MICROHARDNESS TESTER

FM-X Series

FUTURE-TECH

FM-LXR / FM-X3R / FM-X2R / FM-X1R
FM-LX / FM-X3 / FM-X2 / FM-X1

FM-X3

FM-LXR

PATENT PENDING
DESIGN REGISTRATION PENDING

NEW STANDARD OF MICROVICKERS HARDNESS TESTER

FM-LXR / FM-X3R / FM-X2R / FM-X1R / FM-LX / FM-X3 / FM-X2 / FM-X1

■Equipped with a built-in camera mechnism. Independently developed automatic indentation with high performance dedicated software & PC measurement.
By removing the measuring microscope, the appearance is refreshed.
(R type with automatic indentation reading function)

■In addition to the conventional weight method, a lineup of models that adopts the loading by Load-cell and the multistepload switching have made it possible to achieve the heavy accuracy. Multi-load type 50gf~10kgf various with a wide load range corresponds to various tests. (FM-LX series)

■By adopting a tilted turret, the turret rotation reduces the risk of contact bewteen the sample and the indenter/objective lens.

■An infinity lens is adopted. In addition to the standard 2 lenses (10 times and 50 times), up to 5 can be installed at the same time. (option)
A wider range of measurement and observation is possible from low magnification to high magnification.

■Different indenters can be installed at the same time. Vickers (HV) / Knoop (HK) / Brinell (HB) up to 3 pieces.(Option)

■The main display screen can be switched by swiping.

■Capacitive touch panel realizes light touch operation.

■Measured data can be transferred directly by connecting to a PC from the output port of the main unit. Eliminates recording mistakes by operators.

Load-cell type with automatic indentation reading function

FM-LXR

Weight type with automatic indentation reading function

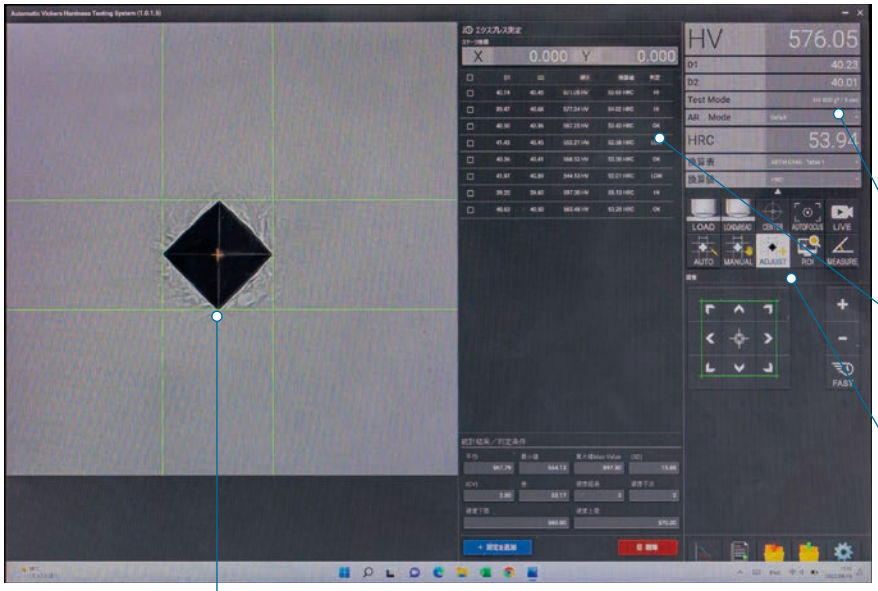
FM-X3R / FM-X2R / FM-X1R

Adopted a built-in camera mechanism.
Equipped with an automatic indentation reading function,
Next-generation microhardness tester.

Best performance and larger field of view is guaranteed and the high-resolution camera and dedicated software is equipped as standard.
The indentation is displayed on the PC/tablet and automatically measured.
Significantly reduces the burden on operators and individual differences in reading.

FM-LXR

Dedicated software "ARGO" main screen



Various data output such as PDF is now possible.
Access is restricted by operators' ID and password.
It has a function. In addition, no complicated setup of conventional software is required.
Anyone can easily perform measurements without the need of complicated settings.

Measurement results, D1 & D2, conversion values for each scale etc. are displayed.

Displays the most recent measurement results in a list.

Various operations can be carried out for the operators to operate easily.
Items are displayed with easy-to-understand illustrated icons.
For load application & reading, lens selection, indenter selection, setting change of various species, data and image save & recall, it became possible to smoothly create report, etc.

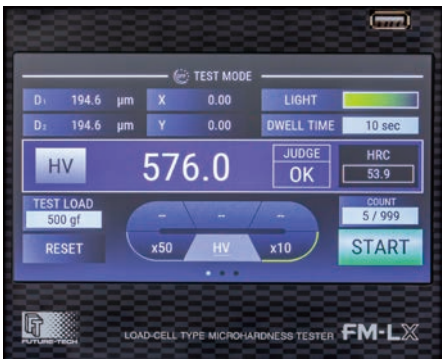
Live/saved image display screen.
The use of a high-resolution camera improves operator visibility and measurement accuracy. Indentations on rough surfaces, which were previously difficult to read, can now be read in many cases.
By making the aspect ratio almost 1:1, it is possible to display and measure wide indentations.

*FM-LXR / FM-X3R / FM-X2R / FM-X1R are models with the automatic indentation reading function "R" added to the FM-LX / FM-X3 / FM-X2 / FM-X1 described on the next page.
Please refer to FM-LX / FM-X3 / FM-X2 / FM-X1 of the next page for the introduction to the functions of the four models other than the automatic indentation reading function.

Load-cell type FM-LX

Loading method using Load-cell instead of the conventional weight method.

By adopting the Load-cell load system, multi-stage load switching is possible.
The load switching work has evolved from the conventional dial operation to a smooth touch panel operation.
Any load can be selected when ordering. (within the minimum to maximum load range)
Equipped with a hardness conversion function.
During HV measurement, the conversion value to any scale can be displayed on the front panel at the same time.



FM-LX

Weight type FM-X3 / FM-X2 / FM-X1

Sophisticated design, excellent usability.
Evolution of the long-selling microhardness tester FM series.

FM-X3 The front panel is the same touch panel type as the LX series and has a variety of functions.
D1 and D2 measurements are digital measurements. With data output function.
Equipped with a hardness conversion function. At the time of HV measurement, the conversion value to any scale can be displayed on the front panel at the same time.

FM-X2 D1, D2 and hardness values are displayed on the front panel with LEDs. D1 and D2 measurements are digital measurements. With data output function. Quick measurement and versatile data management are possible.

FM-X1 The front panel uses a simple sheet switch system.
D1 and D2 measurement is mechanical. Measure the scale visually.

FM-X3

SPECIFICATIONS

Item		FM-LXR	FM-LX	FM-X3R	FM-X3	FM-X2R	FM-X2	FM-X1R	FM-X1
Test load		8 load levels for A type: 10/25/50/100/200/300/500/1000gf 9 load levels for B type: 50/100/200/300/500/1000/2000/5000/10000gf * Arbitrary setting within the minimum to maximum load range is possible only at the time of shipment from the factory. Minimum set load: 1 gf for both types, maximum 20 stages can be set.		8 load levels for A type: 10/25/50/100/200/300/500/1000gf 10 load levels for B type: 5/10/25/50/100/200/300/500/1000/2000gf 12 load levels for C type: 1/3/5/10/25/50/100/200/300/500/1000/2000gf		8 load levels for A type: 10/25/50/100/200/300/500/1000gf 10 load levels for B type: 5/10/25/50/100/200/300/500/1000/2000 gf		8 load levels for A type: 10/25/50/100/200/300/500/1000gf	
Test load switching method		Load-cell type		Weight type dial switching type					
Loading mechanism		Automatic load/hold/release method							
Load applying speed		60μm/sec (Compliant standards: JIS B 7725, ISO 6507-2, ASTM E92: 15 to 70μm/sec)							
Dwell time		5 ~ 999sec						5 ~ 40sec	
Turret mechanism		Rotation: Automatic / Form: 15° tilt type 6 positions							
Diamond indnter	Standard	1 Vickers indenter (HV)							
	Option	Vickers indenter (HV), Knoop indenter (HK) or Brinell indenter (HB): total 2 can be installed				Mounted indenter can be changed to Vickers indenter (HV) or Knoop indenter (HK). (Simultaneous mounting of multiple indenters is not possible.)			
Infinity objective lens	Standard	2 Lenses (X 50 & X 10)							
	Option	Up to 5: (2 standard lenses + 3 additional lenses): X1.25 / X2.5 / X5 / X20 / X100 *5 lenses + 1 indenter or 4 lenses + 2 indenters							
Automatic measurement camera device		Standard equipment (Details below)	—	Standard equipment (Details below)	—	Standard equipment (Details below)	—	Standard equipment (Details below)	—
Measuring microscope (Option for R type)	Type	Electronic						Mechanical	
	Eyepiece	X10							
	Max. measurement length	In case of X 100 : 850μm / In case of X 500 :170μm							
	Min. graduation	Digital : 0.01μm (In case of X 500)						Micrometer : 0.2μm	
	Min. measurement unit	Digital : 0.01μm (In case of X 500)						Eye judgement : 0.1μm	
X -Y stage	Type	Manual type: Analog micro haed is standard equipment.							
	specifications	Dimensions: 100mm x 100mm / Max. movement: X25mm x Y25mm / Min. micro graduation: 1μm / Precision vise (standard equipment) Max. opening: 50mm							
Measurable size of specimen		Maximum height of specimen: 110mm				Maximum depth of specimen: 165mm			
Measurement parameters		HV / HK / HBW / Kc				HV / HK			
Fracture toughness test (Kc)		Conform to JIS R1607 / IF Method				—			
Hardness conversion function		Compliant Standard: ASTM E-140				—			
Cylindrical and spherical offset functions		Built-in function				—			
Specimen thickness calculation function		Built-in function				—			
Hardened layer depth calculation function		Built-in function				—			
Automatic measurement control and data display device: Separated tablet PC		Standard equipment (Details below)	—	Standard equipment (Details below)	—	Standard equipment (Details below)	—	Standard equipment (Details below)	—
Front operation panel	Type	Capacitive touch panel				Sheet switch			
	Operation item	Start/Set/Dwell time/Light source brightness/Test load (display)/Load loading speed/Conversion scale/Turret rotation/Clear/Standby mode				Start/Set/Dwell time/Light source brightness/Turret rotation			
Data display		D1-D2/HV-HK/Hardness value/Test load/OK-NG Criteria/Load status display/Number of tests/X-Y coordinates/Turret position				D1-D2/HV-HK/Hardness value/Test load/OK-NG Criteria/Load status display		Power ON-OFF/Load status display (Pilot lamp)	
Data output and printout		USB port and RS232C (D1-D2/HV-HK/Hardness value/Test load/OK-NG Criteria/Conversion scale and conversion value/Statistical data/Others) *USB port (on the front panel): data output and program installation				USB port and RS232C (D1-D2/HV-HK/Hardness value/Test load/OK-NG Criteria) *USB port (on the front panel): data output and program installation		—	
OK-NG judgement function		Limit setting and HI/OK/LO display						—	
Self diagnosis		Display troubles with motors and switches				—			
Security		Password lock					—	Password lock	—
Light source		Built-in LED light source							
Compliant standard		Comform to JIS B-7725, JIS B-7734, ASTM E-92 and ISO 6507-2							
Dimensions		W283 x D480 x H620mm							
Weight		45kg							
Power supply		Single phase AC100~240V 50/60Hz							

Automatic measurement device specifications (FM-LXR/FM-X3R/FM-X2R/FM-X1R) :Common to R type with automatic indentation reading function

Automatic measurement camera device		Always built-in: camera and camera attachment
Automatic measurement control and data display device: Separated tablet PC	Type	Separate display panel (10.5 inch) and keyboard
	Operation item	Start/Set/Dwell time/Light source brightness/Test load (display)/Load loading speed/Conversion scale/Turret rotation/Clear/Standby mode/ * Manual indentation focusing
	Equipment dimensions	W250 x D300 x H180mm (including keyboard)

FM-X Series

SYSTEM CHART

＜OPTIONAL COMPONENTS＞

OPTIONAL ACCESSORIES

		CODE No.	ITEM		DESCRIPTION
	①	M-014	Knoop indenter		Rhombic diamond indenter for Knoop hardness
	②	M-063	Brinell test	Tungsten carbide ball indenter	ϕ 1mm
		M-039	Hardness calculation table	For HV	5gf - 50kgf (This is standard accessory for FM-X1)
		M-040		For HK	5gf ~ 50kgf
	③	–	Object lens		Type: X1.25 / X2.5 / X5 / X20 / X100
	④	M-062	Eyepiece		× 15
		M-024	Apeature diaphragm		ϕ 1 ~ 6mm (6 types can be selected when ordering)
		M-025	Field aperture		ϕ 1 ~ 7mm (7 types can be selected when ordering)
	⑤	M-009	Monitor measuring device		Color camera + Wide monitor + L-type attachment + Image saving function (with USB memory)
	⑥	M-028	Precision vise		Max. opening : 100mm
	⑦	M-029	Rotary table		Graduation of rotary angle : 5 degree / Table diameter : ϕ 128mm
	⑧	M-030	Thin specimen measuring device		Specimen thickness : 5mm max
	⑨	M-031	Fine specimen measuring device	Vertical type	Specimen diameter : ϕ 5mm max (For measuring the cross section)
	⑩	M-032		Horizontal type	Specimen diameter : ϕ 5mm max (For measuring the cylindrical surface)
	⑪	M-033	Specimen inclining device		Specimen height : 5 ~ 20mm (For mounted specimen)
	⑫	M-034	Universal inclining vise		Inclining device + Vise Max. opening : 45mm
	⑬	M-004-1	Digital printer		RS232C type (For Hardness Tester)
	⑭	M-043RET	Vibration insulation stand		RET-0405 (Rubber type)
		M-057	Optical kit for additional object lens		Internal parts of turret for installing the third and fourth object lenses. (Please specify them when ordering the product.) Only our factory can add them after the shipment.
		M-305	Excel data transfer software for FM		Excel data transfer software (CD-R), RS232C cable for PC connection.
		M-306	For excel data transfer software RS232C → USB conversion cable		RS232C → USB conversion cable * Required when the PC side cable outlet is a USB port instead of RS232C.
		M-074	Manual X-Y stage 50 x 50mm		50 x 50 mm (min. graduation 1 μm)
		M-082	automatic X-Y stage 50 x 50mm		50 x 50 mm (min. graduation 1 μm)
		M-090	automatic X-Y stage 150 x 80mm		150 x 80 mm (min. graduation 1 μm)
		M-091	Fixing jig for six mounted specimens		Sample diameter to set is limited (Please contact us for sample diameter.) Maximum sample diameter ϕ 40mm
		M-059	Digital microhead 25mm		Minimum movement : 1 μm
		–	Digital microhead 50mm		Minimum movement : 1 μm
		–	Automatic measurement camera device		Always built-in: camera and camera attachment

SYSTEM UPGRADE

		CODE No.	ITEM	DESCRIPTION
System to upgrade using software "FT-ZERO"	⑮	M-007	Automatic indentation measurement system 〈AR〉	System configuration: camera, PC, monitor, system control software "FT-ZERO", digital printer
	⑯	M-005	Automatic indentation measurement & automatic X-Y stage system 〈ARS〉	System configuration: automatic X-Y stage, control box, camera, PC, monitor, system control software "FT-ZERO", digital printer
	⑰	M-203	Fully automatic test system (automatic Indentation measurement & automatic X-Y stage & automatic focus system) 〈ARS-F〉	System configuration: Joystick controller, automatic X-Y stage, control box, camera, PC, monitor, system control software "FT-ZERO", digital printer. (Fully automatic test system ARS-F can be selected only when ordering the main unit.)
System upgrade using software "ARGO"	⑮ ⑱	–	Automatic indentation measurement system 〈R〉	System configuration: camera, PC, monitor, system control software "ARGO", digital printer
	⑯	–	Automatic indentation measurement & automatic X-Y stage system 〈S〉	System configuration: automatic X-Y stage, control box, camera, PC, monitor, system control software "ARGO", digital printer
	⑰	–	Fully automatic test system (automatic Indentation measurement & automatic X-Y stage & automatic focus system) 〈F〉	System configuration: Joystick controller, automatic X-Y stage, control box, camera, PC, monitor, system control software "ARGO", digital printer. (Fully automatic test system F can be selected only when ordering the main unit.)

STANDARD ACCESSORIES

	ITEM
Standard accessories common to all types (All accessories are one piece only.)	Manual X-Y stage: Movement amount X25mm x Y25mm / Precision vise / Standard test block(HV700) / Diamond indenter for HV (built-in) / Infinity objective lens Total 2 (× 50 and × 10) / Level adjusting leg × 4 / Level / Indenter cover (built-in) / Machine cover / Power cable (approximately 2000 mm) / Auxiliary tools (Phillips screwdriver x 1: Precision slotted screwdriver x 1: L wrench x 6) / Instruction manual / Accessory storage box

	ITEM	FM-LXR	FM-LX	FM-X3R	FM-X3	FM-X2R	FM-X2	FM-X1R	FM-X1
Standard accessories by types (All are one piece only.)	Automatic measurement camera deivice is always built-in: Camera and camera arrachment	○	—	○	—	○	—	○	—
	Electronic measuring microscope	—	○	—	○	—	○	—	—
	Mechanical measuring microscope	—	—	—	—	—	—	—	○
	Hardness calculation table (for vickers)	—	—	—	—	—	—	○	○
	Hardness conversion table	—	—	—	—	○	○	○	○

LIST OF FUNCTIONS OF EACH MODEL BY PURPOSE

	FM-LXR	FM-LX	FM-X3R	FM-X3	FM-X2R	FM-X2	FM-X1R	FM-X1
Loading method using a load cell	○	○	—	—	—	—	—	—
Loading method using weights	—	—	○	○	○	○	○	○
Automatic indentation reading function. Instantly measure hardness with one click.	○	—	○	—	○	—	○	—
Instantly measure D1 and D2 with a button.	—	○	—	○	—	○	—	—
Hardness conversion function (simultaneous display of conversion values to other scales).	○	○	○	○	○	—	○	—
Light load Brinell test function	○	○	○	○	○	○	○	○
Fracture toughness value (Kc) calculation function	○	○	○	○	○	—	○	—
Data output function (USB memory and RS232C)	○	○	○	○	○	○	—	—
Simultaneous mounting of different indenters (up to 3 HV, HK, etc.)	○	○	○	○	—	—	—	—
Simultaneous mounting of multiple infinity objective lens with different magnifications (up to 5).	○	○	○	○	○	○	○	○

※Appearance and specifications are subject to change without prior notice for the product improvement.

FUTURE-TECH

ilac-MRA IAJapan JCSS JCSS 0228

We are based on JIS Q 17025 (ISO/IEC 17025) as accredited standards, and accredited by JCSS who manages the recognition scheme according to ISO/IEC 17011. IA Japan (accreditation organization who has managed JCSS) who is signatory to the Mutual Recognition Arrangement (MRA) of International Laboratory Accreditation Cooperation (ILAC) and Asia Pacific Accreditation Cooperation (APAC).
We are accredited as MRA Calibration Laboratory of JCSS. Our accreditation number is JCSS 0228.

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MS CM002

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