Mecmesin
testing to perfection

Assembly and Installation of MultiTest-*i* and Vortex-*i* System Test Stands

> **Important**
>
> It is essential that you familiarise yourself with the contents of this *Assembly and Installation Manual*, and the separate *Guide to Safe Use of Mains Powered Test Systems* before attempting to operate your MultiTest-*i* or Vortex-*i* Test System.

Scope

This reference manual covers the following products and their derivatives: (example)

Force testing stands		
Single-column stands	MultiTest	0.5-*i*
	MultiTest	1-*i*
	MultiTest	2.5-*i*
	MultiTest	5-*i*
Twin-column stands	MultiTest	10-*i*
	MultiTest	25-*i*
	MultiTest	50-*i*

Torque testing stand		
	Vortex-*i*	Torque cell capacities: 0.3, 1.5, 3, 6, 10 Nm

Contents

1. Items Supplied with the Test Stand

1.1 MultiTest-*i* test stand

1. Test stand

2. Four rubber feet, four attachment screws

3. Four base anchoring brackets, (if applicable)

4. Adjustable handle lever to secure loadcell to crosshead

5. At least one Intelligent Loadcell (ILC)

6. CD with Emperor™ software

7. Mains and data cables

8. Manual: *Guide to Safe Use of Mecmesin Mains-Powered Test Stands*

1.2 Vortex-*i* test stand

1. Test stand

2. Intelligent Torque Cell (ITC), as an integral part of the crosshead

3. CD with Emperor™ software

4. Mains and data cables

5. Manual: *Guide to Safe Use of Mecmesin Mains-Powered Test Stands*

The test stand provides a stable platform with a moving crosshead (force testing) or rotating platen (torque testing). The Intelligent Loadcell measures the force developed, and the Intelligent Torque cell measures the torque applied. A desktop PC or laptop computer is used to run the Emperor™ software that provides the control of the moving part of the stand, and records, stores and displays the information provided by the measuring cell. Emperor™ is used to create the program for the test, and can make calculations on the received data. The results of the calculations and the raw data can be printed out or saved in files, and may be exported for remote, secure storage, or may be used for further analysis by other software applications.

The stand communicates with the controlling computer via a USB or serial connection. If other connections are available, then peripheral devices such as printers and network connections can be added.

2. Installation

2.1 Unpacking the stand

When you first receive the stand please check that there is no obvious damage to the packaging. If there is any sign that the packaging or the test stand itself has been damaged, please contact Mecmesin or your authorised distributor immediately. Do not use the stand until you have done so.

We strongly recommend that the packaging is kept, as this can be useful if the machine needs to be returned for calibration.

Section 1 lists items that should be included with your test stand. Please contact Mecmesin or your authorised distributor if any items are missing or damaged.

2.2 Lifting the test stand

The unpackaged weight of the test stand is given in the Specification table at the back of this manual. Do not try to lift heavy loads unaided. Use suitable lifting equipment if necessary.

2.3 Locating the stand

The test stand should be positioned on a suitable, level, stable work surface.

2.4 Mains power supply

Mecmesin –*i* stands can be used on 110–120 or 220–240 V ac 50-60 Hz supplies. The rear fuse carrier will be set for your local requirement, but is reversible, so should you replace a fuse, the correct local voltage must be selected. The voltage that is selected is *the one where the arrows meet* (the power inlet is inverted for some test stands):

Fuse carrier   **Carrier removal**

3. MultiTest-*i* Assembly and Installation

3.1 Bolting the test stand to the work surface

In order to comply with European regulation and safe use of the equipment, single column stands should be secured to the bench as follows:

Test stand	Height (mm)	Feet/fixing supplied	Bolting recommended?
0.5-*i*	1710	Anchor brackets	Yes
1-*i*	1510	Anchor brackets	Yes
2.5-*i*	941	Rubber feet	No
5-*i*	1082	Rubber feet /locating eyes	Yes

The extended-length test stands MultiTest 0.5-*i* and MultiTest 1-*i* are supplied with base anchoring brackets to allow the test stands to be bolted to a bench. Screw the anchoring brackets to the four positions on the base plate of the MultiTest 0.5-*i* or 1-*i* using the M6 screws provided. Secure the test stand to the bench using suitable fastenings.

MultiTest 0.5-*i* and 1-*i* are supplied with anchoring brackets

For additional stability the MultiTest 5-*i* is fitted with two 'locating eyes' on the base of the MultiTest 5-*i* to allow the stand to be bolted to a bench.

Mecmesin twin-column force testing stands and Vortex torque testing stands require no further stability fixing than a flat, secure and stable working surface.
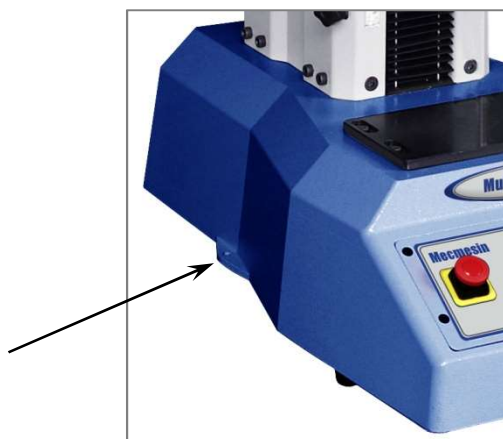
Locating eyes on MultiTest 5-*i*

3.2 Fitting the feet to the stand

Fitting rubber feet to the base of the test stand

The MultiTest 2.5-*i* and MultiTest 5-*i* are supplied with rubber feet. Support the stand and fit the four rubber feet to the base of the stand.

3.3 Fitting the loadcell to the crosshead

Single-column stands

Ensure the stand is switched off.

Screw the adjustable handle lever with the red button into the crosshead dovetail. This lever is designed to tighten without full rotation. Hold the button on the top to raise and disengage the lever, and turn it away from the direction required. Release and turn, and repeat as required.

Do not tighten the lever without a loadcell attached, or the dovetail can become distorted.

Inserting the adjustable handle lever

On single-column test stands, slide the loadcell (ILC) sideways onto the dovetail bracket at the front of the crosshead. The threaded stud must always be on the underside. Secure the loadcell using the handle lever. Some lateral adjustment is available if needed to align the ILC and a sample. Slacken the lever to make the adjustment, and then re-tighten.

Note: There is some additional adjustment available by moving the anvil plate. Use a 3 mm Allen key to slacken the four retaining screws, reposition the anvil plate and re-tighten the screws.

Align the electrical connector of the ILC with the socket on the test stand. Gently push the connector to locate, then tighten the knurled locking ring in a clockwise direction.

Slide the loadcell onto the dovetail ...

tighten securely ...

connect the loadcell

Twin-column stands

The ILC is attached to a twin-column test stand using a cap-head bolt passed through the central hole in the moving crosshead, and secured using the Allen key provided.

Attaching a loadcell on a twin-column system

3.4   Swapping loadcells

You can swap loadcells by simply disconnecting one cell and fitting another. First, return to the Logon Screen and switch off the stand before unplugging the loadcell. When the new loadcell has been connected, switch the stand on again, and log on again,. After a few seconds the new loadcell will be automatically recognised. Emperor will read in the new cell's range, serial number and calibration status.

3.5   Attaching grips and fixtures

Grips and other holding fixtures are often paired, with one being attached to the anvil plate, and the other to the underside of the loadcell. Some fixtures have the QC Quick-interchange system which allows for very rapid changing of the holding accessory. With the Quick-interchange system, the grip is attached to a mounting using an 8 mm diameter pin. The grip can be fitted and removed without the need for additional tools. Be sure to fit the locking spring to secure the accessory in place.

Attaching a grip with the QC Quick Interchange fittings

Take extra care when fitting or removing heavy grips to the underside of the loadcell. Support the accessory while the securing device is removed so that it does not fall. Before fitting a sample, check that both grips and plates are secure.

3.6   Setting the limit stops

Limit stops are provided to prevent damage to the loadcell and grips. A dual safety system provides protection with the first stage being software controlled, followed, if necessary, by a second hardware limit that removes power from the motor. Upper and lower limit stops can be set to restrict movement of the crosshead.

Limit stops should be adjusted after grips or holding accessories have been fitted so that the limit positions will prevent unwanted contact between moving and static parts.

To set either limit stop, slacken the knurled knob by turning it anti-clockwise, then slide the stop to the desired position and re-tighten the knob again.

Remember to check and, if necessary, adjust the position of the limit stops if the grips are exchanged for different holding accessories.
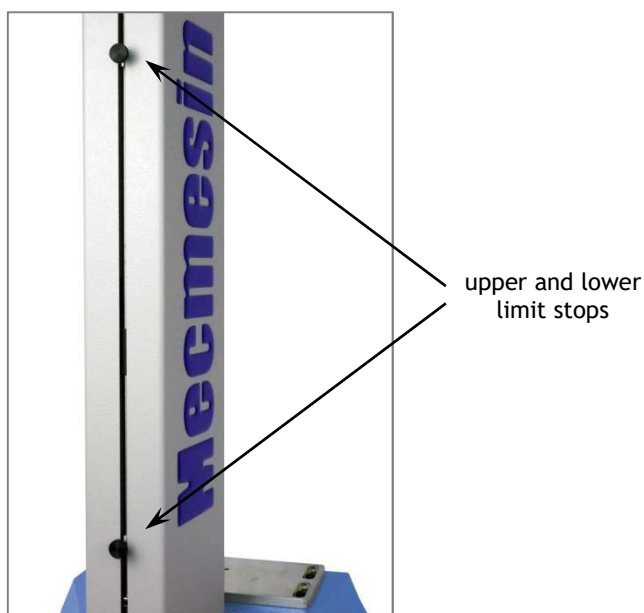
Limit stops on a MultiTest 1-*i*. Stops on other stands all operate in the same way.

Twin-column stands have system limit stops as well as limit stops. **System limit stops should not be moved.** In an emergency, to release a trapped sample the system limit can be moved, but if you do so, **you must contact your Mecmesin distributor for servicing and re-setting**. These stops are designed for protection from damage, and moving them may affect your warranty on the stand.
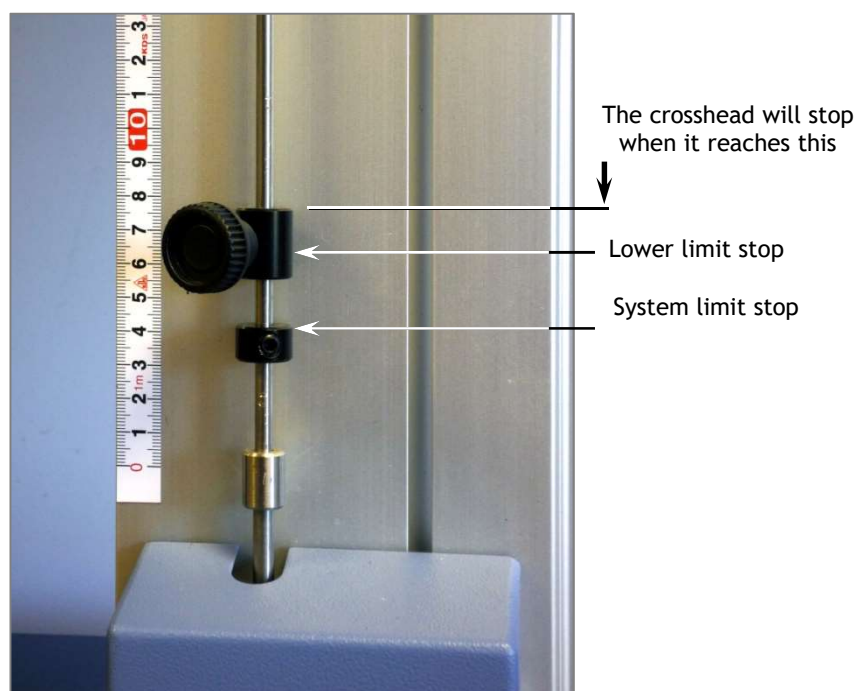
Lower limit stop and system limit stop on a twin-column stand

3.6.1 Limits after connection to the PC, with the software running

If the crosshead reaches a limit during a test, it will stop then reverse direction for approximately 5 mm, then stop again. When this happens an onscreen warning message will be displayed:

Test Stand Status

Test stand has recovered from reaching the lower limit of travel.

OK

Click OK to acknowledge the warning and use the Jog buttons to move the crosshead so that you can then check the position of the limit stops and re-set if required.

If a limit stop is reached while pressing one of the Jog buttons on the front panel of the MultiTest-*i* a different warning message is displayed.

Test Stand Status

Test stand has recovered from reaching the lower limit of travel. Remove the error condition and press Ok or press Abort to disable the test stand and then reconnect.

Abort   OK

Clicking OK will allow you to correct the situation and continue.

Clicking Abort will disconnect the stand and display the following message:

Emperor (Force)

Test system has gone into limited functionality. You will now need to reconnect before testing can continue

OK
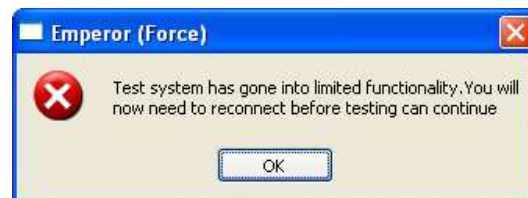
Click OK then Exit to go to the Front Screen, this will reconnect the stand again.

4. Vortex-*i* Assembly and Installation

4.1 Fitting the crosshead to the Vortex-*i*

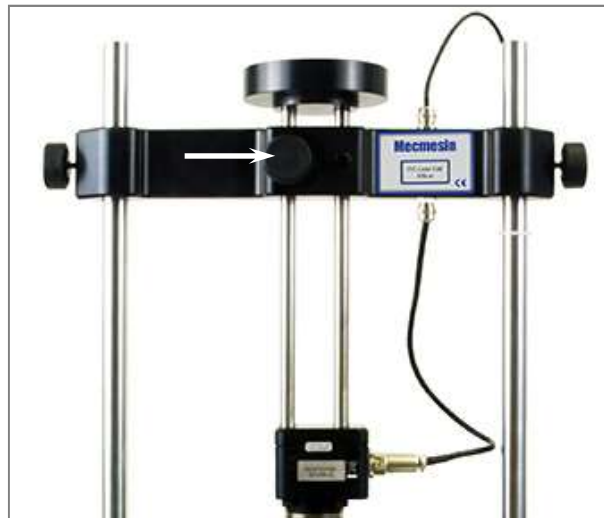Slide the crosshead onto the two support columns and tighten both securing thumb-screws. Different height samples can be accommodated by moving the complete crosshead up and down. Additional adjustment is available by moving the top-load carrier.

If a top-load is to be used, the securing knob (arrowed) is generally left undone during measurement so the carrier can slide up and down. If a top load is not to be used, securely tighten the locking knob after adjusting to the height required.

Crosshead fitted to Vortex-*i* with top-load weights in the carrier

4.2 Connecting the intelligent torque cell

Align the electrical connector of the ITC with the mating socket on the test stand. Gently push the connector to locate then tighten the knurled locking ring in a clockwise direction.

ITC connector

4.3 Swapping intelligent torque cells

You can swap the torque cell by simply disconnecting one cell, removing the crosshead and then fitting another. First, log out of Emperor and then switch off the stand before unplugging the torque cell. When the new torque cell has been connected, switch the stand on again, log on, and after a few seconds the new torque cell will be automatically recognised. Emperor will read in the new cell's range, serial number and calibration status.

5. Connecting the PC
(MultiTest-*i* and Vortex-*i*)

5.1 Connecting the power lead and USB lead

Connect the stand to a suitable mains socket. Plug the USB end of the cable into your PC and the D-connector end into the 9-way socket labelled 'PC' on the rear of the Vortex or single-column MultiTest stand, or the right hand side of a twin-column MultiTest stand.

Rear panels of a Vortex-*i* (left) and MultiTest-*i* (right). Plug the USB cable into the circled PC socket.

5.2 Emergency stop button

The emergency stop button will stop all movement of the crosshead. Pushing the button will override all other controls. When pressed, the button stays latched down, preventing any movement of the MultiTest crosshead or the Vortex platen. To re-set the button, rotate it about 30 degrees clockwise.

The front panel of the MultiTest 1-*i*. Vortex-*i* has a similar emergency stop button and clockwise and anticlockwise jog buttons.

5.3 Jog buttons

Jog buttons are used to position the crosshead or platen so that samples can be attached to the grips. Test Stands have a pair of physical jog buttons on the stand, and another pair of similar buttons on the Emperor screen. The two sets of buttons function in different ways. The physical buttons move the crosshead or platen at a factory-set fixed rate. Emperor allows you to set either a fixed or variable rate. A variable rate means the jog speed increments (gets faster) or decrements (gets slower) each time an on-screen jog button is clicked.

6. Installing Emperor Software on Your PC

6.1 Minimum system requirements

The minimum specification for the Windows PC is 2 GB RAM and 60 GB free space on the hard drive, running Windows™ XP Pro with SP1, or above. A CD drive is required for installation. At least one USB port or RS232 port are required for connecting to the system.

Note: Emperor software is not available for Linux or Apple Macintosh operating systems.

6.2 Access to data folders

Emperor will need access to certain folders listed below. Before installing the program, please make sure that read and write access is granted for these folders. In particular if the computer is part of a centrally controlled Windows Domain system, it may be necessary to consult with your IT department to allow correct access to these locations.

Windows XP User Data location	
Emperor Force	C:\Documents and Settings\All Users\Application Data\Mecmesin\Emperor\Force
Emperor Torque	C:\Documents and Settings\All Users\Application Data\Mecmesin\Emperor\Torque
Windows Vista or Windows 7 User Data location	
Emperor Force	C:\ProgramData\Mecmesin\Emperor\Force
Emperor Torque	C:\ProgramData\Mecmesin\Emperor\Torque
All Windows versions Program files location	
Emperor Force	C:\Program Files\Emperor\Force
Emperor Torque	C:\Program Files\Emperor\Torque

Insert the Emperor CD; Emperor should start automatically and ask if you wish to proceed with the installation of the software. If the installation program does not start automatically or if you have other problems:

- On your computer desktop click the shortcut to 'My Computer'
- Click on the CD drive that contains the Emperor software CD
- Navigate to the Emperor folder
- Right click on the Set-up.exe file, and Run as Administrator

Emperor will begin the process of installing the program onto your hard-drive. Follow the instructions, and accept the license agreement. You can choose which languages are installed: English only, all languages, or custom, so you can select languages you need.

6.3 Start Emperor

Start the program by using the Emperor icon that was installed on your computer desktop—the splash screen is displayed.

Emperor software provides two levels of user, and a password is used to restrict access to either a simple choice of pre-defined tests or some limited functions, or to give access to the full capabilities of the Emperor system.

Operators can select from tests that are pre-defined, and for which reports have already been written, and some functions that can be assigned to each user account.

Masters have full access to all the functions of the Emperor system. The master user has control over which users are operators and masters.

Logon with a Master level username and password. If this is the first time you have started the program, you can use:

Default Username: supervisor

Default Password: supervisor

Note: both the username and password are case-sensitive.
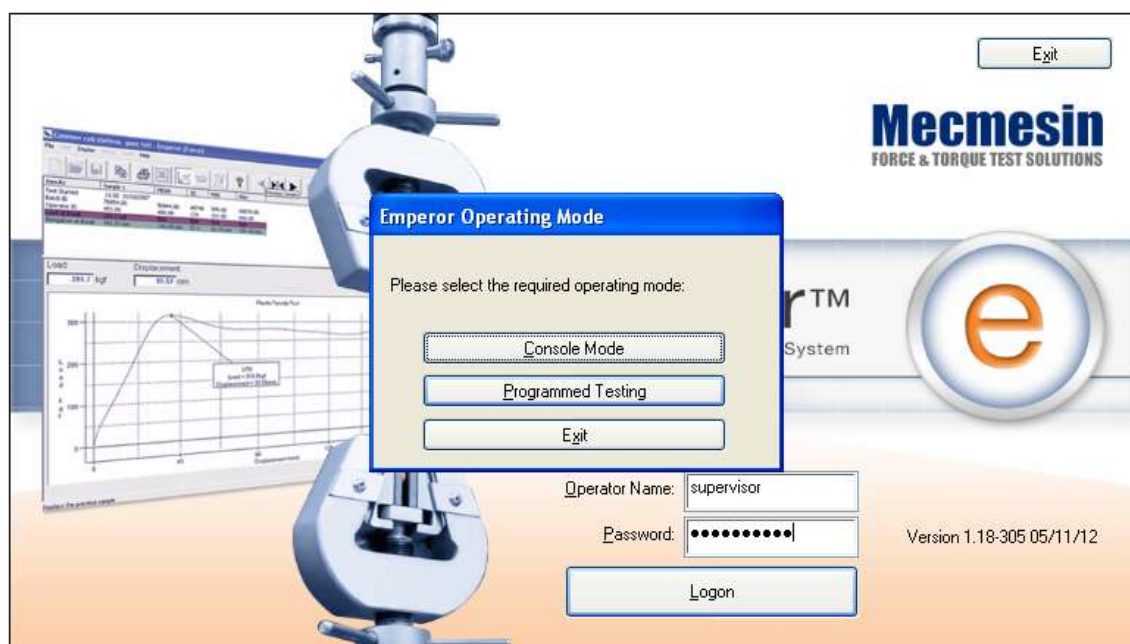
On the Operating Mode selection screen, click on Programmed Testing .

This will start Emperor, and you can set your system preferences, user accounts, create and run test programs, review results, perform calculations for analysis, produce test reports and export data for use elsewhere. For full details, see the manual: *Emperor Programming for Mecmesin Test Systems*.

Appendix A: System Specifications

MultiTest-*i*		0.5	1	2.5	5	10	25	50
Rated capacity	N kgf lbf	500 50 110	1,000 100 220	2,500 250 550	5,000 500 1,100	10,000 1,000 2,200	25,000 2,500 5,500	50,000 5,000 11,000
Number of ballscrews		1	1	1	1	2	2	2
Load measurement								
Available loadcell ranges	N kgf lbf	2 to 50,000 (14 models) 0.2 to 5,000 (14 models) 0.45 to 11,000 (14 models)						
Loadcell accuracy		±0.1% of full scale for loadcells from 2 to 2.5 kN ±0.2% of full scale for loadcells from 5 kN to 50 kN						
Loadcell resolution		1:6,500						
Speed								
Speed range mm/min (in/min)		1-1000 (0.04-40)	1-1000 (0.04-40)	1-1000* (0.04-40)	1-500 (0.04-20)	1-1000 (0.04-40)	1-1000** (0.04-40)	1-400*** (0.04-15)
Crosshead speed accuracy		±0.2% of indicated speed						
Displacement								
Crosshead travel††		1200 mm (47.3")	1000 mm (39.4')	500 mm (19.7')	590 mm (23.2')	950 mm (37.4')	950 mm (37.4')	1100 mm (43.3')
Positional accuracy per 300 mm (11.81") of travel		±130 µm (±0.005")				±100 µm (±0.004")		
Displayed resolution		±0.01 mm (±0.0004")						
Dimensions								
Distance between columns		—	—	—	—	400 mm (15.7")	400 mm (15.7")	420 mm (16.5")
Throat depth†		67 mm (2.6")	67 mm (2.6")	67 mm (2.6")	95 mm (3.7')	—	—	—
Vertical daylight††		1359 mm (53.5")	1159 mm (45.6')	580 mm (23.2')	675 mm (26.6')	1140 mm (44.9')	1140 mm (44.9')	1330 mm (52.4')

MultiTest-*i*	0.5	1	2.5	5	10	25	50
Height	1710 mm (67.3")	1510 mm (59.4')	941 mm (37')	1082 mm (42.6')	1500 mm (59.1')	1500 mm (59.1')	1931 mm (76')
Width	290 mm (11.4")	290 mm (11.4')	290 mm (11.4')	328 mm (12.9')	826 mm (32.5')	826 mm (32.5')	864 mm (34')
Depth	414 mm (16.3")	414 mm (16.3')	414 mm (16.3')	526 mm (20.7')	542 mm (21.3')	542 mm (21.3')	572 mm (22.5')
Weight	38 kg (84 lbs)	36 kg (79 lbs)	22 kg (49 lbs)	38 kg (84 lbs)	140 kg (309 lbs)	140 kg (309 lbs)	285 kg (628 lbs)
Max power requirement	120 W	200 W	250 W	150 W	450 W	450 W	450 W
Voltage	230 V AC 50 Hz or 110 V AC 60 Hz						

*   2.5 kN - recommended maximum speed = 750mm/min (30in/min) above 2 kN

**   25 kN - recommended maximum speed = 500mm/min (20in/min) above 10 kN

*** 50 kN – recommended maximum speed = 250mm/min (10in/min) above 25 kN

†   Measured on centreline of loadcell

†† Measured without loadcell or grips

Note: See Technical Datasheet 431-390 for dimension drawings.

Common specifications

Operating temperature	10ºC - 35ºC (50ºF - 95ºF)
Humidity range	Normal industry and laboratory conditions
Sampling rate (Hz)	Selectable from 1000, 500, 100, 50, 10
Compensation for system movement	Yes
Loadholding	Yes
Digital display of Load/Position/Speed	Yes
Output of test results to PC/Printer/Datalogger	Yes, via USB/network ports RS232 via USB/network converter in ASCII format
Communication with PLC/Digital Control Interface	Yes, via programmable digital ports 6 inputs + 6 outputs

Options available on request:

Column gaiter

Safety guard

Vortex-*i*		0.3 N m	1.5 N m	3 N m	6 N m	10 N m
Measurement range	N.m kgf.cm lbf.in	0-0.3 0-3 0-2.7	0-1.5 0-15 0-13	0-3 0-30 0-26	0-6 0-60 0-52	0-10 0-100 0-90

Load Measurement	
Load accuracy	±0.5% of full scale
Load resolution	1:6500
Load units	mN.m, N.cm, N.m, kgf.cm, gf.cm, oz.fin, lbf.ft, lbf.in

Speed	
Speed range	0.1-20 rev/min (clockwise or anticlockwise)
Speed accuracy	±1% of indicated speed
Speed resolution	±0.1 rev/min

Displacement	
Maximum displacement	2440 revs
Displacement accuracy	0.2° per 36,000°
Displayed resolution	0.001 revs (±0.2°)

Dimensions	
Max travel of adjustable transducer carriage	182 mm (7.2')
Maximum headroom	505 mm (19.9') [448 mm (17.6')]*
Width between columns	208 mm (11.02')
Weight	19.5 kg (43 lbs)
Capacity of lower mounting table	10-190 mm (0.39-7.5')
Capacity of upper mounting table	10-78 mm (0.39-3.07')

Miscellaneous	
Max power requirements	100 W
Voltage	230 V AC 50 Hz or 110 V AC 60 Hz
Loadcell calibration temperature	20±2˚C

* With upper and lower mounting tables fitted

Common specifications

Operating temperature	10ºC - 35ºC (50ºF - 95ºF)
Humidity range	Normal industry and laboratory conditions
Sampling rate (Hz)	Selectable from 1,000, 500, 100, 50, 10
Compensation for system movement	Yes
Loadholding	Yes
Digital display of Load/Position/Speed	Yes
Output of test results to PC/Printer/Datalogger	Yes, via USB/network ports RS232 via USB/network converter in ASCII format
Communication with PLC/Digital Control Interface	Yes, via programmable digital ports 6 inputs + 6 outputs

Options available on request:

Safety guard

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

E&OE

Appendix B: EC Declaration of Conformance

EC DECLARATION OF CONFORMITY

We,

Mecmesin Limited

Newton House, Spring Copse Business Park, Slinfold, West Sussex, RH13 0SZ

hereby declare that the product(s):

MultiTest 0.5-i; MultiTest 1-i; MultiTest 2.5-i; MultiTest 5-i; MultiTest 10-i; MultiTest 25-i, MultiTest 50-i & Vortex-i
Computer Controlled Test Stand

and associated and derivative product(s):

MultiTest 0.5-xt; MultiTest 1-xt; MultiTest 2.5-xt; MultiTest 5-xt; MultiTest 10-xt; MultiTest 25-xt, MultiTest 50-xt & Vortex-xt
Console Controlled Test Stand

to which this declaration relates, are in conformity with the essential requirements of the Council Directives:

- EMC Directive 2004/108/EEC
- Low Voltage Directive 2006/95/EEC
- Machinery Directive 2006/42/EEC

and tested to the following standards and other normative documents:

EN 61000-6-2, EN 61000-6-3, EN 60204-1, EN 61010-1, EN 60950-1

Declaration Issue Date: 1st September 2010

Managing Director: John Page

Mecmesin
FORCE & TORQUE TEST SOLUTIONS

Mecmesin

testing to perfection

Mecmesin : a world leader in affordable force and torque testing solutions

Since 1977, Mecmesin has assisted thousands of companies achieve enhanced quality control in design and production. The Mecmesin brand represents excellence in accuracy, build, service, and value. In production centres and research labs worldwide, designers, engineers, operators, and quality managers endorse Mecmesin force and torque testing systems for their high performance across countless applications.

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The Mecmesin global distribution network guarantees your testing solution is rapidly delivered and efficiently serviced, wherever you are.

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