

PA201

SMART Sound/Vibration Analyzer



www.svdigital.com
www.digitalsv.com
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SV Corporation

Industrial PDA

SPEC

Industrial PDA Specification



ITEM	DAQ SPEC
A/D Converter	24 Bit
Input Channel	1 - 4 Channel, Tacho
Sensor Type	IEPE, AC, RPM, IR Temperature Sensor
Sampling Frequency	32,768Hz or 51,200Hz
Input Range	±5V(peak) or ±2.5V(peak)
Dynamic Range	17 - 134dB (50mV/Pa x 10Gain) 37 - 160dB (50mV/g x 10Gain)
Input Signal Gain	2, 4, 8, 16, 32, 64
SNR	100dB More
Frequency Range	0.5 - 16kHz(3dB) or 0.5 - 20kHz(3dB)
Temperature	-10°C to +50°C

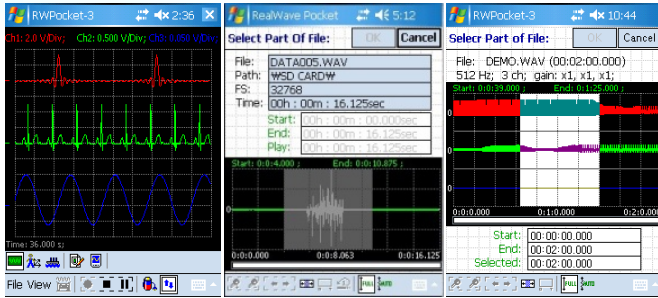
SYSTEM SPEC	
Operating System	WinCE 5.0
CPU	PXA320 (806MHz)
LCD	3.5" 240 * 320 TFT-LCD + TSP
MEMORY	
Flash	NAND 128MB
System Memory	DDR SDRAM 128MB
AUDIO, SLOT & PORT	
Audio Codec	AC'97 Codec
Speaker Amp.	1W
External Memory Slot	SD/MMC Slot
USB	1 Host, 1 Device
INPUT/OUTPUT DEVICES	
I/O	Head-Phone, Speaker, LED, Power etc.
Key	Power, Reset, Menu, Navi etc.
GENERAL COMMUNICATION	
Communication	Serial, Wifi
POWER	
Battery	Lithium Polymer 4000mAh (Removable)
Battery Charger	Built-in battery charger
Power	5V, 3A
ENVIRONMENT	
International Protection	IP64
Operating Temperature	-10°C to +50°C (+14°F to +122°F)
Storage Temperature	-30°C to +70°C (-22°F to +158°F)
Humidity	5% - 95% Non-condensing
MORE OPTION	
Option	3M CMOS Camera, 1D Bar-code Scanner, IR Temp Sensor, Laser Tacho

Measurement & Analysis Software (Common)

Basic Features / VLM / SLM

Basic Features

- ◆ IEPE Microphone, IEPE Accelerometer Connection
- ◆ Time Signal Recording, Playback Function(Wave File)
- ◆ Real-time Hearing in Measuring Mode(Head Phone Option)
- ◆ Sensor Calibration : Sensitivity Calibration by S/W
- ◆ Input Signal Gain : 2, 4, 8, 16, 32, 64 Times Selectable
- ◆ Auto Scale(Y-axis) and Peak Detection
- ◆ Start Measuring Time Delay Function(pre-trigger)
- ◆ Recording Information Setup(Objective and Axis etc.)
- ◆ Measurement Configuration Saving, Loading and Recall from File
- ◆ FFT Data Recording and Comparative Analysis(ref File)
- ◆ Wave Replay and Select Part Function
- ◆ Data Export : Text, Excel, Matlab, BMP, JPEG
- ◆ Overload Detector and Alert



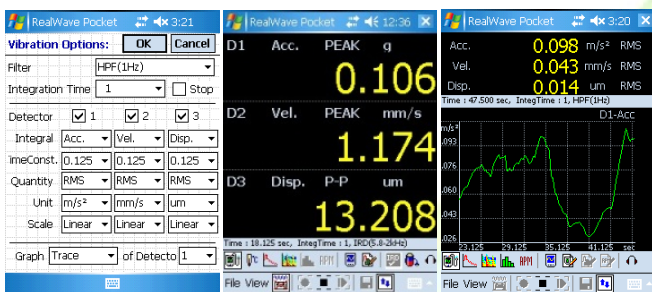
3-Ch Oscilloscope

Time Select Part (1.2-Ch)

Time Select Part (3-Ch)

Vibration Level Meter (VLM)

- ◆ Filter : High-pass Filter(1, 5, 10Hz, 100Hz-15kHz cutoff)
Band-pass Filter(0.5-300Hz, 2Hz-1kHz, 10-500Hz, 10Hz-1kHz cutoff – ISO 10816)
Butterworth Filter(1.6kHz, 200Hz, 100Hz cutoff)
- ◆ 3 Detectors : Acceleration, Velocity, Displacement
- ◆ Display : 3 Detectors shows synchronous display of Digital Value & Time Trace Graph
- ◆ Integration Time and Time Constant Control
- ◆ Value : RMS, Peak, Peak-to-Peak, Min, Max
- ◆ Unit : Acceleration m/s^2 , cm/s^2 , mm/s^2 , $\mu m/s^2$, g, dB
Velocity m/s , cm/s , mm/s , $\mu m/s$, dB
Displacement m , cm , mm , μm , dB
- ◆ Real Time Measurement Data and Wave File Recording and Playing
- ◆ Time Constant : 35ms, 0.125ms, 1sec etc.



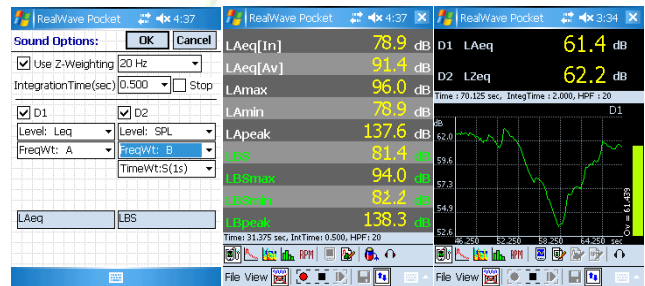
VLM Option Setup

VLM Measurement Mode (Acc., Vel., Disp.)

Vibration Value & Trace

Sound Level Meter (SLM)

- ◆ Standards : IEC61672-1 Class1, IEC60651 Type1
- ◆ Freq. Range : 0.5 - 16kHz or 0.5 - 20kHz
- ◆ High-pass Filter : 1Hz, 20Hz
- ◆ Freq. Weighting : A, B, C, Z
- ◆ Time Weighting : Fast, Slow, Impulse
- ◆ Integration Time : 0.125, 0.25, 0.5, 1, 2, 5, 10s
- ◆ Dynamic Range, Linearity : 120dB more
- ◆ Display Mode : Digital Value, Compare, Graph
- ◆ Detector : Selectable Synchronous 2 Detectors
- ◆ Measurement Value :
 - Sound Pressure Level(Lp) : LAsp, LAFp, LAIp, LBSp, LBFp, LBp, LCSp, LCFp, LCp, LZSp, LZp, LZIp
 - Equivalent Noise Level(Leq) : LAeq, LAeq(avg), LBeq, LBeq(avg), LCEq, LCEq(avg), LZe, LZe(avg)
 - Noise Exposure Level(Le) : LAe, LBe, LCe, LZe
 - Max, Min SPL : LASmax, LASmin, LAFmax, LAFmin, LAImax, LAImin, LBSmax, LBSmin, LBFmax, LBFmin, LBImax, LBImin, LCSmax, LCSmin, LCFmax, LCFmin, LCImax, LCImin, LZSmax, LZSmin, LZFmax, LZFmin, LZImax, LZImin, LAeqmax, LAeqmin, LBeqmax, LBeqmin, LCEqmax, LCEqmin, LZe, LZe, LZe, LZe
 - Statistical Noise Level(Ln : L1, L5, L10, L50, L90, L95, L99, User Define) : LASn, LAFn, LAIn, LBSn, LBFn, LBIn, LCSn, LCFn, LCIn, LZSn, LZFn, LZIn, LAeqn, LBeqn, Lceqn, LZe, LZe
 - Peak Noise Level(Lpeak) : LApeak, LBpeak, LCpeak, LZpeak



SLM Option Setup

SLM Mode (Leq, Lp, Synchronous)

Trace Graph



Measurement & Analysis Software (Common)

FFT / Octave / Hearing / PC Program

Frequency Analysis (FFT)

- ◆ Frequency : Selectable 100Hz - 16kHz
- ◆ Buffer Size : Selectable 256, 512, 1024, 2048, 4096 (Max. 2000 Lines)
- ◆ Window : Rectangular, Hanning, Flattop
- ◆ Average : Linear, Exponential, Peak
- ◆ Weight : A, B, C, D, E
- ◆ Auto Peak Detection Function & Y-axis Auto Scaling
- ◆ Harmonic Cursor
- ◆ Post Process : FFT Analysis after Variables Modification such as Band, Buffer Size, Window, Averaging, Weight Compensation

FFT-based Octave Analysis (OCT)

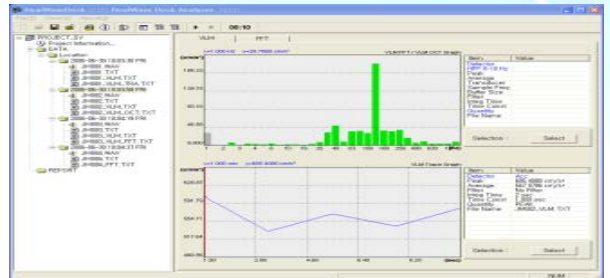
- ◆ Frequency : 16kHz
- ◆ Buffer Size : 4096
- ◆ Window : Rectangular, Hanning, Flattop
- ◆ Average : Linear, Exponential, Peak
- ◆ Weight : A, B, C, D, E
- ◆ Y-axis Auto Scaling
- ◆ Post Process : FFT Analysis after Variables Modification such as Band, Buffer Size, Window, Averaging, Weight Compensation

Digital Filter-based Octave Analysis (DOCT)

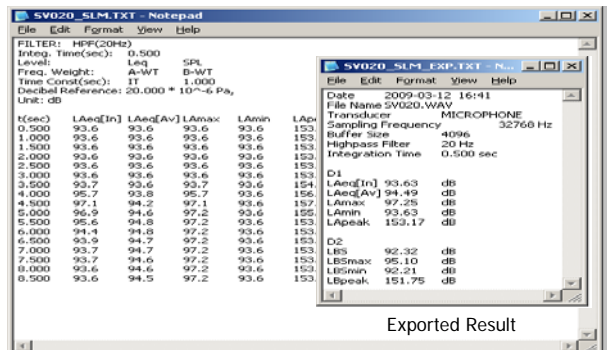
- ◆ Frequency : 16kHz
- ◆ Digital Filter Application According to IEC rule
- ◆ Nth Octave : 1/1, 1/3, 1/6 Octave

Desktop Software (Standard)

- ◆ Time Trace Data Display
- ◆ Octave Data Graph Display
- ◆ FFT Data Graph Display
- ◆ Text Data Display
- ◆ PC-based Replay (Wave File)
- ◆ Peak Value Auto Search at the Selected Area
- ◆ Data Administration & Report

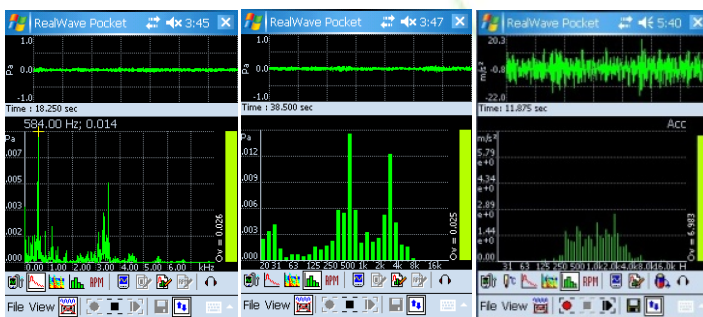


PC Program



Exported Result

SLM Result



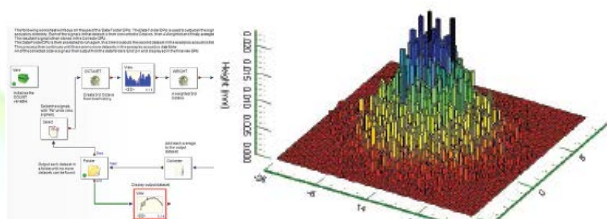
Time signal & FFT Spectrum

Time Signal & FFT-based 1/3 Octave

Time Signal & Digital Filter-based 1/6 Octave

Data Analysis Software (Option)

- ◆ Import Wav Data from PA201 in PC
- ◆ DATS-lite NVE Post Signal Processing
- ◆ Acoustic Weighting
- ◆ Arithmetic(Data & Data) / Calculus
- ◆ Acoustic & Vibration Analysis
- ◆ Human Biodynamics / Frequency Analysis
- ◆ Signal Generation & Manipulation



DATS-lite NVE Post Signal Processing Software

Hearing System

- ◆ Real-time Hearing in Realtime FFT, Spectrogram, FFT based Octave, Digital Filter based Octave, VLM and SLM Mode

1-Ch Portable Sound/Vibration Analyzer

General Sound & Vibration / Ship Vibration / Spectrogram / RPM

PA201-1CH

Main Features

- ◆ General Purpose Class 1 or 2 Sound Measurements to the latest International Standards
- ◆ Frequency Range : 0.5-16kHz(Default) / 0.5-20kHz(Option)
- ◆ Sampling Frequency : 32768Hz(Default) / 51200Hz(Option)
- ◆ Dynamic Range : >120dB
- ◆ High-pass Filter : 1Hz, 5Hz, 10Hz
- ◆ Ship Vibration Filter(ISO 6954 : 2000) Application
- ◆ Lp, Leq, Le, Lmax, Lmin, Ln, Lpeak Data Measure & Logging(Continuous 2 Month)
- ◆ Leq, Lp, Lpeak, LAeq, Lceq Simultaneous Logging in Octave Mode
- ◆ Long Time Recording (> Wave Recording 1hour x 10 times or > 64 days (Leq per 1s) or >30 days(1/3 Octave) at 4GB SD Memory)
- ◆ Data Transfer using SD Memory or USB
- ◆ Start/Stop Time Pre-setting, Average Time Pre-setting
- ◆ Measurement Start Using Internal Trigger
- ◆ Auto Wind Screen Detection & Compensation, Diffusion Area Compensation
- ◆ Back Erase Function : Erase 5 seconds long data after Temporary Measurement Stop

Software options

- ◆ Vibration Level Meter(VLM)
- ◆ Sound Level Meter(SLM)
- ◆ Ship Vibration Level Meter(SVLM)
- ◆ FFT Analysis(FFT)
- ◆ FFT-based Octave Analysis(OCT)
- ◆ Digital Filter-based Octave Analysis(DOCT)
- ◆ Spectrogram Analysis(SPEC)
- ◆ FFT-based RPM Meter(RPM)

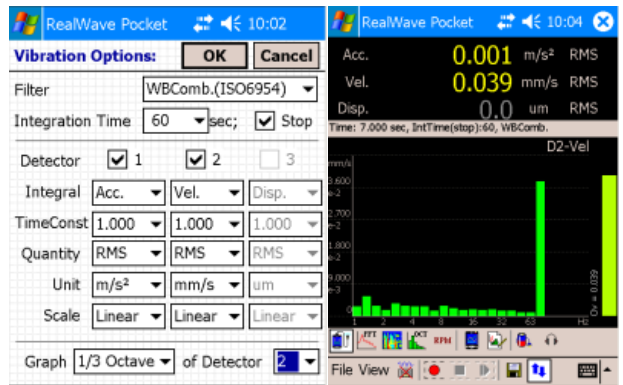
Spectrogram Analysis (SPEC)

- ◆ Frequency : Selectable 100Hz - 16kHz
- ◆ Buffer Size : Selectable 256, 512, 1024, 2048, 4096 (Max. 2000 Lines)
- ◆ Window : Rectangular, Hanning, Flattop
- ◆ Weight : A, B, C, D, E
- ◆ Display : Time(X)-Frequency(Y)-Amplitude(Z : Color-coded)



Ship Vibration Level Meter (SVLM) (ISO 6954:2000)

- ◆ All Function Support of General VLM
- ◆ Sampling Frequency : 2048Hz
- ◆ Ship Vibration Filter (ISO 6954(2000))
- ◆ Crest Factor
- ◆ FFT-based Octave Analysis Support(1/1, 1/3) :
 - 2048 Buffer Size, Hanning Window, 75% Overlap,
 - Exponential Average

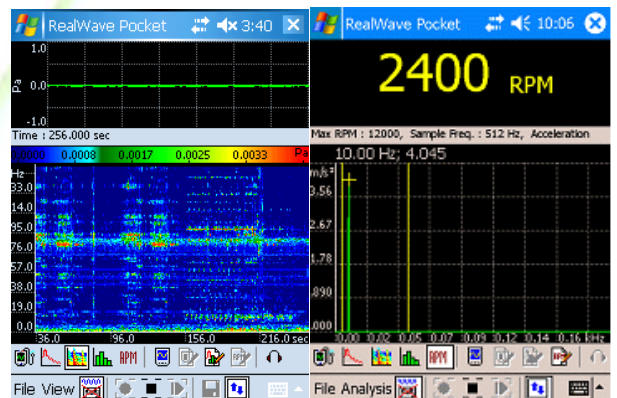


Ship Vibration Setup

Overall Value, 1/3 Octave

FFT-based RPM Meter (RPM)

- ◆ Input Sensor : Accelerometer
- ◆ RPM Calculation Method : Peak Detection of Frequency of 1st Order (manual)
- ◆ Max. RPM : 96000 RPM (4096Hz Sampling Freq.)
- ◆ 4096 Buffer Size, Hanning Window, Linear Average
- ◆ Picket Fence Error Correction



Time Signal & Spectrogram

FFT-based RPM Meter

2-Ch Portable Analyzer for CMS

VLM / FFT / SLM / RPM / IRD / Temp. / Spectrogram

PA201-2CH

Main Features

- ◆ IEPE Type Accelerometer, Microphone Signal Input
- ◆ Infrared Temperature Sensor Input(DC Voltage) Option
- ◆ Laser Type RPM Sensor Input Option
- ◆ Bar-code Scanner Option (Product information can be synchronized with measurement data)
- ◆ Mini Digital Camera Option (Measurement location & circumstance capture image can be synchronized with measurement data)
- ◆ Power Plant, Rotational Machine, Automotive, Electronics Diagnosis
- ◆ IRD 810 Filter, Human Vibration Filter(ISO 8041)
- ◆ Crest Factor Calculation
- ◆ Frequency Range : 0.5-16kHz
- ◆ Sampling Frequency : 32768Hz
- ◆ Dynamic Range : >100dB
- ◆ High Pass Filter : 1Hz, 10Hz

Software Options

- ◆ Vibration Level Meter(VLM)
- ◆ TTL-based RPM and FFT-based RPM Meter(RPM)
- ◆ IRD 810 Filter Built-in / ERP Support(Required Customizing)
- ◆ Temperature Display
- ◆ FFT Analysis(FFT)
- ◆ FFT-based Octave Analysis(OCT)
- ◆ Digital Filter-based Octave Analysis(DOCT)
- ◆ Spectrogram Analysis(SPEC)
- ◆ Sound Level Meter(SLM)
- ◆ Ship Vibration Level Meter(SVLM)

Vibration Level Meter(VLM)

- ◆ Sampling Frequency : 32768Hz
- ◆ Filter : IRD810 Emulation Filter 5.8-2kHz & 23-10kHz
 - High-pass Filter with 1Hz, 5Hz, 10Hz & 100-15kHz
 - Band-pass Filter with 0.5-200Hz, 1-1kHz, 10-500Hz & 10-1kHz
 - Butterworth Filter with 1.6kHz, 200Hz, 100Hz
 - Whole-body Combined Filter (ISO6954(2000))
- ◆ Time Data, Filtered FFT(<4096Hz) or Octave Data Simultaneous Measurement & Recording
- ◆ Features as 1-Ch VLM

RPM Meter(RPM)

- ◆ TTL-Based RPM Measurement using Laser Tachometer
- ◆ Measuring Distance : 0.05 - 2m
- ◆ Measuring Range : 10Hz - 16kHz (1,000,000rpm)
- ◆ Output : 0.1 - 5VDC
- ◆ Size : Ø22 x 50mm



- ◆ Temperature Range : -10 - +60°C
- ◆ Vibration & RPM Synchronous Display Option(customized)
- ◆ Basic FFT-Based RPM Measurement using Accelerometer

IRD 810 Filter Mode (ERP Support)

- ◆ Reinterpretation & Mathematical Modeling of the Analog Circuit of IRD810 Equipment
- ◆ Vibration Meter Emulation Mode using Digital Filter type Algorithm
- ◆ FFT Data Output Integration Process
- ◆ ERP Client Software Development Support

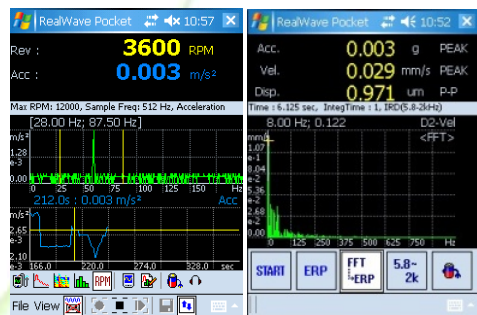
Temperature Measurement (TEMP)

- ◆ Temp. Display connecting with Infrared Thermometer
- ◆ Temp. Data Logging
- ◆ Direct Power Supply for Sensor
- ◆ Measurement Range : -70 to +380°C
- ◆ Operation Temp. : -40°C to 125°C without Cooling Device
- ◆ Temp. Resolution : 0.02 °C
- ◆ Accuracy : ± 0.5 °C to ± 4 °C



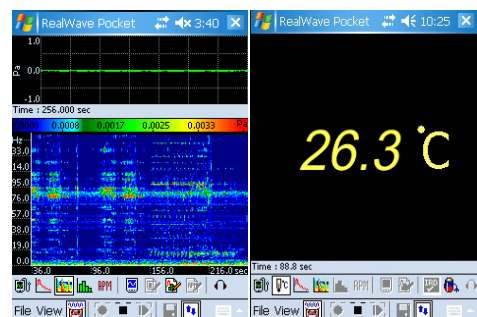
Spectrogram Analysis (SPEC)

- ◆ Frequency : Selectable 100Hz - 16kHz
- ◆ Buffer Size : Selectable 256, 512, 1024, 2048, 4096 (Max. 2000 Lines)
- ◆ Window : Rectangular, Hanning, Flattop
- ◆ Weight : A, B, C, D, E
- ◆ Display : Time(X)-Frequency(Y)-Amplitude(Z : Color-coded)



RPM & Vibration Measurement

IRD 810 Filter Mode (ERP Support)



Time Signal & Spectrogram

Temp. Measurement

3-Ch Vibration Analyzer

Human / Ship / Hand-Arm / General Vibration (ISO 10816)

PA201-3CH

Main Features

- ◆ Vibration Measurement According to International Vibration Regulations
- ◆ Human Vibration(ISO 8041), Ship Vibration(ISO 6954:2000) Measurement
- ◆ Hand-Arm Vibration(ISO 5349:2001) Measurement
- ◆ General Vibration(ISO 10816) Measurement
- ◆ Frequency Range : 0.5 - 80Hz(Vibration Acceleration & Velocity Level), 0.5 - 8kHz(Vibration Acceleration & Velocity , Displacement Level)
- ◆ Sampling Frequency : 512Hz or 8192Hz or 16384Hz
- ◆ Dynamic Range : >90dB
- ◆ Human Vibration Filter : Wb, Wc, Wd, We, Wf, Wj, Wk, Wm
- ◆ Ship Vibration Filter : Whole-body Combined(W.b. Combined)
- ◆ Hand-Arm Vibration Filter : Wh
- ◆ RMS, MTVV, MSDV, VDV, PEAK, P2P, cf Value Output / Each Channel
- ◆ RMS, Min, Max Value Output / Each Channel
- ◆ Digital Value, Trace, FFT, Octave Graph Display / Each Channel
- ◆ Different 5 types Display, Easy Display Change
- ◆ Overall Value Display Support
- ◆ Peak Value Auto Detection & Y-axis Auto Scaling
- ◆ X-axis(Frequency axis) Log-scale Display Support
- ◆ Long time Data Storage (with Max. 8GB SD Memory Card)
- ◆ Reporting(PC Software)
- ◆ Storage, Sensor & Analysis Information Confirmation Support
- ◆ Trace, Octave, FFT Graph Control of the Logged Data

Software Options

- ◆ Vibration Level Meter(VLM)
- ◆ Human, Ship Vibration Level Meter(HVLM, SVLM)
- ◆ Hand-Arm Vibration
- ◆ General Vibration Level Meter(8kHz/Channel)

Human Vibration Level Meter (HVLM)

- (ISO 8041, 2631-2)

- ◆ Sampling Frequency : 512Hz
- ◆ Whole Body Filter (ISO 2631-2, ISO 8041)
- ◆ Frequency weighted Acceleration or Velocity Value
 - Trace, FFT, FFT-based Octave(1/1, 1/3) Display
 - RMS, MTVV, MSDV, VDV, PEAK, P2P, cf Value Output / Each Channel
 - Max. 4096 Buffer Size, Hanning Window, 75% Overlap
 - Exponential Average, 3-axis combined value Display

Ship Vibration Level Meter (SVLM)

- (ISO 6954:2000)

- ◆ Sampling Frequency : 512Hz
- ◆ Ship Vibration Filter (ISO 6954(2000))
- ◆ Frequency weighted Acceleration or Velocity Value

- Trace, FFT, FFT-based Octave(1/1, 1/3) Display
- RMS, Min, Max value Output / Each Channel
- Max. 4096 buffer Size, Hanning Window
- Exponential Average
- ◆ Built-in Low Frequency VLM(<250Hz/Channel)

Hand-Arm Vibration – (ISO 5349:2001)

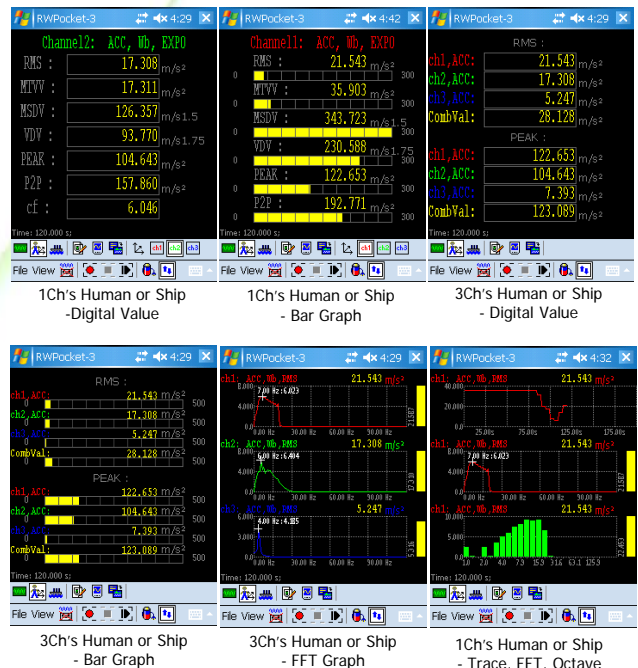
- ◆ Sampling Frequency : 16384Hz, 8192Hz
- ◆ Hand-Arm Vibration Filter (ISO 5349:2001)
- ◆ Frequency weighted Acceleration Value
 - Trace Display
 - RMS, Min, Max Value Output / Each Channel
 - Daily Vibration Exposure A(8)

General Vibration Level Meter (VLM)

- (ISO 10816)

- ◆ Sampling Frequency : 16384Hz, 8192Hz
- ◆ Filter : High-pass Filter(1, 2, 5, 10, 20Hz)
- ◆ 3 Detectors per channel : Acceleration, Velocity, Displacement Simultaneous Display
- ◆ Display Type : Digital Value, Time Trace, FFT, 1/1, 1/3 Octave Graph / Each Channel
- ◆ Integration Time Changing Option, Averaging Mode
- ◆ Measurement Value : RMS, Peak, Peak-to-Peak, Min, Max
- ◆ Unit : Acceleration m/s^2 , cm/s^2 , mm/s^2 , $\mu m/s^2$, g, dB
 - Velocity m/s , cm/s , mm/s , $\mu m/s$, dB
 - Displacement m , cm , mm , μm , dB
- ◆ Real Time Measurement Data and Wave File Recording and Playing

Various Display Option

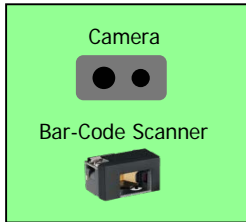
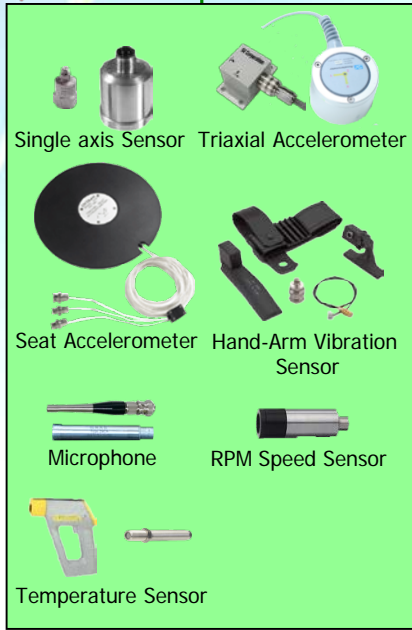


PA201 Smart Sound/Vibration Analyzer

System Configuration (Common)

SMART

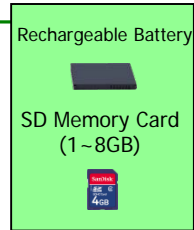
Sensor Input (from 1channel to 3channels)



Option



Accessories



Waterproof Case



Aluminum Case

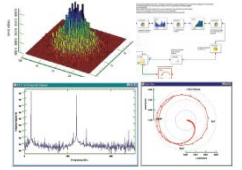


PC Software (RealWave Desk)

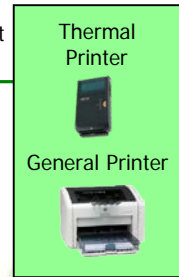


USB Connection

PC Software(Optional) (DATS-lite NVE)



Print I/F



Triaxial Low Freq. Accelerometer (MA301)

- ◆ MEMS Type, External Amplifier Needed
- ◆ Sensitivity : 2V/g
- ◆ Dynamic Range : ± 2g
- ◆ Frequency Range : 0 - 400Hz (Nominal, 3dB)
- ◆ Low Power Consumption (approx. 50mW)
- ◆ Operating Temperature : -40 - +85°C
- ◆ Power : 8 - 32V DC Power
- ◆ Output : ± 4V Differential Output or 0.5 - 4.5V Single Ended Output
- ◆ Low Impedance Output Regardless of Cable Length
- ◆ Max Mechanical Shock : 2000g (0.1ms)
- ◆ Output Noise, Differential (RMS, typical) : 13µg/Hz^{1/2}
- ◆ Rugged Anodized Aluminum Chassis



Amplifier for MEMS Sensor (MSPS)

- ◆ Input Channel : 3-Ch. MEMS Sensor Signal Input(Lemo Conn.)
- ◆ Input Range : ± 2g, 2V/g Sensitivity, 0 - 400Hz Range
- ◆ Output : 3 Ch., ± 5V (BNC)
- ◆ Differential Amplifier : 1.25 Gain
- ◆ 1g Offset Adjustment Function
- ◆ Power : DC 9 - 12V or 9V Battery
- ◆ Power Switch, Power LED Display(Low Battery Alert)



Company Specialized in Sound/Vibration

SV Corporation

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