lite software can be used. This shows the accumulated data graphically, plotting torque from the AFTI, and angular displacement from the stand.

Baud Rate Selection

Hold the **Mode** key and turn on the stand. Make sure that the options, which appear on the digital screen of the stand, are the same for both the gauge and computer:
B:9600 - B: 19200 - B: 57600 - B:115200
Rotate control knob to select correct baud rate and press the **Zero** key to set and continue.

PC Commands

? Request the load value from a connected AFTI and then add a displacement value from the stand to the result. This will display results on the PC in the form of '0.0, 0.0<CR><LF>' (load, angular displacement).

To enable communication between Vortex-*d* system and Emperor™ Lite software, please ensure you select 'Vortex-*d*' or 'AFTI (Torque)' from within the system settings (see Emperor Lite manual).

Measuring and Displaying Torque

Note: torque transducers are delicate pieces of equipment and can easily be damaged unless treated with care.

Torque is measured on a Vortex-*d* by a 'smart' static torque transducer mounted on the transducer holding plate (D), (page 10). The transducer must be connected to an Advanced Force/Torque Indicator (AFTI) mounted on one of the columns of the Vortex-*d*. The torque transducer is connected to the 15pin female D-connector on the side of the AFTI.

One way of causing damage would be to drive the base fixture at high speed to a point where the transducer encounters something 'solid'. This is a risk when a user is, either unfamiliar with operating a new test frame, or with the characteristics of a new sample. It is recommended that an AFTI to Vortex-*d* cable is fitted and that a suitable 'break/limit' is set. (Please refer to the AFTI operating manual).

Setting-up Top-loading
(if required)

Operation of Mounting
Tables

Some testing applications require torque to be measured while axial top-load is being applied to the specimen. Testing a 'push-and-twist' child-resistant closure according to ASTM D3475 would be one example of such an application.

Attach top fixture to sample ensuring central adjuster knob (C) (page 10) is loosened. Add appropriate weight(s), up to 5kg, into the loading dish (A) (page 10). The test may now be performed. *Do not re-tighten the central adjuster knob.*

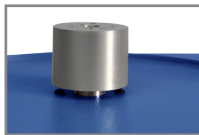
The upper and lower mounting tables have been designed to accommodate samples in a wide range of sizes, shapes and symmetries. It is however necessary to avoid over-tightening these fixtures such that the cap sample is distorted significantly. Optimum results can be obtained for critical applications by using a mandrel dedicated for use with each particular design of cap, see (a) for example.



Adjusting Height of Crosshead

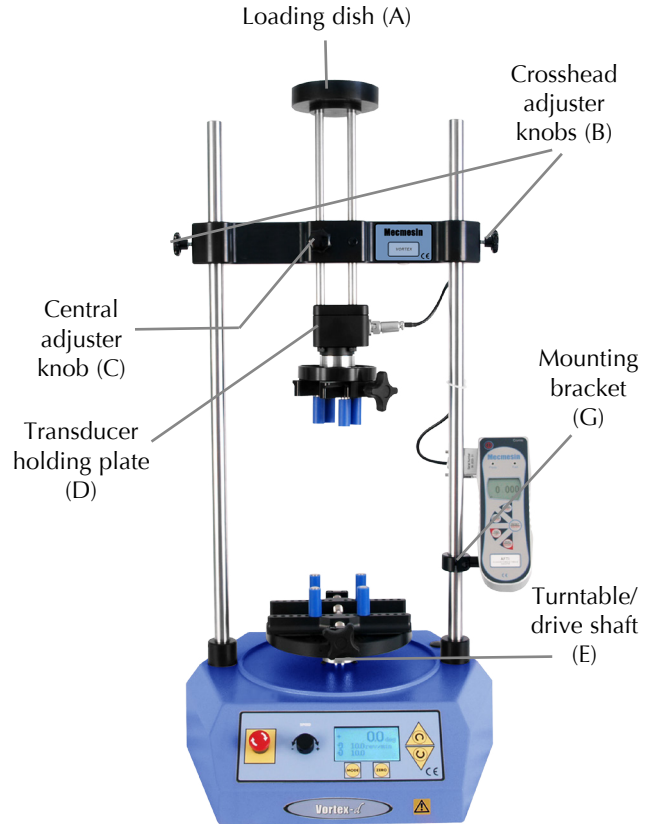


Upper and lower mounting tables



Turntable spacer (F)

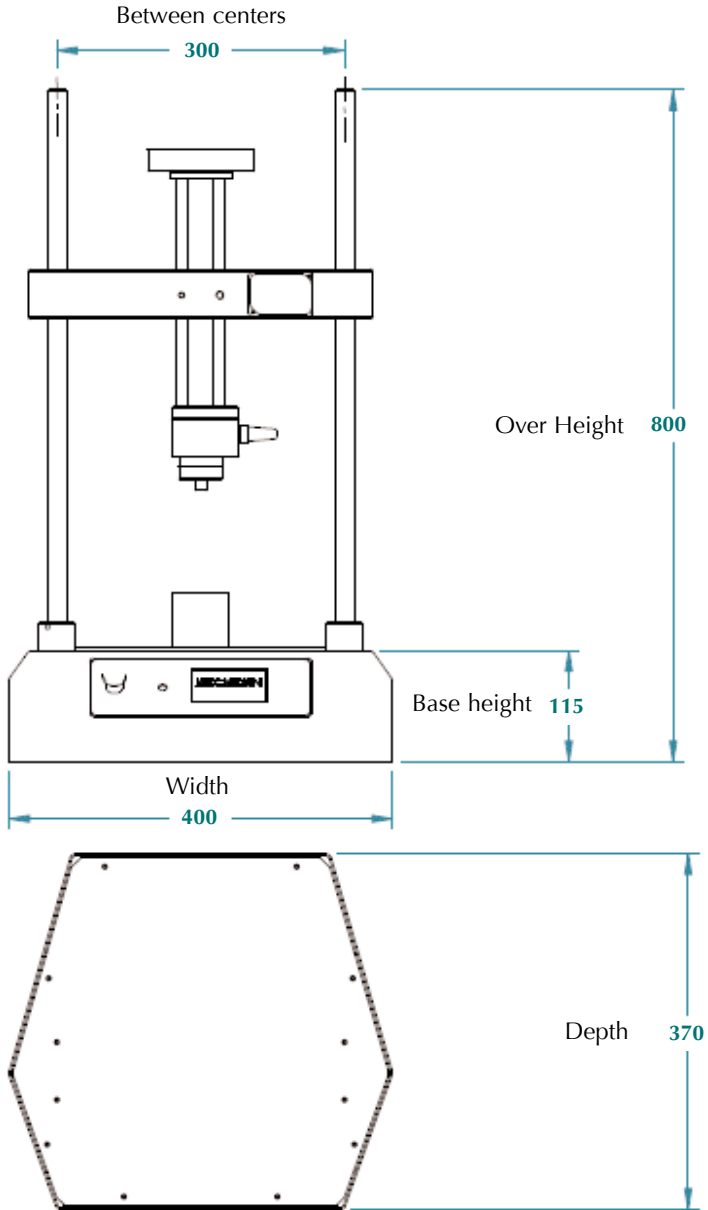
After placing the machine base unit on a stable and level work surface, a crosshead may need to be installed. It will be necessary to refer to the photograph below:



Before a specimen can be correctly located in the lower gripping fixture, the crosshead will need to be adjusted to an approximately suitable height. Use one hand to slacken off both side adjuster knobs (B), while supporting the weight of the crosshead with the other hand. Gently raise/lower the crosshead and re-tighten the side adjuster knobs to secure.

Fine adjustments can subsequently be made by slackening the central adjuster knob (C), raising/lowering the transducer holding plate and carriage (D) and re-tightening.

Dimensions (mm)



Specifications

Model

Vortex-d

Test Frame

Maximum load	N.m	10
	kgf.cm	100
	lbf.in	90
Height		800
Width		400
Depth		370
Weight (stand & crosshead only)		18kg (40lb)
Power Consumption		80 watts (maximum)
Voltage		230V AC 50Hz
		110V AC 60Hz

Lower table motion

Speed range		0.1 - 20rpm
Speed accuracy		0.003rpm
Position accuracy		±1degree over 36000 degrees
Speed unit		Revs per minute
Position unit		Degrees and Revs
Speed resolution		0.1rpm
Position resolution		0.001revs or 0.20deg
Rotation direction setting		Membrane switch
Rotation speed setting		Precision Digital Control Knob
Rotation speed		By LCD
Angle indicated		By LCD
Stop on limit point		Yes, with AFTI & appropriate cable
Stop on sample break		Yes, with AFTI & appropriate cable
Full computer-control		No, Vortex- <i>i</i> required
Logging/plotting torque/time and torque/angle*		Yes, with Emperor™ Lite software & appropriate cable (upon request)
Output of test results to PC/Printer/Datalogger*		Yes - includes auto-export to Microsoft™ Excel with Emperor™ Lite or PC input tool
Temperature range		10 - 35°C / 50 - 95°F
Humidity		Normal laboratory ambient conditions

* Not supplied as standard

** features associated with external gauge

Specifications

AFTI & 'Smart' Static Torque Transducer -Key Features

Transducer capacities available	10, 6 and 1.5N.m
Display resolution	1:5000
Accuracy	±0.5% of full scale
Internal sampling rate	5000Hz averaged down to 80Hz (medium) or 2000Hz (high) peak capture (user selectable)
Power source	5 AAA NiMH rechargeable batteries
Charger supplied	Yes
Battery life	Approx 20 hours between charges
Calibration temperature	20 ±2°C

Universal Fixtures* - Key Features

Lower mounting table	10 - 190mm diameter specimens
Upper mounting table	10 - 78mm diameter specimens
System headroom	450mm (with upper and lower tables fitted)

Essential Complementary Equipment

Advanced Force/Torque Indicator (Part 851-401)

At least one of:

- 'Smart' 10N.m static torque transducer (Part 879-044)
- 'Smart' 6N.m static torque transducer (Part 879-043)
- 'Smart' 1.5N.m static torque transducer (Part 879-042)

Options (Available upon request)

Upper universal gripping fixture (Part 432-321)
Lower platen with universal gripping fixture (Part 432-320)
RS232 to USB converter cable (Part 432-228)
Emperor™ Lite Software (Part 840-008)
AFG/AFTI to Vortex-*d* stand stop & RS232 cable (Part 351-074)

Appendix 1

A guide to safe use of mains powered test frames

MECMESIN TEST FRAMES HAVE BEEN DESIGNED AND MANUFACTURED IN A CONTROLLED SYSTEM TO ENSURE COMPLIANCE WITH ALL RELEVANT EUROPEAN COMMUNITY DIRECTIVES.


To download a copy of the EC declaration of conformity, please go to www.mecmesin.com in the 'Knowledge Centre' section, then double-click on Certificates of Conformity.

Receiving and Unpacking

1. Upon receiving the Mecmesin test frame ensure adequate equipment is available to safely lift the test frame from the packaging. Trying to lift heavy items without adequate assistance or the correct equipment may lead to accidental personal injury.
2. Once safely removed from the packaging place the test frame on a stable and level work surface. Inspect the machine for any signs of obvious transit damage.

IF ANY DAMAGE IS DISCOVERED DO NOT GO ANY FURTHER WITH INSTALLATION AND DO NOT CONNECT TO MAINS SUPPLY UNDER ANY CIRCUMSTANCES.

Installing the Machine

3. After placing the machine on a stable and level work surface, check that the mains inlet voltage corresponds to your electrical installation - either 230 Vac or 110 Vac.  The machine has a label close to the mains inlet connector which advises which voltage it is set for. If the machine does not correspond to your supply, inform your local Mecmesin supplier who will rectify the situation. Connecting a mains powered test frame to the wrong supply will almost certainly cause extensive damage to the equipment.

The Mecmesin test frames must only ever be connected to a mains power installation that has a fully installed earthing system.

CONNECTING A MAINS POWERED TEST FRAME TO AN ELECTRICAL POWER OUTLET WITHOUT AN EARTH CONNECTION IS EXTREMELY DANGEROUS AND COULD LEAD TO A RISK OF ELECTROCUTION.


Appendix 1

A guide to safe use of mains powered test frames

4. Mecmesin test frames should only ever be installed in suitable environment conditions. The operating temperature and relative humidity should be within the range specified on page 12. After all the above points have been checked and confirmed to be correct you may connect the machine to the mains outlet only with supplied mains leads.

When the power is applied with the **ON/OFF** switch in the **ON** position, the LCD will illuminate. This shows power is reaching the machine and it is ready for use.

Operator training

5. Each person who is to use the machine should be fully trained in the safe use of  motorised testing machines. Training can be arranged by contacting Mecmesin Limited or an authorised agent. The machine has the ability to generate torques

large enough to cause permanent damage to human limbs, if placed between the turntable and the columns. Fingers, hands and other parts of the body should be kept away from the moving turntable. An operating test stand should never be left unattended. Always disconnect the machine from the mains power supply when not in use to avoid inadvertent actuation of the machine by untrained personnel.

Protective Clothing

6. Eye protection should always be used in the form of an approved pair of safety spectacles. They should be replaced if they are scratched or damaged in any way. They should be kept clean and clear to give maximum visibility to the user.

Extra bodily protection may be necessary if destructive testing or volatile failure of a test piece is likely. A risk assessment should be carried out prior to using the test frame to ensure that all necessary safety measures have been considered and carried out.

Appendix 1

Machine Guarding

7. If, after the assessment, it is considered that machine guarding is needed, then contact your local supplier who, through Mecmesin, can arrange the supply of a suitable guard for the required level of protection.
8. Once the machine is installed it should provide a reliable long term resource for universal testing. If however the machine fails, or appears to behave in an unusual manner, contact your local supplier for support. Do not continue to use the machine until it has been checked, and if necessary, repaired and returned to a safe working condition. To ensure optimal safe performance, your Vortex-*d* must be regularly serviced and the 'Smart' loadcell calibrated by Mecmesin Limited or an authorised agent.
9. If the machine is damaged in use, advise your local supplier and have the machine repaired to a safe working conditions. Do not use the machine until it is repaired.
10. It may occasionally become necessary to clean the outside of your test stand. This can be done by disconnecting it from the mains electricity supply, removing loose debris with a soft brush, then wiping with a damp cloth. Under no circumstances should organics solvents or any other cleaning fluid be used.

IF IN DOUBT CONSULT YOUR LOCAL SUPPLIER TO ENSURE CONTINUED SAFE USE

11. The Vortex-*d* must be powered down when attaching/removing the cables.



Note: no cable should exceed 3 metres in length. When the connectors are not in use, please ensure that they are covered with the connector covers all the time.

Appendix 2

Your Vortex-d should be supplied with the following accessories

1. Operating instructions
2. Translation of Appendix 1 (does not apply to English speaking countries, or countries outside European Union (EU))
3. Crosshead, without a 'Smart' static torque transducer
4. Swivel mounting bracket for AFTI
5. Lower turntable drive shaft adaptor
6. Appropriate mains cable
7. Assorted set of Allen keys

Appendix 3

RS232 Port Settings

Selectable Baud Rates	9600, 19200, 57600, 115200
Data Bits	8
Start Bits	1
Stop Bits	1
Parity	None
Flow Control	None

Appendix 4

Packing instructions for Vortex-d motorised test frame when returning to Mecmesin Limited

1. Remove the AFTI display unit, AFTI swivel bracket, upper gripping fixture and lower gripping fixture.
2. Set the top edge of the crosshead 100 to 225mm below the top of the side pillars to tighten both the crosshead adjustor knobs (B) (page 10).
3. Set the loading dish (A) to the lowest possible position, and tighten the central adjuster knob (C) (page 10).
4. Place the Vortex-*d* in the plastic foam base unit collar.
5. Place the Vortex-*d* and base unit collar into the outer box resting on two plastic foam spacers.
6. Wrap gripping fixtures up the bubble wrap provided, place in accessories box and slide accessories box into accessories sleeve.
7. Slide tongue of accessories sleeve between upper plastic foam spacer and outer box.
8. Align edges of inner sleeve with long sides of the outer box.
9. Gently slide down inner sleeve until it is flush with outer box.
10. Close and then seal the outer box with a suitable adhesive tape.

Note: If necessary, an AFTI can be returned in the same box as a Vortex-*d*, by wrapping the AFTI and its plastic case in bubble wrap and placing them in the outer box before inserting the Vortex-*d*, i.e. between stages (4) and (5) above.

If you have any feedback regarding Mecmesin, its products or services, which you would like to share with us, please contact Mecmesin at: info@mecmesin.com

Also Available from Mecmesin...



AFTI

Precise and performing, the Advanced Force & Torque Indicator (AFTI) has been designed for use solely with Mecmesin's "Smart" Force & Torque transducers.

Accessories

A collection of force and torque accessories exclusive to Mecmesin can be fitted to the AFTI.

To complete your own application test and for any further details, please do not hesitate to refer to our Accessories Catalogue.

Customised accessories are also available upon request.



Smart Static Torque Transducer
available in 10Nm, 6Nm
and 1.5Nm



Specific fixtures: Cork Mandrels



Adjustable Mounting Table

To find out about our broad range of grips and accessories, please call us on
+44 (0) 1403 799979 or visit us at www.mecmesin.com

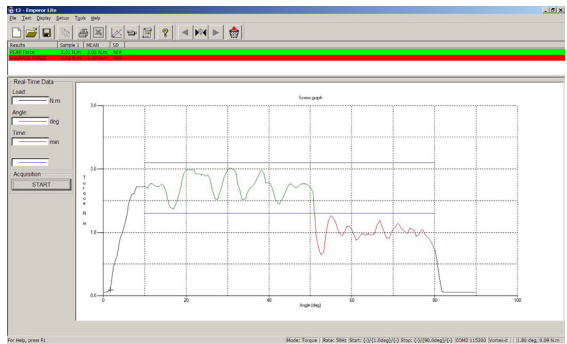
Cables

Cable	Mecmesin Part Number
RS232 (9-pin D-type) to USB converter kit	432-228
AFG/AFTI to Vortex- <i>d</i> stand + RS232 communication cable	351-074

Emperor™ Lite

Fully assess your products performance by transforming your test results into meaningful graphs including results and reports with Emperor™ Lite.

Emperor™ Lite is Mecmesin's powerful data-acquisition software, which, when combined with the Vortex-*d*, plots graphical test traces enabling operators to perform in-depth analysis of their measurements.



Vortex-*i*

The Vortex-*i* possesses all the mechanical features of the Vortex-*d*, but it is fully computer-controlled for incomparable repeatability. Driven by Emperor™, Mecmesin's powerful yet user-friendly Windows® software, the Vortex-*i* enables advanced programmable functions, such as run to torque, angle, time or break as well as sophisticated graphical interrogation of results.

Mecmesin

testing to perfection

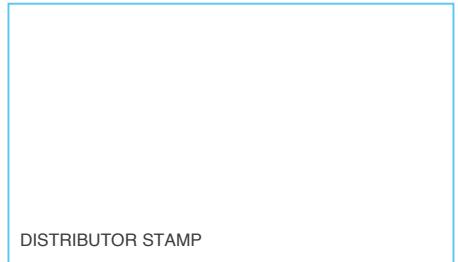
Over 30 years experience in force & torque technology

Formed in 1977, Mecmesin Ltd is today widely regarded as a leader in force and torque technology for quality control testing in design and production. The Mecmesin brand stands for excellent levels of performance and reliability, guaranteeing high quality results. Quality control managers, designers and engineers working on production lines and in research laboratories worldwide rely upon Mecmesin force & torque measurement systems for a range of quality control testing applications, which is almost limitless.

Visit us on the web at
www.mecmesin.com



FS 58553



DISTRIBUTOR STAMP

Mecmesin reserves the right to alter equipment specifications without prior notice.

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