

wind energy plants material testing
 modal analysis structural health monitoring
 noise reduction vibration severity
 drop testing velocity frequency response
Vibration Sensors
 spectral analysis Signal Conditioners
 unbalance monitoring ship vibration Monitors
 shock testing end-of-line test Meters
 vibration exposure earthquake monitoring Calibrators
 noise vibration harshness (NVH)
 whole-body vibration order tracking analysis
 vibration immission passenger comfort
 machine condition monitoring seismic vibration emergency shutdown
 acceleration calibration crash test
 fatigue testing quality control
 building vibration ground-borne vibration
 head injury criterion (HIC)
balancing predictive maintenance
 pipeline vibration human vibration
 bearing monitoring displacement

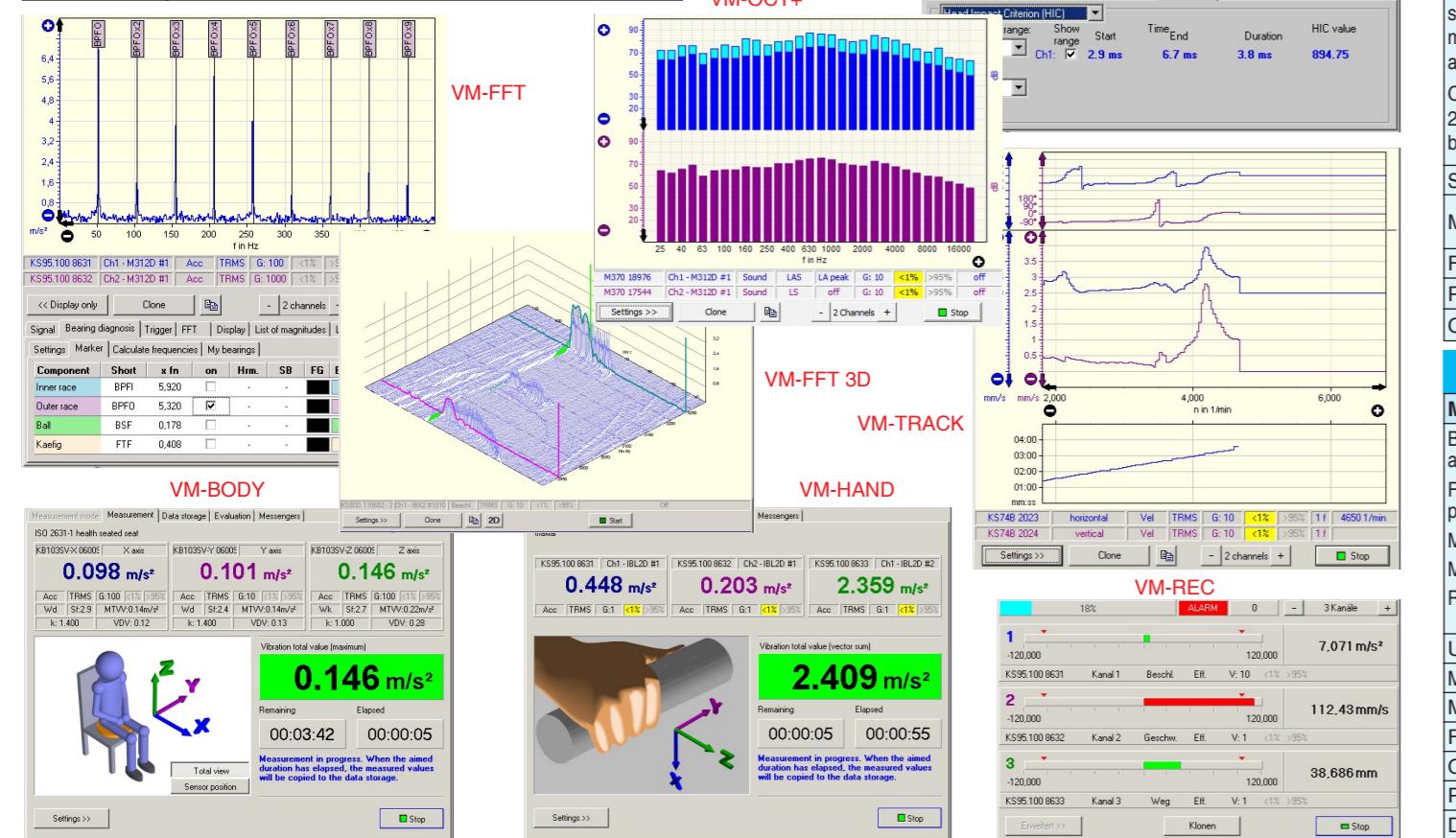
VibroMetra PC Vibration Measuring System

- Why choose VibroMetra?
- Designed for vibration measurement - No ballast by unwanted functionality
- VibroMetra is modular making it particularly economic with fewer channels
- Also supports IEPE compatible microphones, force and pressure transducers
- Off-line measurement: Save raw data in the background for later analysis
- Compact hardware making VibroMetra particularly suited for mobile use
- Simple plug & play installation
- Short training time. Start first measurement within a few minutes
- Data export in common graphics, text and binary formats
- Free updates

Hardware: M312B
IEPE / USB Interfaces 2 IEPE, 1 digital trigger
 0.1 to 40,000 Hz

Available Software Modules:

- VM-BAL(+/-)**
 - Balancing of long and disk-shaped rotors, one or two planes
 - User guidance by clear text instructions
 - Up to six correction methods
 - Report function
 - Compact and handy VM-BAL Kit
- VM-SCOPE(+)**
 - Displays short vibration events, e.g. for drop testing
 - Memory for 10 second post and 1 second pre trigger
 - Acceleration (VM-SCOPE+ also velocity, displacement)
- VM-PLOT(+)**
 - Long-term recording for slow changing vibration events
 - Zoom and scroll functions for time graph
 - Acceleration (VM-PLOT+ also velocity, displacement)
- VM-FFT(+)**
 - FFT analyzer with 5 window functions, high frequency resolution
 - RMS and peak spectrum
 - Bearing analysis with bearing library in VM-FFT+
 - Power density spectrum in VM-FFT+
 - User-defined limits for alarms, e.g. for quality testing
 - Acceleration (VM-FFT+ also velocity, displacement)
- VM-FFT 3D(+)**
 - View of FFT change over time (3D)
 - Useful tool for run-up / coast-down analysis
 - VM-FFT 3D+: envelope, bearing and acoustic analysis
- VM-TRACK(+)**
 - Magnitude and phase as function of the rotary frequency
 - Quick detection of resonances
 - Acceleration (VM-TRACK+ also velocity, displacement)
- VM-REC(+)**
 - Real-time recording in binary or text format
 - Bar graph and numeric display
 - Pre and post triggering
 - Acceleration (VM-REC+ also velocity, displacement)
- VM-METER(+)**
 - RMS, peak value, instantaneous value
 - Vibration acceleration, velocity and displacement
 - VM-METER+: for phase, rpm, main frequency, acoustics
- VM-OCT+**
 - Third-octave band analyzer, VC/Nano criteria, sound level
- VM-STRUC(+)**
 - Building vibration monitoring, DIN 4150-3
- VM-HAND(+)**
 - Hand-Arm vibration measurement, ISO 5349, ISO 8041-1
- VM-BODY(+)**
 - Whole-Body vibration measurement, ISO 2631, ISO 8041-1



Vibration Analyzers and Meters

Vibration Analyzer VM100

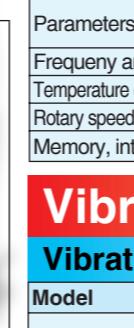
Model	VM100A	VM100B
Large touch screen		
Intuitive operation		
NFC detection for Measuring point		
Inputs	9 IEPE; 1 tacho	3 IEPE; 1 tacho
Measuring modules	Included: FFT, plot of overall values (RMS, peak, crest) Optional: hand-arm / whole-body vibration, machine monitoring, envelope analysis, run-up/coast-down test, balancing, third-octave analysis (VC/Nano)	
Frequency range	0.4 Hz - 24 kHz; various high/low pass filters	
Data storage/transfer	SD card, USB interface, CSV	

Vibration Meters

Model	VM22	VM23	VM24	VM25
VMID Measuring Points provide reliable magnetic coupling, identify the measuring point and set the instrument automatically				
Main frequency display				
With FFT				
Accelereration	-	-	0.1 - 240 m/s ² 0.2 - 10,000 Hz 3 - 1000 Hz 1000 - 10,000 Hz	0.1 - 240 m/s ² 0.2 - 10,000 Hz 3 - 1000 Hz 1000 - 10,000 Hz
Velocity	0.1 - 1000 mm/s 10 - 1000 Hz (ISO 10816)	0.1 - 1000 mm/s 2 - 100 Hz 10-1000 Hz	0.1 - 1000 mm/s 10 - 1000 Hz (ISO 10816)	0.1 - 1000 mm/s 2 - 300 Hz 10 - 1000 Hz
Displacement	-	0.01 - 60 mm 3 - 60 / 200 Hz	0.01 - 60 mm 2 - 300 Hz	0.01 - 60 mm 2 - 300 Hz
Parameters	true RMS	true RMS, peak - peak	true RMS, peak, crest, K(t)	true RMS, peak, crest, K(t)
Frequency analysis	-	512 lines (no graphics)	-	127 lines FFT
Temperature (infrared)	-	-	-	-40 - 125 °C
Rotary speed (optical)	-	-	-	1 - 9999 rpm
Memory, interface	16,000 values/USB	16,000 values/USB	16,000 values/USB	16,000 values/USB

Human Vibration and Universal Meter VM31

Inputs	4 IEPE channels
Measuring modes	Hand-Arm vibration Whole-body vibration Acceleration Velocity Displacement
Display modes	RMS, Maximum RMS (MTV) Peak value, maximum peak value Total Vibration Value (a_{av}) Vibration dose value (VDV) Crest factor
Band filters	0.1 - 2000 Hz (acc.) 1 - 1000 Hz (acc.) 2 - 300 Hz (vel.) 10 - 1000 Hz (vel.) 5 - 250 Hz (displacement)
Weighting filters	Hand-Arm: Wh, Whole-Body: Wb, Wc, Wd, Wj, Wk, Wm to ISO 8041 PC data transfer



Size: 120 mm x 65 mm x 25 mm
 Power supply: 3 AAA cells or USB
 Available in the following kits:
 VM31-WB (Whole-Body Kit)
 VM31-HA (Hand-Arm Kit)
 VM31-HAWB (H/A and W/B Kit)
 VM31-M (Machine Vibration Kit)

Vibration Monitoring

Vibration Monitors

Model	M12	M14
M12 provides common analog signals: AC, DC, RMS, peak, 4-20 mA, relay		
Available in the following kits: VM31-WB (Whole-Body Kit) VM31-HA (Hand-Arm Kit) VM31-HAWB (H/A and W/B Kit) VM31-M (Machine Vibration Kit)		
Weighting filters		
PC data transfer		

RMS/peak or FFT monitoring

Vibr. acceleration	10 / 50 / 250 m/s ²	1000 m/s ²
Vibration velocity	10 / 50 / 250 mm/s	1000 mm/s
Vibr. displacement	100 / 500 / 2500 μm	
High pass filters	FB3 plug-in modules; 2 to 1000 Hz	5/10/20/50/100/200/500/1000 Hz
Low pass filters	FB2 plug-in modules; 0.1 to 50 kHz	0.1/0.2/0.5/1/k/2/k/10kHz
Monitoring modes	true RMS or true peak-peak	true RMS or true peak FFT (500 lines, 10 limits)
Analog and digital interfaces	DC (RMS and pk-pk); AC wide-band; AC filtered; DC 4-20 mA; USB; RS-485	AC wide-band; DC 4-20 mA; USB; RS-485
Relay output	1 relay: 40 VAC/2 A	2 relays: 60 VAC/0.5 A
Sensor input	IEPE	IEPE
Level indication	LED bar graph	LED bar graph; bi-color
PC interface	USB for transfer of stored data	12 to 28 VDC
Cellular functions	SMS; sensor data platforms ThingSpeak and AskSensors	Dimensions
		22 x 76 x 111 mm ³
		13 x 100 x 114 mm ³

Building Vibration Monitor VM40C

Includes triaxial piezoelectric sensor, signal conditioning, monitoring, recording and battery
Optional accessories: 2G/4G modem, radio beacon light, printer
DIN 4150-3; BS 7385; SN 640312a
Acceleration: 0.01 - 15 m/s ² ; Velocity: 0.1 - 2400 mm/s at 1 Hz; 0.1 - 30 mm/s at 80 Hz
Supported standards



Vibration Switches • Digital Vibration Sensor

Model	NEW VS10	NEW VS11	NEW VS12
Built-in piezoelectric accelerometer			
Filters and ranges programmable via USB			
MOS relay 60 V / 0.5 A			
M8 mounting stud			
Robust cases with IP67			
USB Measurement			
Monitoring functions	RMS/Peak value	RMS/Peak value or 10 selectable FFT limits	
Measuring ranges	acceleration: 0.1 - 1000 m/s ² ; velocity: frequency dependent		
Frequency ranges	HP: 0.1/2/5/10/20/50/100/200/500/1000 Hz; LP: 0.1/0.2/0.5/1/2/5/10 kHz		
Connections	Screw terminals for relay and supply, Micro USB socket inside	8-pin socket for USB/relay	
Power supply	USB or 5 to 30 VDC		
Dimensions (Ø x h)	50 mm x 52 mm	50 mm x 52 mm	50 mm x 36 mm

Plug-In Filter Modules for M12, M33 and M208

The plug-in filter modules FB2 (low pass) and FB3 (high pass) are available with the following 3 dB cut-off frequencies:

FB2:	0.1 / 0.3 / 0.5 / 1.0 / 3.0 / 5.0 / 10 / 30 / 50 kHz
	Butterworth, 4th order low pass
FB3:	2 / 3 / 5 / 10 / 30 / 50 / 100 / 300 / 500 / 1000 Hz
	Butterworth, 2nd order high pass
FBV/FBD:	Single / double integrator modules (M33 / M208)

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Vibration Transducers

General Purpose Shear Accelerometers

Model	KS76C10	KS76C100	KS77C10	KS77C100	KS56	KS57
Output	IEPE	IEPE	IEPE	IEPE	Charge	Charge
Range	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$	$\pm 4000 \text{ g}$	$\pm 4000 \text{ g}$
Sensitivity	10 mV/g	100 mV/g	10 mV/g	100 mV/g	18 pC/g	18 pC/g
$f_{\min} \text{ (3 dB)}$	0.12 Hz	0.13 Hz	0.12 Hz	0.13 Hz	0.1 Hz	0.1 Hz
$f_{\max} \text{ (3 dB)}$	33 kHz	24 kHz	33 kHz	24 kHz	17 kHz	17 kHz
Connector	UNF 10-32	UNF 10-32	UNF 10-32	UNF 10-32	UNF 10-32	UNF 10-32
Weight	20 gr.	23 gr.	20 gr.	23 gr.	23 gr.	23 gr.
Height	17 mm	17 mm	17 mm	17 mm	17 mm	17 mm
Base	17 mm hex.	17 mm hex.	17 mm hex.	17 mm hex.	17 mm hex.	17 mm hex.

Low Cost Accelerometers

Model	KS78C10	KS78C100	KD37	KD41
Output	IEPE+TEDS	IEPE+TEDS	Charge	Charge
Range	$\pm 500 \text{ g}$	$\pm 60 \text{ g}$	$\pm 1000 \text{ g}$	$\pm 300 \text{ g}$
Sensitivity	10 mV/g	100 mV/g	60 pC/g	200 pC/g
$f_{\min} \text{ (3 dB)}$	0.65 Hz	0.2 Hz	0.1 Hz	0.1 Hz
$f_{\max} \text{ (3 dB)}$	23 kHz	22 kHz	15 kHz	11 kHz
Connector	UNF 10-32	UNF 10-32	UNF 10-32	UNF 10-32
Weight	10.2 gr.	11.2 gr.	45 gr.	60 gr.
Height	15.5 mm	15.5 mm	24 mm	29 mm
Size (mm)	11 x 10 Ø	12 x 10 Ø	12 x 10 Ø	12 x 10 Ø
Base	12 mm hex.	12 mm hex.	17 mm hex.	19 mm hex.

Miniature and Modal Analysis Accelerometers

Model	KS91C	KS94C10	KS94C100	KS94L	KS9C10	KS95C100	KS93	KS96B10	KS96B100	KS97B10	KS97B100	KS98B10	KS98B100
Output	IEPE	IEPE	IEPE	L.P. IEPE	IEPE	IEPE	IEPE	IEPE+TEDS	IEPE+TEDS	IEPE+TEDS	IEPE+TEDS	IEPE+TEDS	IEPE+TEDS
Range	$\pm 600 \text{ g}$	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$	$\pm 240 \text{ g}$	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$	$\pm 6000 \text{ g}$	$\pm 500 \text{ g}$	$\pm 60 \text{ g}$	$\pm 500 \text{ g}$	$\pm 60 \text{ g}$	$\pm 500 \text{ g}$	$\pm 60 \text{ g}$
Sensitivity	10 mV/g	10 mV/g	100 mV/g	14 mV/g	10 mV/g	100 mV/g	5 pC/g	10 mV/g	100 mV/g	10 mV/g	100 mV/g	10 mV/g	100 mV/g
$f_{\min} \text{ (3 dB)}$	0.3 Hz	0.2 Hz	0.5 Hz	0.3 Hz	0.2 Hz	0.5 Hz	0.1 Hz	0.2 Hz	0.15 Hz	0.2 Hz	0.15 Hz	0.2 Hz	0.15
$f_{\max} \text{ (3 dB)}$	37 kHz	36 kHz	28 kHz	22 kHz	36 kHz	28 kHz	22 kHz	18 kHz	13 kHz	18 kHz	13 kHz	16 kHz	11 kHz
Connector	Submin. M3	Submin. M3	Submin. M3	Submin. M3	Submin. M3	Submin. M3	Submin. M3	UNF 10-32	UNF 10-32	UNF 10-32	UNF 10-32	UNF 10-32	UNF 10-32
Weight	1.3 gr.	2.4 gr.	3.2 gr.	3.2 gr.	2.4 gr.	3.2 gr.	2.7 gr.	2.4 gr.	3.2 gr.	3.2 gr.	3.0 gr.	3.8 gr.	
Height	6.7 mm	10 mm	10 mm	10 mm	9.5 mm	9.5 mm	7.5 mm	9 mm	9 mm	9 mm	10 mm	10 mm	
Base	8.2 mm Ø	10.5 mm Ø	10.5 mm Ø	10.5 mm Ø	10.6 mm Ø	10.6 mm Ø	10.6 mm Ø	9 x 9 mm	9 x 9 mm	9 x 9 mm	10 x 10 mm	10 x 10 mm	

Triaxial Accelerometers

Model	KS903B10	KS903B100	KS943B10	KS943B100	KS943L	KS963B10	KS963B100	KS813B	KS823B
Output	IEPE+TEDS	IEPE+TEDS	IEPE	IEPE	L. P. IEPE	IEPE+TEDS	IEPE+TEDS	IEPE	IEPE
Range	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$	$\pm 240 \text{ g}$	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$	$\pm 55 \text{ g}$	$\pm 12 \text{ g}$
Sensitivity	10 mV/g	100 mV/g	10 mV/g	100 mV/g	14 mV/g	10 mV/g	100 mV/g	100 mV/g	500 mV/g
$f_{\min} \text{ (3 dB)}$	0.1 Hz	0.1 Hz	0.2 Hz	0.5 Hz	0.3 Hz	0.2 Hz	0.15 Hz	0.2 Hz	0.07 Hz
$f_{\max} \text{ (3 dB)}$	20 kHz	10 kHz	22 kHz	22 kHz	19 kHz	18 kHz	10 kHz	10 kHz	6 kHz
Connector	1/4"-28 UNF	1/4"-28 UNF	Binder 707	Binder 707	Binder 707	1/4"-28 UNF	1/4"-28 UNF	Binder 718	Binder 718
Weight	6.5 gr.	9 gr.	14 gr.	16 gr.	16 gr.	8.5 gr.	11 gr.	115 gr.	365 gr.
Height	14 mm	14 mm	11 mm	11 mm	11 mm	8.6 mm	8.6 mm	33 mm	58 mm
Base	14 x 14 mm	14 x 14 mm	22 x 20 mm	22 x 20 mm	22 x 20 mm	19.2 x 19.2	19.2 x 19.2	30 mm Ø	54 mm Ø

Industrial Accelerometers

Model	KST74C10	KST74C100	KS84.100
Output	IEPE	IEPE	IP67 insulated
Range	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$	$\pm 20 \text{ g}$
Sensitivity	10 mV/g	100 mV/g	100 mV/g
$f_{\min} \text{ (3 dB)}$	0.12 Hz	0.13 Hz	0.12 Hz
$f_{\max} \text{ (3 dB)}$	33 kHz	24 kHz	24 kHz
Connector	UNF 10-32	UNF 10-32	UNF 10-32
Weight	20 gr.	23 gr.	23 gr.
Height	17 mm	17 mm	33 mm
Base	17 mm hex.	17 mm hex.	22 mm hex.

Probe Accelerometer

Model	KST94C-4N	KST94C-9N
With movable tip for automated vibration testing in production lines		
5.5 mm stroke		
	IP67	IP62
Output	IEPE	IEPE
Range	$\pm 600 \text{ g}$	$\pm 60 \text{ g}$
Sensitivity	100 mV/g	100 mV/g
$f_{\min} \text{ (3 dB)}$	0.12 Hz	0.13 Hz
$f_{\max} \text{ (3 dB)}$	21 kHz	16 kHz
Connector	UNF 10-32	TNC
Length	60 mm	60 mm
Diameter	25 mm	25 mm

About Metra

- Metra was founded by Richard Weber in 1954 in Radebeul near Dresden (Germany).
- In the late fifties Metra began to produce piezoelectric sensors.
- In sixties and seventies Metra developed a broad range of vibration sensors and instruments.
- Metra made its own piezoceramic materials.
- Comprehensive research activities in the field of piezoelectric sensor design.
- In 1970 the first shear-type accelerometer were developed.
- In the eighties Metra grew to one of the largest manufacturers of accelerometers in Europe.
- Today Metra is an internationally established manufacturer of vibration measuring equipment.
- The family business is in the third generation of management.

Highest Quality Standards

- Our sensors and instruments are calibrated traceable to a PTB reference standard.
- Carefully selected piezo materials and artificial aging guarantee long-term stability.
- The standard warranty period is 2 years.