

MICROHARDNESS TESTER

# FM Series

FM-110/FM-310/FM-810



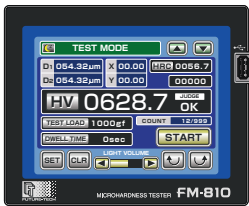
# FM Series

## FM-110, FM-310, FM-810

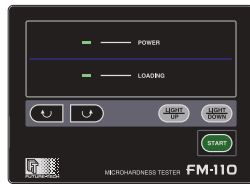
Lab-friendly functions make FM Series Microhardness Testers ideal for materials labs.

FM-810e & FM-810 make precise Vickers (HV) / Knoop (HK) / Brinell (HBS & HBW) / Fracture Toughness (Kc) measurements quick and easy.

— One touch selection on touchpad —



〈FM-810Series〉



〈FM-110Series〉



〈FM-310Series〉



## Features

### ■ ADVANCED COLOR LCD TOUCH PANEL OPERATION AND DISPLAY

Color LCD touch panel/display coordinated with highly integrated PC board. Measuring procedures, conditions and data are displayed clearly. (FM-810 Series)

### ■ BRINELL TESTING

Accurate light load Brinell Testing is available as a standard function. Required optional item "Ball Indenter  $\phi$  1mm". (FM-810 Series)

### ■ FRACTURE TOUGHNESS TESTING, Kc

Kc value can be measured as a standard function according to JIS R1607/ IF Method. Together with the value of Micro Vickers and Knoop, it is very effective to evaluate the quality of new material. (FM-810 Series)

### ■ CLEAR VIEW AND EASY MEASURING

The changeable aperture diaphragm and field aperture with a newly developed light source mechanism provides more resolution at both high and low magnifications. Easy to change color filter provides more resolution. (All Series)

### ■ A VARIETY OF SELECTABLE LOADS

Type of test load is selectable. You can select from an abundance of loads and have own load combination (Option/Negotiable)

### ■ X-Y COORDINATE DISPLAY

Stage coordinate is indicated on the display in a link operation with the digital microhead (option).

### ■ 4 OBJECT LENSES (OPTIONAL)

The new turret mechanism enables to observe wide area of specimen area with up to 4 object lenses. Various magnifications easily available by rotating the correct objective into position. Placement of an indentation and its reading is more accurate and repeatable by choice of proper objective. (FM-810 Series)

### ■ 2 INDENTERS FOR HV/HK MEASUREMENTS (OPTIONAL)

The new turret mechanism enables to adapt 2 indenters simultaneously. It allows Vickers and Knoop tests without replacing the indenter. (FM-810 Series)

### ■ USB PORT OUTPUT

### ■ EQUIPPED WITH THE CYLINDRICAL/SPHERICAL OFFSET FUNCTION AND THE SPECIMEN THICKNESS CALCULATION FUNCTION.

### ■ HARDENED LAYER DEPTH CALCULATION FUNCTION (FM-810 SERIES)

The hardened layer depth can be automatically calculated by a simple operation.

# SPECIFICATIONS

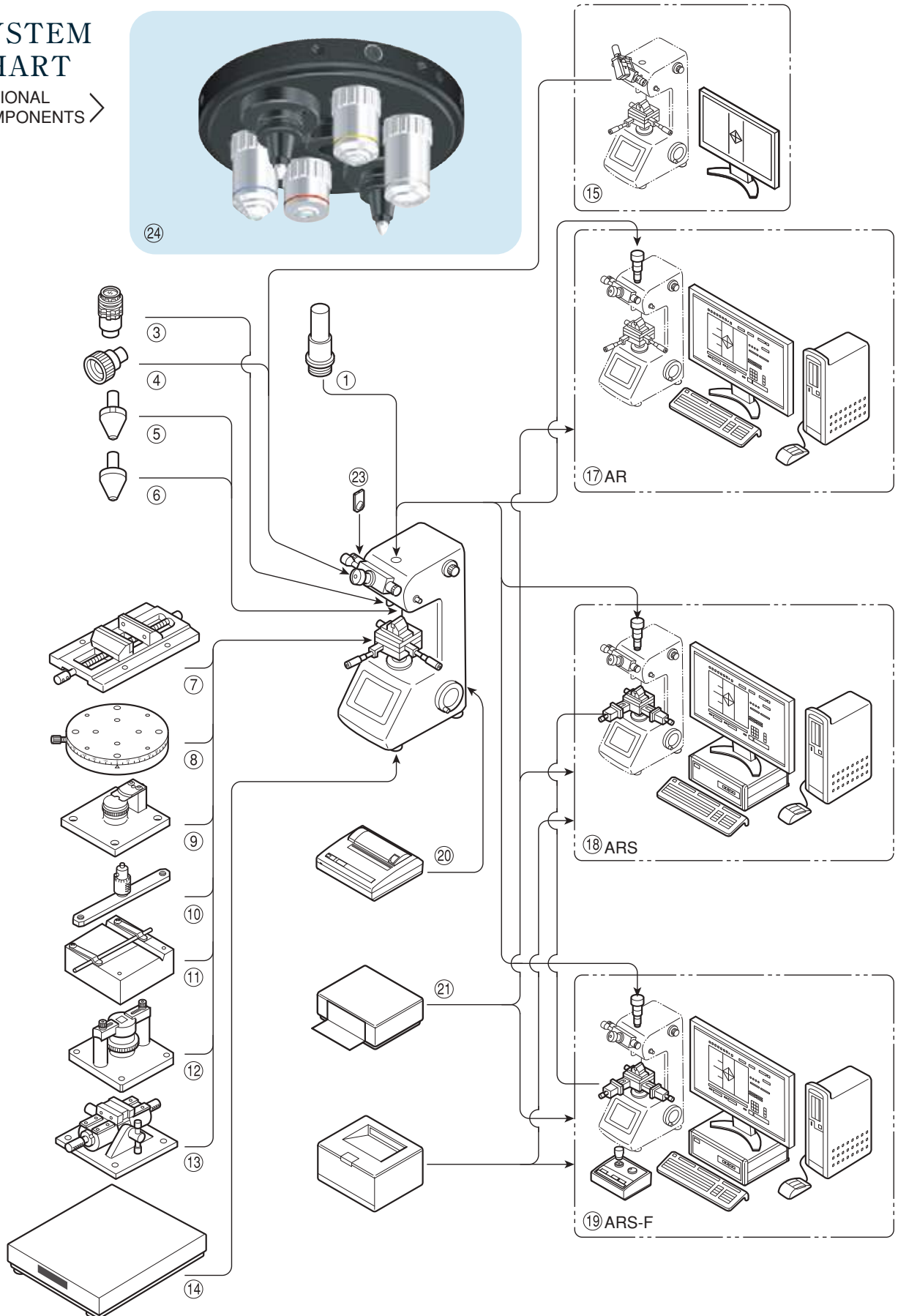
FM-110 / 310series FM-810series  
 \* Choose either 1,000 or 2,000

MODEL		FM-110e	FM-110	FM-310e	FM-310	FM-810e	FM-810							
TEST LOAD	TYPE A	mN : gf :	49.03 5	98.07 10	245.2 25	490.3 50	980.7 100	1,961 200	2,942 300	4,903 500	9,807 1,000	19,614 2,000		
	TYPE B	mN : gf :	9.807 1	29.42 3	49.03 5	98.07 10	245.2 25	490.3 50	980.7 100	1,961 200	2,942 300	4,903 500	9,807 1,000	
	TYPE C	mN : gf :	9.807 1		49.03 5	98.07 10	245.2 25	490.3 50	980.7 100	1,961 200	2,942 300	4,903 500	9,807 1,000	19,614 2,000
	TYPE D	mN : gf :	9.807 1		49.03 5	98.07 10	245.2 25	490.3 50	980.7 100		2,942 300	4,903 500	9,807 1,000	19,614 2,000
	TYPE E	mN : gf :	9.807 1	29.42 3	49.03 5	98.07 10	245.2 25	490.3 50	980.7 100		2,942 300	4,903 500	9,807 1,000	
LOADING MECHANISM		Automatic Load and Release Method												
LOAD APPLYING SPEED		60 μm / sec												
DWELL TIME		5 ~ 40 sec					5 ~ 99 sec							
TURRET MECHANISM		Manual	Automatic	Manual	Automatic	Manual	Automatic							
DIAMOND INDENTER	Standard	Vickers Indenter (HV)												
	Option	—												
OBJECT LENS	Standard	2 Lenses ( X 50 & X 10)												
	Option	Max. 3 Lenses ( X 50 & X 10 plus 1 Lenses)						Max. 4 Lenses ( X 50 & X 10 plus 2 Lenses)						
EYEPIECE		X10												
MEASURING MICROSCOPE	Type	Mechanical					Electronic							
	Max. measurement length	In case of X 100 : 850 μm / In case of X 500 : 170 μm												
	Min. graduation	Micrometer : 0.5 μm					Digital : 0.01 μm (In case of X 500)							
	Min. measurement unit	Eye judgement : 0.1 μm					Digital : 0.01 μm (In case of X 500)							
X - Y STAGE	Type	Manual												
	Dimensions	100x100mm												
	Max. movement	(X) 25x(Y) 25mm												
	Min. micro graduation	1/100mm												
	Option	Digital microhead						Digital microhead (Panel display)						
PRECISION VISE	Max. opening	50mm												
MAX. HEIGHT OF SPECIMEN		95mm												
MAX. DEPTH OF SPECIMEN		115mm												
TEST PARAMETER		—			HV/HK			HV / HK / HBS / HBW / Kc						
FRACTURE TOUGHNESS TEST (Kc)		—			—			Conform to JIS R1607 / IF Method						
HARDNESS CONVERSION		—			—			Conform to SAE (J-417b) & ASTM (E-140)						
OPERATION PANEL		START/ LIGHT UP-DOWN/ TURRET ROTATION (For Auto-Turret Type)			START/ RESET/ DWELL TIME/ LIGHT UP-DOWN/ TURRET ROTATION (For Auto-Turret Type)			START / RESET/DWELL TIME / LIGHT UP-DOWN / TEST LOAD / CONVERSION SCALE / TURRET ROTATION (For Auto-Turret Type)/ CLEAR						
DATA DISPLAY		POWER / LOADING (Pilot Lamp)			D1/ D2 /HV-HK/ HARDNESS VALUE / LOADING / OK-NG CRITERIA			D1 / D2 / HV-HK / HARDNESS VALUE / CONVERSION DATA / OK-NG CRITERIA / START(Blinking for Loading) / TEST TIMES / etc.						
DATA OUTPUT & PRINT OUT		—			RS232C : (HV-HK/ HARDNESS VALUE/ OK-NG) USB : (D1/ D2 / HV-HK / HARDNESS VALUE / TEST LOAD/ OK-NG)			RS232C / USB (D1/D2/HV-HK/ HARDNESS VALUE / TEST LOAD / OK-NG / CONVERSION SCALE / CONVERSION DATA / STATISTIC DATA / etc.)						
OK / NG CRITERIA		—			Limit setting and HI/OK/LO display									
SELF DIAGNOSIS		—			Display troubles with motors and switches									
LIGHT SOURCE		LED												
OPTICAL FUNCTION		Aperture diaphragm/ Field aperture / Color filter : Replaceable												
ACCURACY		Conform to JIS B-7734/B-7725, ASTM E-384, and ISO 6507-2												
PHOTOGRAPHIC DEVICE		Capable to mount at anytime on top of the machine (Camera/ Attachment : Option)												
DIMENSIONS		W186 x D450 x H504mm												
WEIGHT		Approx. 40 kg (Including Standard Accessories)												
POWER SUPPLY		Japan : Single phase AC 100V 50/ 60Hz Overseas : Single phase AC100~240V 50/ 60Hz(Should be specified before shipment)												

# FM Series

## SYSTEM CHART

< OPTIONAL COMPONENTS >



# OPTIONAL ACCESSORIES

CODE No.	ITEM		DESCRIPTION
M - 0 1 4	KNOOP INDENTER ⑤		Rhombic diamond indenter for Knoop hardness
M - 0 6 3	BRINELL TEST	TUNGSTEN CARBIDE BALL INDENTER ⑥	φ 1mm
M - 0 3 9	HARDNESS CALCULATION TABLE	FOR HV	5gf - 50kgf (This is standard accessory for FM-100/FM-100e)
M - 0 4 0		FOR HK	5gf - 50kgf
M - 0 1 6	OBJECT LENS ③		×40
M - 0 1 7			×20
M - 0 1 9			×5
M - 0 6 2	EYEPIECE ④		×15
M - 0 2 2	COLOR FILTER ⑳		φ 20mm: Yellow & Blue ( "Green" is standard accessory. )
M - 0 2 3	COLOR TEMPERATURE CONVERSION FILTER		For the color monitor measuring device
M - 0 2 4	APERTURE DIAPHRAGM		φ 1 ~ 6 mm each selectable (6 kinds)
M - 0 2 5	FIELD APERTURE		φ 1 ~ 7 mm each selectable (7 kinds)
M - 0 5 4	CAMERA MOUNTING TUBE ①		For adapting photographic camera & CMOS camera
M - 0 0 9	MONITOR MEASURING DEVICE ⑮		Color CMOS camera + 23" LCD + L-type attachment + Image saving function (with 4GB USB memory)
M - 0 0 3	AUTOMATIC READING SYSTEM (AR) <u>Automatically measures indentation</u> ⑰		<b>Indentation measurement is automated</b> Light-and-dark image processing protects this system against the influence of metals or damage. Automatic measurement can be done with high accurate repeatability exceeding any skilled technician. <b>System configuration</b> : 1.3M CMOS camera, camera attachment, personal computer, 23" LCD, connecting cable and exclusive control/data processing software. <b>Minimum unit</b> : 0.1 μm <b>Measurement scale</b> : HV, HK <b>Measurement method</b> : Shading image processing method <b>Repeat accuracy</b> : ±0.5% / HV500 500gf
M - 0 0 1	AUTOMATIC X-Y STAGE & CONTROL UNIT (ARS) <u>Automatically measures indentation</u> <u>Automate stage control</u> ⑱		<b>Indentation measurement is automated / Stage control is automated</b> Reduced reading errors by operators and greatly reduced work time. <b>System configuration</b> : .3M CMOS camera, camera attachment, automatic X-Y stage, control box, personal computer, 23" LCD, connecting cable and exclusive control/data processing software. <b>Minimum unit</b> : 0.1 μm <b>Measurement scale</b> : HV, HK <b>Measurement method</b> : Shading image processing method <b>Repeat accuracy</b> : ±0.5% / HV500 500gf <b>Stage dimensions</b> : 110mm×110mm <b>Stage movement</b> : X50mm×Y50mm
M - 2 0 6 A	AUTOMATIC MEASURING SYSTEM WITH AUTO-READ & STAGE & FOCUS (ARS-F) <u>Automatic focus, automatic indentation measurement, automatic stage</u> ⑲		<b>Fully automatic system</b> All processes of indentation formation, focus adjustment and indentation measurement after the sample setting are performed unattended. <b>System configuration</b> : 1.3M CMOS camera, camera attachment, automatic X-Y stage, control box, personal computer, 23" LCD, connecting cable, joystick controller, sample contact prevention safety mechanism, and exclusive control/data processing software. <b>Minimum unit</b> : 0.1 μm <b>Measurement scale</b> : HV, HK <b>Measurement method</b> : Shading image processing method <b>Repeat accuracy</b> : ±0.5% / HV500 500gf <b>Stage dimensions</b> : 110mm×110mm <b>Stage movement</b> : X50mm×Y50mm
M - 0 2 8	PRECISION VISE ⑦		Max. opening : 100mm
M - 0 2 9	ROTARY TABLE ⑧		Graduation of rotary angle : 5 degree      Table diameter : φ 128mm
M - 0 3 0	THIN SPECIMEN MEASURING DEVICE ⑨		Specimen thickness : 5mm max
M - 0 3 1	FINE SPECIMEN MEASURING DEVICE	VERTICAL TYPE ⑩	Specimen diameter : φ 5mm max      (For measuring the cross section)
M - 0 3 2		HORIZONTAL TYPE ⑪	Specimen diameter : φ 5mm max      (For measuring the cylindrical surface)
M - 0 3 3	SPECIMEN INCLINING DEVICE ⑫		Specimen height : 5 ~ 20mm      (For mounted specimen)
M - 0 3 4	UNIVERSAL INCLINING VISE ⑬		Inclining device + Vise    Max. opening : 45mm      (For mounted specimen)
M - 0 0 4	DIGITAL PRINTER	⑳	RS232C type or CENTRONICS type      (For Hardness Tester)
		㉑	Ink - jet type      (A4 size)
M - 0 4 3	VIBRATION INSULATION STAND ⑭		AVT-0405 (Air type) / RET-0405 (Rubber type)
M - 0 5 7	MECHANICAL PARTS FOR ADDITIONAL OBJECT LENS		Turret internal parts for installing the third and fourth object lenses. (Please specify them when ordering the product.) Only our factory can add them after shipment.
M - 0 6 5	DUAL INDENTER TURRET (For FM-810 Series) ㉒		Used when installing two HV/HK indenters at the same time. (Please specify it when ordering the product.)

# STANDARD ACCESSORIES

CODE NO.	ITEM	FM-110e	FM-110	FM-310e	FM-310	FM-810e	FM-810
M - 0 2 6	X - Y STAGE	1	1	1	1	1	1
M - 0 2 7	PRECISION VISE	1	1	1	1	1	1
M - 0 3 7	STANDARD TEST BLOCK (HV700)	1	1	1	1	1	1
M - 0 1 3	DIAMOND INDENTER	1	1	1	1	1	1
M - 0 4 1	MEASURING MICROSCOPE (WITH X10 EYEPIECE)	MECHANICAL TYPE	1	1	—	—	—
M - 0 4 2		ELECTRONIC TYPE	—	—	1	1	1
M - 0 6 1	OBJECT LENS (BUILT-IN)	X 50	1	1	1	1	1
M - 0 1 8		X 10	1	1	1	1	1
M - 0 5 2	LEVEL ADJUSTING LEG	4	4	4	4	4	4
M - 0 6 6	LEVEL	1	1	1	1	1	1
M - 0 5 3	INDENTER COVER (BUILT-IN)	1	1	1	1	1	1
M - 0 5 5	MACHINE COVER	1	1	1	1	1	1
M - 0 5 1	POWER CORD	1	1	1	1	1	1
	AUXILIARY TOOLS (SCREW DRIVER : + 1PC & - 1PC & L WRENCH : 4 PCS)	1	1	1	1	1	1
M - 0 3 9	HARDNESS CALCULATION TABLE	1	1	—	—	—	—
	FOR VICKERS	1	1	—	—	—	—
	HARDNESS CONVERSION TABLE	1	1	1	1	—	—
	INSTRUCTION & MAINTENANCE MANUAL	1	1	1	1	1	1
M - 0 5 6	ACCESSORY BOX	1	1	1	1	1	1



(FM-310)  
Digital Microhardness Tester



(FM-110)  
Analog Microhardness Tester



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<http://www.ft-hardness.com>

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