

# 3 channel Vibration Meter Nor133

# 6 channel Vibration Analyser Nor136

# NorVibraTest PC application program Nor1038

## Nor133 and Nor136

### Features and applications

- Whole body vibration to ISO 2631, EN/2002/44/EC
- Hand Arm vibration to ISO 5349, EN/2002/44/EC
- Building Vibration measurement to DIN 4150, ISO 2631, BS6472
- Ship cabin vibration measurements to ISO 6954
- General machine vibration - data logger
- 6 channels (Nor136) in whole body mode
- Graphical and numerical display of all channels simultaneously
- Huge memory capacity with SD memory card
- Records the raw data signal for later analyzed in NorVibraTest
- Powerful post processing software NorVibraTest
- Complete range of accelerometers for HA and WB measurements
- Multi language
- Comment channel
- Supports, IEPE, Charge, AC and DC voltage sensors
- Data export to National Instrument DIAdem software



## Nor133 and Nor136

The Precision Vibration Meters Nor133 and Nor136 are designed in accordance with ISO 8041. In their basic versions, both meters are well suited for measurement of whole body and hand arm vibration measurements. Optional upgrades allow for the measurement and analysis of vibration in buildings, ships, vehicles and public transport systems in accordance to international and national standards. The units are also suitable for general machine vibration. User interface is simple and easy to use whilst the large backlit display and the small physical dimensions make the unit ideal for field use. The Nor133 and Nor136 have several unique features not found in similar vibration meters.

### Raw data recording (option 1)

Optionally, the Nor133 and Nor136 may record the vibration signal onto a SD memory card simultaneously with the measurement, for later and more sophisticated signal analysis in the PC program NorVibraTest. This option gives the opportunity to assess the same measurement at a later time with any desired weighting functions, e.g. if standards have changed or to new criteria. In other words, the measurement doesn't need to be repeated on a machine or vehicle if the standards change. Just analyse the old raw data again using the new weighting functions!

### 6 channel whole body assessment

Set to the whole body mode, the Nor136 may record and measure up to 6 vibration channels simultaneously. A comprehensive WB assessment should be carried out in a 6-channel mode, where 3 channels measure the WB vibration of the subject and the other 3 channels measure the vibration of the source. The correlation of these data can then be examined in the NorVibraTest program to determine the transfer function, of the driver's seat for example, so unknown influences or artefacts can be removed from the WB measurement.

### Synchronising more Nor133 / Nor136 or the Noise analyser Nor140

Another useful feature is the ability to synchronise a vibration measurement with a noise measurement made with the Nor140 Sound Analyser. Both measurements may be synchronized by the time information and may later be analysed with the NorVibraTest program to allow cause and effect relationships to be examined in more detail. In the same way two Nor133/136 may be synchronised.

### Enhanced overload detector

Although the units feature more than 95dB dynamic range, overload may occur. A special overload display shows the % of overload per channel. Thus, the user may validate to use the measured data if the overloaded part of the overall measurement time is small.

### Comment microphone

A build in microphone channel can record comments before or after a measurement. Just press the voice button and speak in your comments associated with the measurement. It may also record the noise during measurements. The upper frequency during a measurement is however limited and the information may therefore be limited.

### Options

The Nor133 and Nor136 may be extended with a selection of optional features, thereby allowing you to tailor the instrument to your specific requirements. Optional features may be ordered and installed at any time by just adding a new set of option codes.

#### Option 1: Raw data recording.

This option enables the storage of the measured unweighted raw data onto the SD card for more detailed examination of the measurement, such as removing artifacts or analyzing the data with other weighting functions.

#### Option 2: Extended standard support level 1.

In its basic version the instrument supports ISO 5349 and health risk assessments to ISO 2631-1 with the limits defined in EN/2002/44/EC. Adding option 2 will extend the possibility to do "comfort" and "motion sickness" measurements in accordance to ISO 2631-1, ISO 2631-2 and 4, ISO 6954, VDI2057 part 1,2&4, BS6472-1 : 2008, Austrian VOLV requirements, and the German LärmVibrationsArbSchV.

#### Option 3: Level versus time.

This option stores all the measured data every second. Mainly used for building vibration or other monitoring applications.

#### Option 4: DC and charge input.

This option enables the use of charge accelerometers and DC sensors.

#### Option 5: Extended standard support level 2.

Extended standard support level 2 adds support for DIN 4150-2, Building vibration. Impact on humans in buildings, and DIN 4150-3 Effects of vibration on structures. ISO 4866 and BS 7385-1.

#### Option 6: Data export to National Instruments DIAdem software.

NI DIAdem is software for managing, analyzing, and reporting data collected during data acquisition such as from Nor133/136 and/or generated during simulations. DIAdem is designed to meet the demands of today's testing environments, for which quick access to large volumes of scattered data, consistent reporting, and data visualization are required to make informed decisions. For more information about this software visit [www.ni.com/diadem/](http://www.ni.com/diadem/).



### Vibration sensors

Norsonic has a carefully selected range of single and triaxial sensors. All acceleration sensors are IEPE sensors. The main types are the 10mV/g triaxial seat-pad accelerometer Nor1286, The miniature 100mV/g triaxial accelerometer Nor1287. It has a weight of only 4 gram and are ideal for hand arm measurement with the hand arm adapter Nor7385. The general purpose triaxial accelerometer Nor1288 is suitable for several measurement applications within the field of human vibration. It has a sensitivity of 100mV/g.

### Nor1038 NorVibraTest

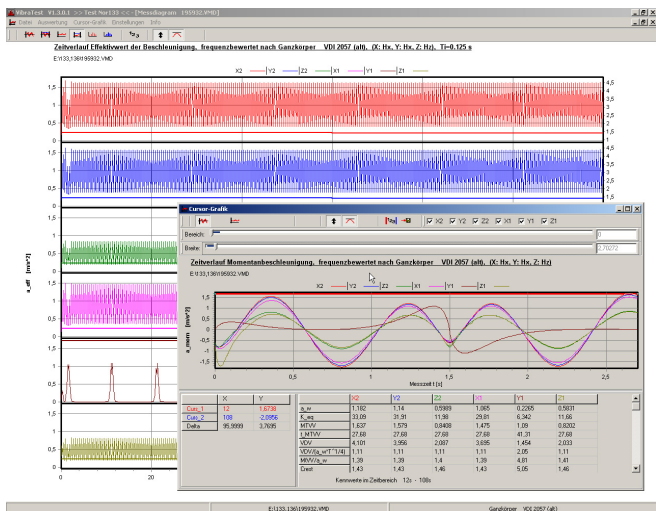
A powerful tool for post processing and creation of measurement reports based on captured raw data. The program is mainly made for assessment of human vibration measurements. The program handles up to 6 measured vibration channels. The program requires that the Nor133 or Nor136 is equipped with option 1, raw data recording.

The program recalculates the different indices based on the raw data signal according to the selected standard. The user can merge several measurements done at different workstations to obtain the total A(8) value.

### Features - Nor1038 NorVibraTest

- Project oriented system
- Calculation of all weighted features for multi-file measurements
- Re-calculation according to different standards eg. if the standard change.
- Displays e.g. weighted and un-weighted time signal, frequency spectrum, power density
- Additional weighting functions available
- Export of the vibration signals to ASCII
- Zoom
- Calculated values between cursors
- Correlation verification between channels
- Calculation of A(8) for multi-step cycles
- Report generator based on Microsoft® Word for generating user defined reports
- Multi language (German and English)

Delivered with the instrumentation is also a simple-to-use conversion program called NorVibConverter Nor1044. The .vcd or .vlt files from the 133/136 are then converted in a .txt file as shown. It is possible to calculate the A(8) according to the different standards applicable.



Kenwerte	05A28790.HHD	X2: Chan_1	Y2: Chan_2	Z2: Chan_3	X1: Chan_4	Y1: Chan_5	Z1: Chan_6
a_w	[m/s <sup>2</sup> ]	0.7764	0.549	3.361	1.268	0.8763	1.061
K_eq	[]	21.74	15.37	67.21	35.49	24.54	21.22
MTW	[m/s <sup>2</sup> ]	4.304	3.75	20.61	9.132	4.773	11.02
Zeitpunkt MTW	[s]	65.02	56.92	56.44	49.18	64.75	33.98
VDV	[m/s <sup>1.75</sup> ]	5.815	4.342	29.17	8.895	5.795	9.639
VDV/(a_w*T <sup>1/4</sup> )	[]	0.575	0.607	0.666	0.539	0.508	0.698
MTW/a_w	[]	5.54	6.83	6.13	7.2	5.45	10.4
Crest-Faktor	[]	9.19	14.2	13.2	9.1	8.14	18.8
tägliche Einwirkdauer	[min]	480					
A(8) (xyz-1)	[m/s <sup>2</sup> ]	1.775					
A(8) (xyz-2)	[m/s <sup>2</sup> ]	3.361					
Minderung (Z)	[%]	68.43					

Setup

Destination: C:\Program Files\Norsonic\NorVibraTest\

A(8) Norm: EN 2002-44EG a\_w

DE-VibArbSchw

AT-VOLV

EN 2002-44EG a\_w

EN 2002-44EG VDV

SE-AFS 2005:15

Nor133/136: Data Converter V1.3.1

File Setup

ISO2631

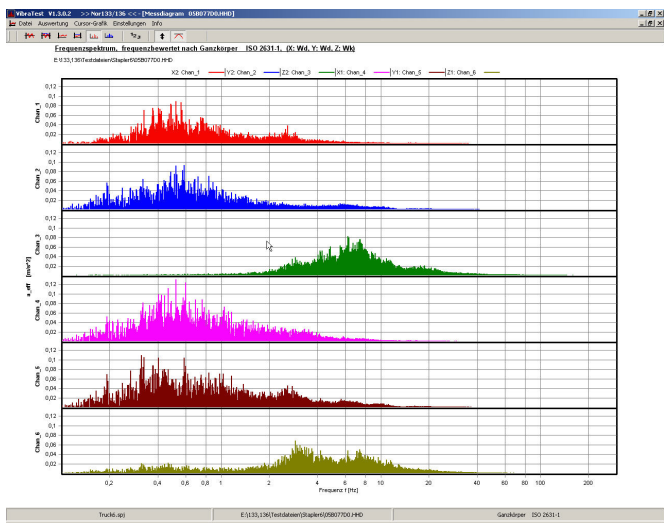
Health

Wd/Wd/Wk

Chan	Unit	a_w	MTW	VDV	Ovfl	Ovfl_%
X1	ms-2	0.004	0.230	0.000	0	0.0
Y1	ms-2	0.004	0.204	0.000	0	0.0
Z1	ms-2	0.002	0.129	0.000	0	0.0
X2	ms-2	0.003	0.191	0.000	0	0.0
Y2	ms-2	0.000	0.000	0.000	0	0.0
Z2	ms-2	0.000	0.000	0.000	0	0.0

SE-AFS 2005:15

Set	A(8)	t_expos	t_action	Max
XYZ-1	0.006	24:00	24:00	X
XYZ-2	0.005	24:00	24:00	X



## Technical Specifications

<b>Number of channels</b>	3 (Nor133)		6 (Nor136)	
<b>Input connector</b>	4-pin Lemo (00)		7-pin Lemo (1B)	
<b>Gain (Measure range)</b>	1 (Standard)	1/4 (Extend)	8	16
<b>ICP input voltage</b>	±3V	±12V	±0,38V	±0,19V
<b>Charge</b>	±1000pC	±4000pC	±125pC	±62,5pC
<b>Voltage AC</b>	±3V	±12V	±0,38V	±0,19V
<b>Voltage DC</b>	±3V	±12V	±0,38V	±0,19V

Please note: These are nominal values. The exact values are depending on the calibration of each independent meter

<b>Dynamic range</b>	> 95dB
<b>Frequency range</b>	Wholebody: -10%:0,6 – 65Hz, UDC 0 – 65Hz, 3dB 0,3 – 95Hz, UDC 0 – 95Hz Handarm: -10%:0,6 – 830Hz, UDC 0-830Hz -3dB0,3 – 1220Hz, UDC 0-1220Hz
<b>Physical units</b>	m/s <sup>2</sup> , mm/s, V <sub>rms</sub> , g (for sensor sensitivity)
<b>Measured parameters</b>	Nor133/136: aw(xyz), MTVV, VDV, VDV/(aw*T1/4), A(8), PPV NorVibraTest: Crest-factor, MTVV/aw, A(8), A(8)-vector, Damping, PPV
<b>Applicable standards</b>	- ISO 2631-1:1997, (whole body) - ISO 5349-1:2001, (hand arm) - 2002/44/EG - ISO 6954: 2001, (crew and passengers on ships) - DIN 4150-2 (1999-06) Structural vibration - Human exposure to vibration in buildings - BS6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings
<b>Option 1 Raw data recording</b>	Raw data recording onto SD card for later signal anlysis in the PC program NorVibraTest (software included in option 1)
<b>Option 2, Extended standard support package level 1</b>	- ISO 2631-1: Kinetose/Comfort - ISO 2631-2:2003, (vibrations in buildings) - ISO 2631-4:2001, (fixed-guide-way transport systems) - User defined (WB)
<b>Option 3</b>	Level vs time option
<b>Option 4</b>	Charge and DC input
<b>Option 5, Extended standard support package level 2</b>	- DIN 4150-3 (1999) Structural vibration - Effects of vibration on structures - ISO4866 - BS 7385-1
<b>Option 6</b>	Data export to National Instruments DIAdem software
<b>Data interface</b>	USB2.0 – full speed, RS232 up to 115200baud
<b>Memory</b>	8Mb internal memory Removable SD card, up to 8 GB
<b>Environmental specifications</b>	
<b>Temperature</b>	-10 bis + 50 C
<b>Humidity</b>	0 – 99% RH
<b>Battery</b>	4 St. AA
<b>External power</b>	11-18Vdc
<b>Display</b>	Large backlit display with 160x240 pixel resolution