

# Force-Displacement measuring System

## FSA series

A Complete test system to draw force-displacement curves  
 Ideal for feeling testing or material characteristic evaluation  
 High Sampling Rate and High Data reproducibility

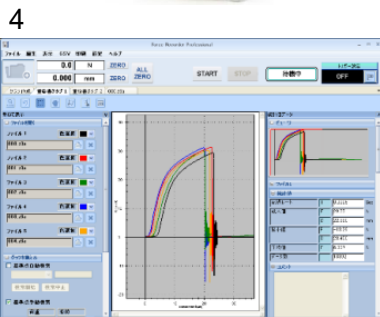


The FSA series is complete test system which can be configured for a wide array of applications requiring both force and displacement measurement. This series draws force-displacement graphs in real time at a high-speed 2000Hz data sampling and it achieves comparing multiple graphs on the screen. The FSA series takes statistical data and contribute to evaluation and analysis. With our wide range of attachments, other measurements such as tension, compression, peeling tests are also possible, with test stands variations available: Hand Operated-Manual type, High Load / Higher accuracy types, are available for requirements. The force gauge can be removed for separate uses and calibration. It makes maintenance easily, maintains high-precision measurement and gives a wide range of measurements.



Features	
System to achieve real-time the force-displacement curves	High repeatability with motorized test stand
2000Hz High-speed data sampling follows rapid force change, capturing measurement values accurately	Variety of force testing are possible with optional attachment combinations
Maximum of 5 graphs with visible graph comparing functions	Simple connections to PC with USB cable and allow quick data export to Word, Excel, PDF.

## Components of FSA series



1. Force gauge  
Indicates force and displacement values.  
Can be removed from a test stand and use individually or be calibrated separately.
2. Test Stand  
Provides stable test speed and angle, high repeatability.
3. Cable\*  
Connects the force gauge and the test stand for control.
4. Software  
Draw force-displacement graphs. Captures force and displacement values at Max. 2000/sec.
5. Attachments  
Standard attachments are included for basic compression and pull tests.



6. Additional Attachments (sold separately)  
Wide choices of optional attachments are available for your measurement requirements (please contact us for details).

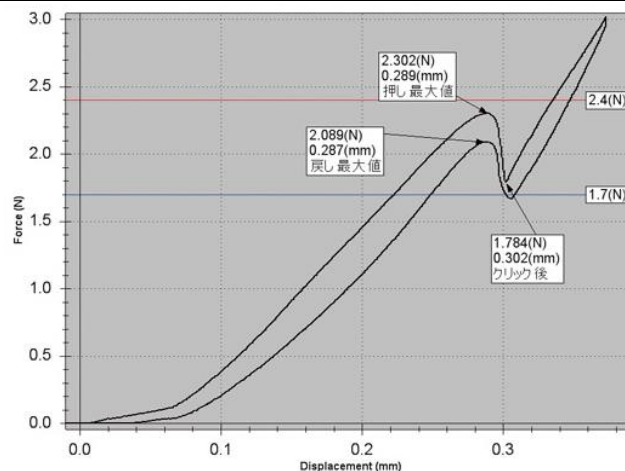
**This package System allows your force-displacement measurements with a single system**

\*FSA-MSL model is for manual operation, hence no cable connections required. Please refer to P3 to check each model.

### [Test Examples]

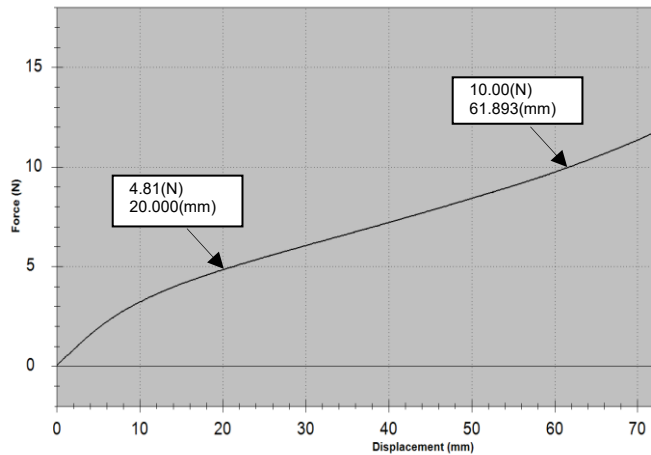
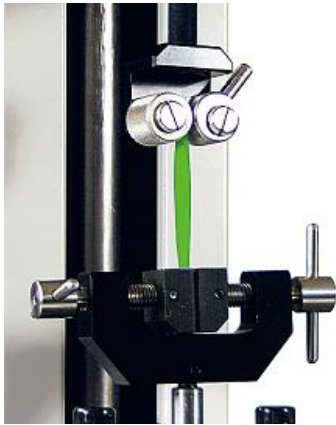
- Cushion materials repulsion tests
- Bending and Tensile tests of various materials
- Simple evaluations of spring characteristics
- Car cushions hardness tests
- Repulsion tests for sport equipment
- Cushioning materials repulsion tests
- LCD panels strength tests

### Switch Pressing Force Test Image: Measurement and Analysis










Curves on Force-Time graphs continually show from left to the right, and never returns to the left. On the other hand, curves on the force-displacement graph return back to the left due to base on displacement. The force-displacement analysis helps to provide statistics on hysteresis identification.

### Tensile Test Image: Measurement and Analysis



Measuring displacement can help identify relation of the amount of deformation and the force required for the test sample transformation.

**[FSA series Models]** Various models are available for your testing requirements.

Vertical type				
Compact <b>FSA-0.5K2-__N</b>	Up to 1000N <b>FSA-1K2-__N</b>	High capacity <b>FSA-2.5K2-__N</b>	High capacity <b>FSA-5K2-__N</b>	
Capacity:500N	Capacity:1000N	Capacity:2500N	Capacity:5000N	
Motorized version to set testing speeds, testing and stopping times. Recommended for Repeat tests and Durability tests with counter functions.				
				
Vertical & High Accuracy type		Horizontal type		Portable type
Compact and Professional <b>FSA-0.5KE-__N</b>	Professional <b>FSA-1KE-__N</b>	Compact <b>FSA-0.5HK2-__N</b>	High capacity <b>FSA-2.5HK2-__N</b>	Carriable <b>FSA-MSL-__N</b>
Capacity:500N	Capacity:1000N	Capacity:500N	Capacity:2500N	Capacity:50N
High rigidity / functional. Memories with 5 measuring conditions, Travel settings.		Motorized version to set testing speeds, testing and stopping times. Recommended for Repeat tests and Durability tests with counter functions.		Lightweight Handheld operation
				

\* Refer to the next page for selecting model.

## [Selecting Model]

You can select a range(\_\_\_\_N) according to your testing needs.

**FSA-0.5K2-200N**

Force Range(capacity) choices  
2N, 5N, 20N, 50N, 100N, **200N**, 500N, 1000N, 2500N, 5000N

Please select appropriate range for your test requirement.

The force range selection must be lower than the capacity of this model.

## [Specifications (General)]

FSA series		
Measurement Unit	Force*	N, kgf, lbf
	Displacement*	mm, inch
Resolution	Force	4 digits (e.g. Resolution of 5N force gauge is 0.001N)
	Displacement	0.001mm (on software Force Recorder Professional) 0.01mm (on force gauge display)
Accuracy	Force	+/- 0.2%F.S. +/-1 digit
	Displacement	+/- 0.1mm +/- 1digit( with no load) *1
Sampling cycle		2000 data/sec
Display update cycle		16 data/sec
Output function		USB, Serial(RS232C), Analog(Approx. +/- 2V), Comparator, Over load, Sub comparator, USB flash drive *2
Motorized Stand Function		Stroke limit, Overload Prevention, Force control*3、Emergency Stop
Motorized Test Stand Power		AC100V-240V Free input *4
Operating Environment		Temperature:0 - 40°C Humidity:20 -80%RH
Accessories		Instruction Manual, Inspection Certificate, Warranty Certificate, Power cable, Spare hues, USB cable, Driver CD-ROM(including software for data log "Force Logger"), Graphing software "Force Recorder Professional."

\*1 When maximum force is applied, the stand may be deformed vertically as below.

FSA-0.5 to 5K2: less than 0.5mm, FSA-0.5/1KE: less than 0.25mm, FSA-0.5/2.5HK2 : less than 0.5mm

\*2 USB flash drive is not included.

\*3 The value of Force control is specified with the absolute value

\*4 Power supply units are required individually for Motorized Test Stand and the Force gauge.

## [Software specifications (General)]

Operating environment	OS: Windows 7/8/8.1/10
Hardware	CPU: Pentium4 (1GH more) or more is recommended
	Memory: 2GB more recommended
	Hard Disk: 10GB (data storage area) or more
Platform	NET Framework or more
Execution environment	Microsoft Internet Explorer 6.0 or later
	Windows Installer 3.1 or later
Connecting Port	USB1.1 and USB2.0 * connector

\* We do not guarantee the operation with USB 3.0.

## [Specifications • Individual System Details]

FSA Series									
Spec/Model	FSA-0.5K2	FSA-1K2	FSA-2.5K2	FSA-5K2	FSA-0.5KE	FSA-1KE	FSA-0.5HK2	FSA-2.5HK2	FSA-MSL
Range	2N,5N,20N,50N,100N,200N,500N	2N,5N,20N,50N,100N,200N,500N,1000N	2N,5N,20N,50N,100N,200N,500N,1000N,2500N	2N,5N,20N,50N,100N,200N,500N,1000N,2500N,5000N	2N,5N,20N,50N,100N,200N,500N,1000N,200N,50N,100N,200N,500N,1000N	2N,5N,20N,50N,100N,200N,500N,1000N	2N,5N,20N,50N,100N,200N,500N,1000N	2N,5N,20N,50N,100N,200N,500N,1000N,2500N	2N,5N,20N,50N
Maximum capacity	500N	1000N	2500N	5000N	500N	1000N	500N	2500N	50N
Included Motorized Test Stand *1	MX2-500N	MX2-1000N	MX2-2500N	MX2-5000N	EMX-500N	EMX-1000N	MH2-500N	MH2-2500N	MSL-50N
Stroke (mm) *2	230	290	290	295	265	290	230	265	80
Stroke Limit Setting	Manual	Manual	Manual	Manual	Digital or Manual	Digital or Manual	Manual	Manual	
Speed (mm/min) *3	10-300	10-300	10-300	0.5-300	0.5-600	0.5-600	10-300	10-300	10-300
Max. Sample Height(mm) *4	Height 235	Height 300	Height 320	Height 380	Height 295	Height 320	Length 245	Length 340	Height 44





\*1 Please refer to the specification of each Motorized Test Stands for further operation details.

\*2 Stroke means movable capacity. Stroke range varies depending on the force gauge and the attachments combined. Long Stroke option is available. Please refer to page6 [Available Stand Options] for details.

\*3 Speed Range Change options are available. Please refer to page6 [Available Stand Options].

\*4 For maximum sample height, please refer to the distance between table and the tip of the measuring shaft of the force gauge When the head is at the top with no attachments.(FSA-0.5K2/FSA-1K2: up to 1000N model of ZTA series, FSA-2.5K2/FSA-5K2: With over 2500N model of ZTA series is mounted.)

Maximum sample length of FSA-0.5HK2 applies to the distance between the tip of the fixed axle of the table and the tip of the force gauge measuring shaft (With up to 1000N model ZTA series, FSA-2.5HK2: With over 2500N model of ZTA series is mounted.)

Related Accessories and Jigs			
Compression Test Accessory <b>UR series</b>	Pantograph Grip <b>PGC series</b>	Film Grip <b>FC series</b>	90-degree peel test Fixture <b>P90-200N</b>
Hemispherical polyurethane Jig	Easy gripping for deformable samples	Suitable for gripping thin film forms	Recommended for adhesive tape, tests
			

\* Multiple choices of accessories and jigs are available for various measurement needs.

\* Original jigs can be made to order based on your measurement requirements.

\* Please refer to the specification of each accessory details for more information

Available Stand Options									
Long Stroke (-L, -2L): for long stretch samples and long distance compression tests Extended column (-EXT): for large samples									
Model	FSA-0.5K2	FSA-1K2	FSA-2.5K2	FSA-5K2	FSA-0.5KE	FSA-1KE	FSA-0.5HK2	FSA-2.5HK2	FSA-MSL
Long Stroke(-L)	✓			✓					
Extended column (-EXT) (mm)	+200(-L) +400 (-2L)	✓ +300(-L)	✓ +300(-L)	✓ +200 (-EXT) (*1)	✓ +300(-L)	✓ +300(-L)			
(-V●●) Speed Range Changing Option: for changing measurement speed for individual requirements									
Model	FSA-0.5K2	FSA-1K2	FSA-2.5K2	FSA-5K2	FSA-0.5KE	FSA-1KE	FSA-0.5HK2	FSA-2.5HK2	FSA-MSL
Speed Range (mm/min)	✓ 1.5 to 45 3 to 90 15 to 450 20 to 600 30 to 900	✓ 2.5 to 75 5 to 150 25 to 750 35 to 1000	✓ 2.5 to 75 5 to 150				✓ 1.5 to 45 3 to 90 15 to 450 20 to 600 30 to 900	✓ 2.5 to 75 5 to 150	
(-CN) External Signals Options for Operation improvements on measurement site									
Model	FSA-0.5K2	FSA-1K2	FSA-2.5K2	FSA-5K2	FSA-0.5KE	FSA-1KE	FSA-0.5HK2	FSA-2.5HK2	FSA-MSL
-CN	✓	✓	✓	✓	Standard	Standard	✓	✓	

\* If you change the stroke or speed, the capacity may decrease. Please contact us for further information.

\*1 The long stroke option is not available for FSA-5K2. Extended column option is available only for FSA-5K2.

\*1 The stroke does not extend. It extends the column of test stand so the max. sample height changes from 380mm to 580mm.

The min. sample height also changes from 95mm to 295mm therefore it is not suitable for measuring small samples.

### [Examples of The Systems with selected combinations of individual options]

e.g.1) FSA-0.5K2-200N→ For Long Stroke option(-L) is selected

Select System "FSA-0.5K2-200N-L"

e.g.2) FSA-0.5K2-200N→ For Speed Range option (-V●●) is selected

Select System "FSA-0.5K2-200N-V●●"

\*Values is in ●●. If speed range "20 to 600" is selected, -V●● is -V600.

e.g.3) FSA-0.5K2-200N for both Long stroke option(-L) and Speed range option(-V600)

Select System "FSA-0.5K2-200N-L-V600"

### [Cautions]

- Information in this document is subject to change without prior notice.
- This document is product descriptions and handling precautions, and do not guarantee various characteristics or safety.
- This product is designed for force measurement purpose only.
- Do not copy and use this content without authorization.
- Some sample cannot be measured depending on their materials or shapes.
- Please do not add load over capacity of a force gauge to prevent sensor break-down.
- Displacement reading error can occur due to deflection of a sensor or test stand when load is added.
- Optional attachment and PC are Not included in this unit
- Software could not work in some operating environment