



# USER'S GUIDE

## ADASH 4900 VIBRIO M

VIBRATION METER, ANALYZER  
AND DATA-COLLECTOR




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## Warnings

 Ignoring any of the recommendations mentioned below may cause failure of the instrument.


 Handling voltage higher than 24 V can cause an accident.

 Never plug this instrument into household voltage.

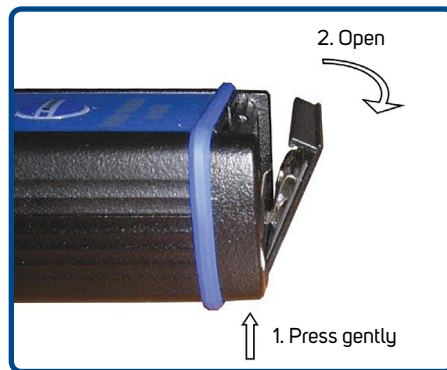
 **HEADPHONES WARNING !**  
Listen at moderate volumes to avoid ear damage. Remove the headphones from ears while moving the sensor or reconnecting the cable.

## Before Switching ON


### Inserting Batteries

 The batteries are accessible after opening a lid at the bottom of the instrument. Open the lid by pressing its lower edge (the edge with hinge) - see figure.

Do not ever use force! Proper polarity is shown in the picture.



Opening the lid

 **Do not forget to switch the instrument off before opening the battery lid!**  
**Never handle the batteries with the instrument switched on!**




Placement of batteries

## Connectors - Top Panel




## Switching ON and OFF


### Switching ON

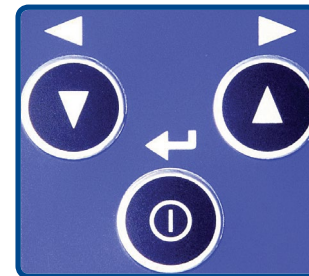
 Press the middle button ①.

### Switching OFF


 Press and hold the button ①.  
The POWER OFF screen appears.  
Release button and the instrument switches off.

### Power Save Mode


 When the user does not press any button for 15 minutes, the instrument goes to Power Save mode - the screen is darkened. When the user does not operate the instrument for another 15 minutes, the instrument switches off.





## Information Line

 An information line is displayed at the top of the screen during all measurement modes.



 - moving wave indicates measurement in progress,

 - the bar is displayed during measurement initialization,

 - headphone output volume bar,

 - battery status,

 - time.

# Measurement

## Sensor Mounting

Screw the magnetic base onto the sensor. Do not forget to remove the plastic cover and the metal washer (it closes the magnetic field to prolong the lifetime of the magnet) before measuring. Place the plastic cover and the metal washer back on the magnet after measuring.

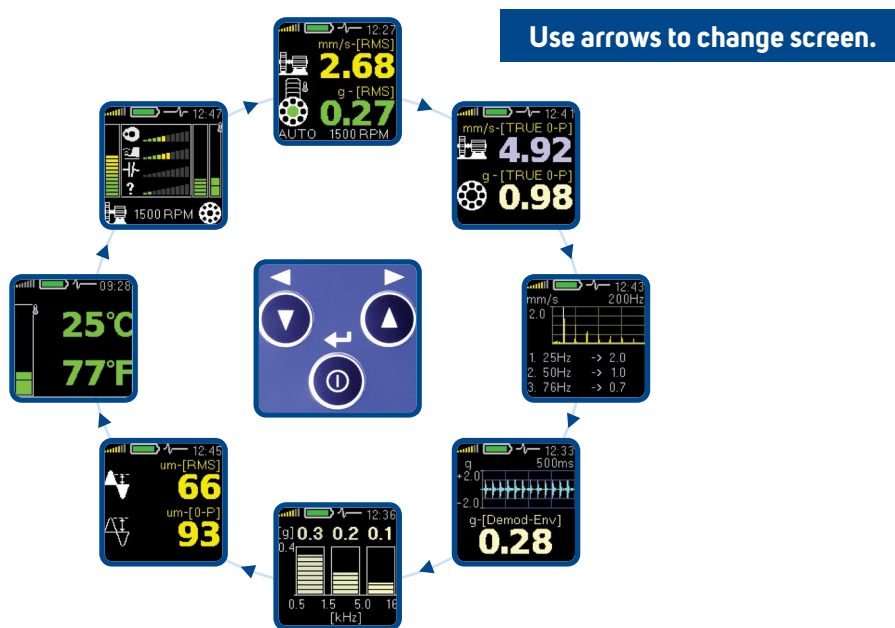
Place the magnet on a measuring point very carefully. The best way how to do is to rest the edge of the magnet on its side and then slowly attach the sensor to the measuring point. If you bring the magnet near to the machine with its whole area hitting the machine all of a sudden then the strong impact can irreversibly destroy the sensor.

If you use a measuring tip instead of a magnet, the measured values are not going to be stable. This is not surprising because the measured values depend considerably on the pressure of the tip at the measurement point. A magnet which attaches a sensor generates a constant pressure so the values are stable.

**Attention!!! Use the measuring tip only in hard to reach places where it is not possible to place the magnetic base.**

## Various Screens with Measurements - Use Arrow Buttons

The instrument offers many various vibration measurements. Every type of measurement uses its own screen. When you move between screens, then you will see all measurement results. Use the arrows for moving.



# Screens

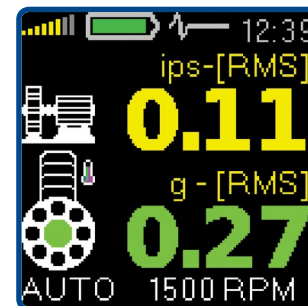
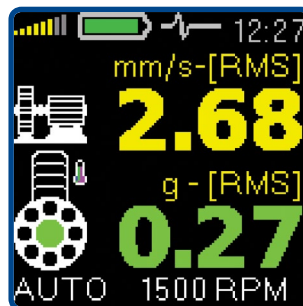
## Overall RMS Values

**i** Two RMS values appear on first screen.

The top value is velocity. When this value is high then you should expect machine failures like unbalance, misalignment or looseness.

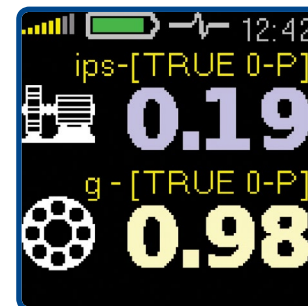
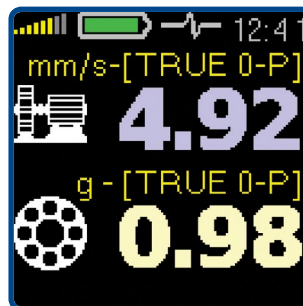
The bottom value is acceleration and it corresponds the rolling bearing defect.

The color of the displayed values (green, yellow or red) corresponds to the warning and alert limits.



## Overall PEAK Values

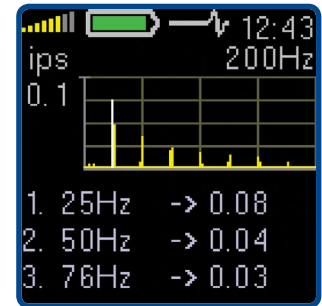
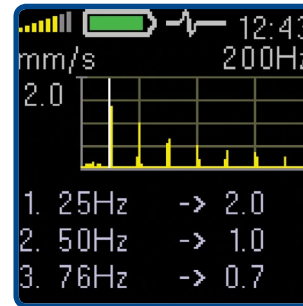
**i** The same measurement properties as for overall RMS are used. Only the results are displayed in TRUE O-P.





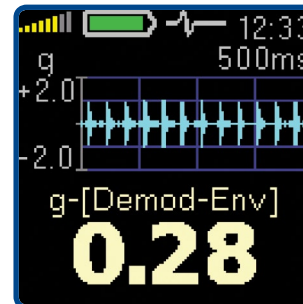
## Spectrum 200 Hz

- i** FFT spectrum of velocity in the 200 Hz range.  
The speed frequency line is displayed white (if it is known).  
Three top peaks are displayed in the list.



## Time Signal for Roller Bearing Diagnosis

- i** The acceleration time waveform filtered in 0.5 - 16 kHz band-pass. It means the speed frequency and harmonic frequencies of the speed are removed.  
The acceleration Demod -  $g_{ENV}$  RMS value is displayed on the bottom.



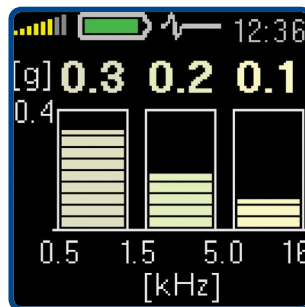
continue ►

# Screens

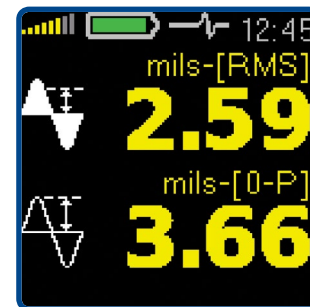
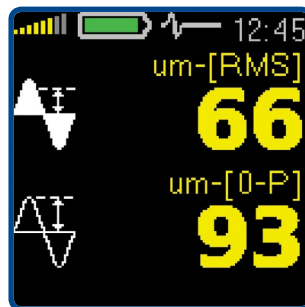
## Vibrations in Frequency Bands for Gearbox and Bearing



Measurement of RMS acceleration in three bands:  
0.5 kHz - 1.5 kHz, 1.5 kHz - 5 kHz, 5 kHz - 16 kHz.



## Overall Displacement RMS and O-Peak

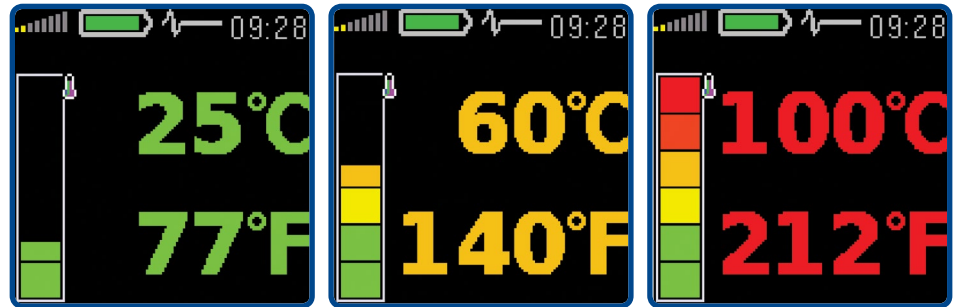


## Temperature

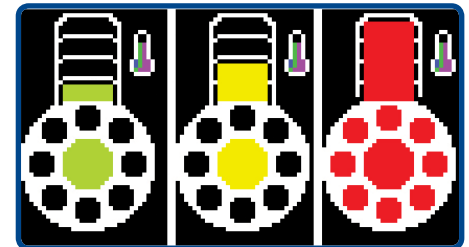
**i** It is displayed in degrees of Celsius and Fahrenheit.

The colored bar is used as well. The ranges of colors are following:

- less than 30 °C - green,
- 30 - 45 °C - yellow,
- 45 - 60 °C - orange,
- 60 - 75 °C - red,
- more than 75 °C - dark red.



The bearing icon on the other screens is also colored according to the actual temperature value.

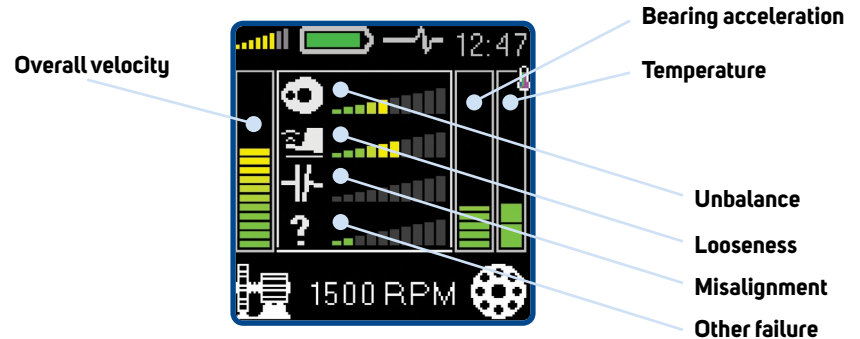


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# Screens

## FASIT Expert System

**i** The FASIT screen displays the severity levels of machine faults. The temperature bar is also displayed on the right. The speed is required for FASIT analysis.



In the bottom left corner you can see the Machine icon. The vertical bar displays the overall machine condition.

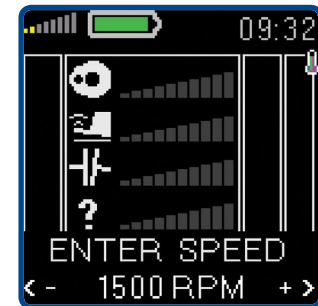
The FASIT displays the severity of failure sources:

- Unbalance (icon of circle with heavy spot),
- Looseness (shoe icon),
- Misalignment (coupling icon),
- Unknown failure source (question mark icon).

In the bottom right corner you can see the roller bearing icon. The vertical bar displays the bearing condition.

The vertical bar with the temperature icon on the right displays the measured temperature.

**👉** If the speed is unknown, then it must be manually entered before the analysis. Use arrows for setting and press OK.



## Evaluation of the Machine and Bearing Conditions

A diagnostician always asks a basic question after the measurement: "What condition of the machine should I assign to the measured value?"

Machine conditions are divided into 3 levels, which have the same colors as traffic lights:

### **GOOD – GREEN COLOR**

The machine is in a good condition, no defect is found. The operation is without restrictions.

### **ALERT - YELLOW COLOR**

The beginning of a defect has been found in the machine. It is possible to operate the machine. However, more attention must be paid to the machine and the repair must be planned.

### **DANGER – RED COLOR**

A serious defect has been found in the machine. The machine should not be operated.

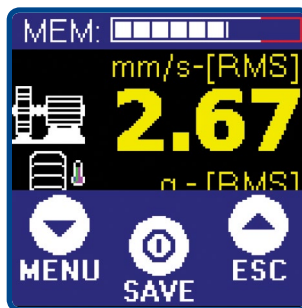
# The Stroboscope

**i** **The stroboscope** or stroboscopic lamp, commonly called a strobe, is a device which produces regular flashes of light on selected frequency. When we have to study or to visually inspect machinery, which has cyclically moving parts, then the stroboscope enables the user to freeze the movement (usually rotation). Imagine a rotating disc with one hole. When the flashes of light are synchronized with the disc rotation speed, then there is just one flash made during one rotation.

It means that the disc is lit up when the hole is always in the same position. It is the principle of the illusion of frozen movement.



**h** Press the middle button **⓪** and the three buttons appear on screen. Now the three unit buttons have new functions (**MENU**, **SAVE**, **ESC**).



## Strobo Switch ON



Press **MENU**. The list of menu items appears.  
 Select **LIGHT** and press middle button **Ⓢ**. Next menu appears.  
 Select **STROBO** and press middle button **Ⓢ**.

**The strobo runs now.**



Initially the strobo uses the speed frequency (if it is known) or the last speed from memory.

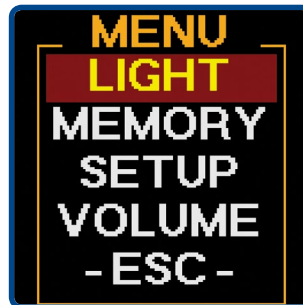


By pressing the arrow buttons **▼ ▲** you can change that frequency manually.

The step (**1, 10, 100 RPM**) is displayed on the bottom line of the screen.

If you need to change the step then press the middle button **Ⓢ** and the STROBO menu appears.

Select required step and press the middle button **Ⓢ**.



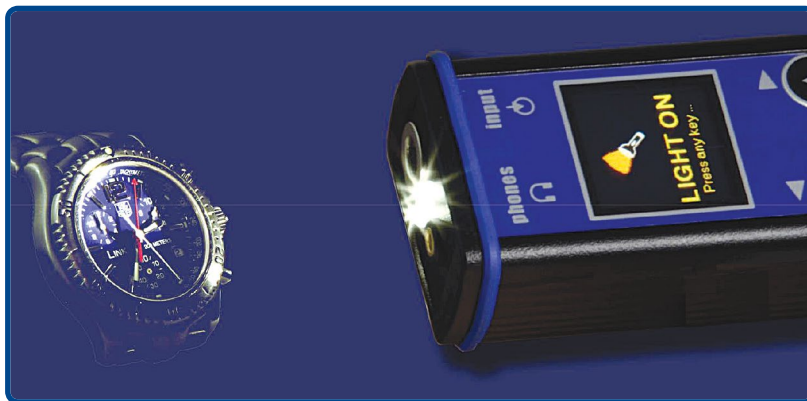
## Strobo Switch OFF

Open the STROBO menu, select **-ESC-** and press middle button **Ⓢ**.

## The Torch

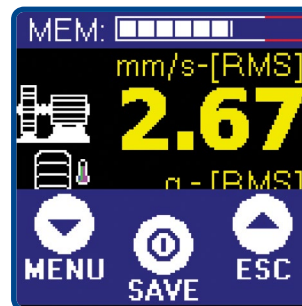


Sometimes you need to inspect or read in dark corners. The unit has a handy torch built in the front panel.



Press the middle button **①**.

Now the three unit buttons have new functions (**MENU**, **SAVE**, **ESC**).







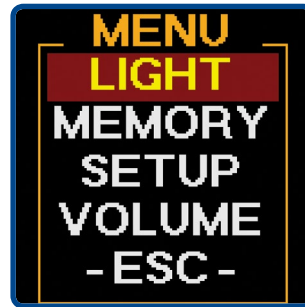
Press **MENU**.

The list of menu items appears.

Select **LIGHT** and press middle button ①.

Next menu appears.

Select **TORCH** and press middle button ①.



**The TORCH lights now.**


The torch screen appears.






Press any key to switch off the torch.

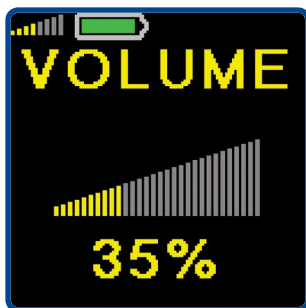
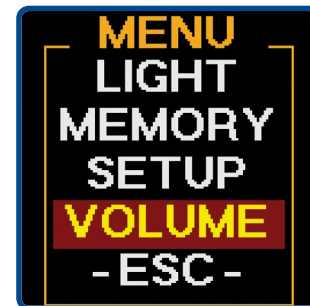
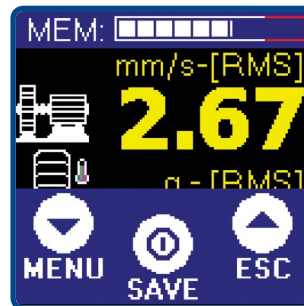



## Using of Headphones

 Connect the headphones by a stereo 3.5 mm jack to the input on the top panel. You now hear the signal from the vibration sensor in the headphones.

The volume can be set-up. Press the middle button . Now the three unit buttons have new functions (**MENU**, **SAVE**, **ESC**).

 Press **MENU**. The list of menu items appears.  
Select **VOLUME** and press the middle button .



Use arrow buttons to set the volume and press the middle button .



### HEADPHONES WARNING!

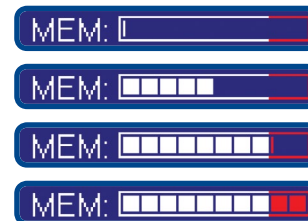
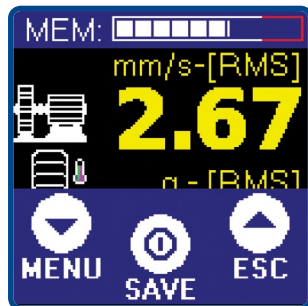
Listen at moderate volumes to avoid ear damage. Remove the headphones from ears while moving the sensor or reconnecting the cable.

## Saving Data to the Memory (For version with memory only)

### Memory Info



There is info about used memory displayed at the top the screen, when pressing the middle button **①**. Memory bar is displayed also on route screen.



- empty memory
- approx. 50% of the memory used
- over 80% of the memory used (red area of the bar)
- memory full

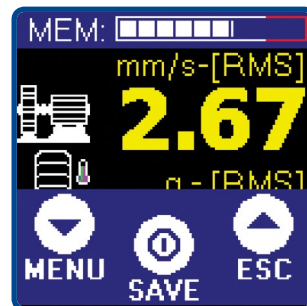
### Saving the Measurement Screen



You can store measured values (screens) to the memory. Each screen is stored to a specific address (Point ID) from 1 to 250.



Press the middle button **①** when the measurement is completed. Now the three unit buttons have new functions (**MENU**, **SAVE**, **ESC**). If the reading is not completed yet, then the Save button is not available. The information about used memory is displayed on the top of screen.

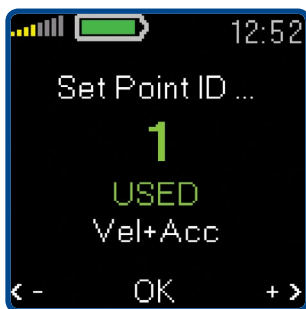




Press the **SAVE** button. The screen with Point ID appears. The last selected point ID is displayed.

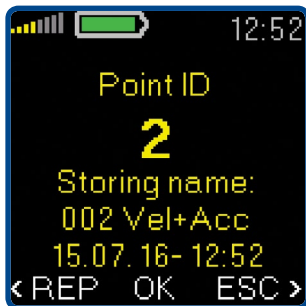
continue ►


## Saving Data to the Memory (For version with memory only)

If this point ID contains data, then USED is displayed otherwise EMPTY is displayed.



 Use the arrow buttons ▼ ▲ and select the required point ID. If you hold the arrow button for longer time then the movement is faster. To confirm the Point ID press the middle button .



Now the three buttons have new functions (**REP**, **OK**, **ESC**). Press the middle button  (**OK**) to save the screen.

**ESC** - Escapes back to the measurement screen

**OK** - Saves data

**REP** - Goes back to the Point ID selection

### More Measurements (Readings) in One Point ID

When you for example measure some screen regularly (e.g. each 10 minutes) then you can save all readings to one point ID number. Each point can contain more stored screens.

### Loading Memory to the DDS Tree

If you connect the unit to computer, then all readings can be loaded to DDS software and saved to the tree structure (database). See DDS manual for details.

### Stored measurements

See the Appendix I for the detailed information about what is being saved for each screen.

# Route Readings (For version with memory only)

## Downloading of the Route to the Instrument

**i** The instrument enables performing route measurements. Before you start route measurement you have to load the route (the list of machines) from the computer (DDS software) to the instrument.



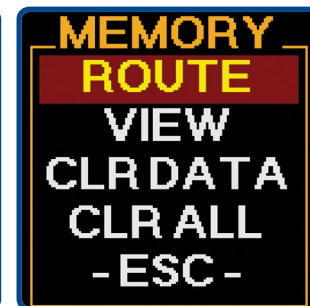
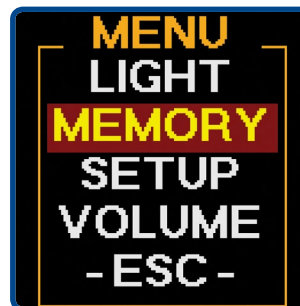
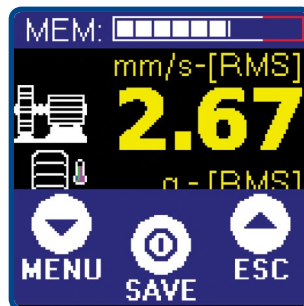
1. Connect the instrument to your PC by USB cable.
2. Switch the unit ON.
3. Use DDS software to load the route from PC to instrument (see DDS manual).



## Route Collection

**i** Select the **MENU/ MEMORY/ ROUTE** items. The route screen appears.

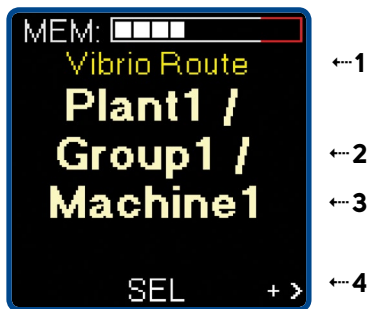
The first machine name appears.



# Route Readings (For version with memory only)



Use the arrows to find required machine from the list and press **SEL**.



The route is the list of machines. The names of tree items were defined in DDS.

- 1 → Route name
- 2 → Machine path
- 3 → Machine name
- 4 → Function keys



Press **OK** for confirmation.

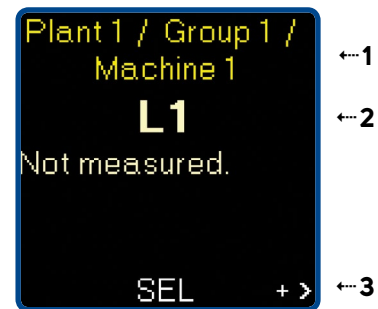


**ESC** - Escape from the route

**BCK** - Return back to the machine selection screen



The first point will be opened (L1). Use the arrows to find required point from the list and press **SEL**.

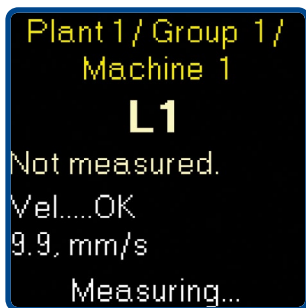


- 1 → Machine path and name
- 2 → Point name
- 3 → Function keys



Press **MEAS** to start the reading.

**You can watch the reading process on screen.**



**BCK** - Return back to the point selection level

**UP** - Return back to the machine selection screen



When the point reading is completed, then the following info screen appears. Press **OK** to save all measured data.



**DEL** - deletes the last reading without saving,

**UP** - saves the reading and shifts to the next point.


When the route readings are finished, use DDS software again to load the data to the computer.


continue ►

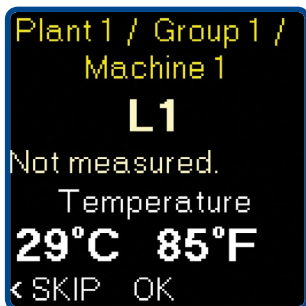
# Route Readings (For version with memory only)


## Special Readings are Taken Differently

### TEMPERATURE

 If the temperature measurement is required, it will be taken as the first reading.


 After you press **MEAS** the temperature screen appears.




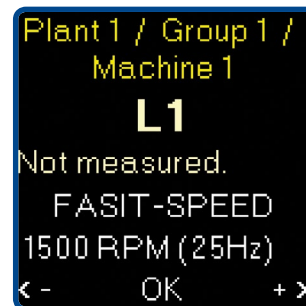
 Actual temperature values is displayed. Adjust appropriate position of unit for temperature reading. Press **OK** to save value.

**SKIP** - Skip reading

### FASIT

 The speed is required for FASIT analysis. The speed can be downloaded from DDS (if the machine has constant speed) or it must be entered before the reading.

 If the FASIT-SPEED screen appear, then use arrows to define the speed value and press **OK**.

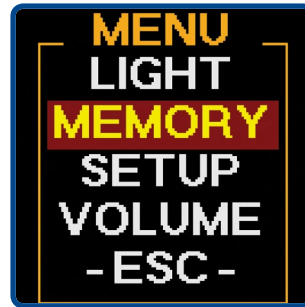
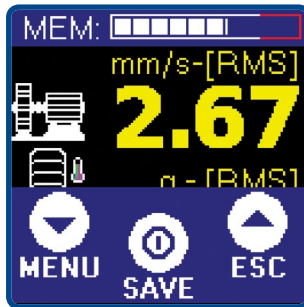




## Erasing of Route Data in Memory



Press the middle button ① and the three buttons appear on screen. Now the three unit buttons have new functions (**MENU, SAVE, ESC**).



Press **MENU**. The list of menu items appears.



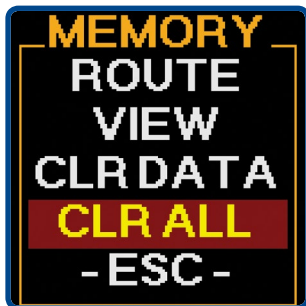
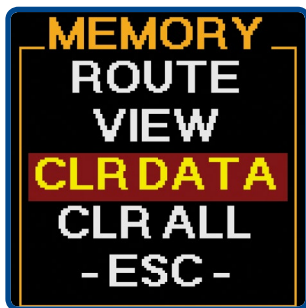
Select the **MEMORY** and press the middle button ①.

continue ►

## Route Readings (For version with memory only)



Select **CLR DATA** or **CLR ALL**. See next paragraphs.

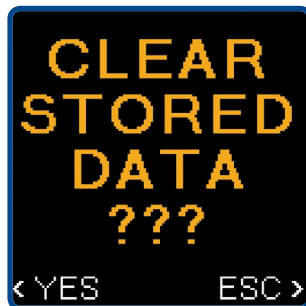


### CLR DATA

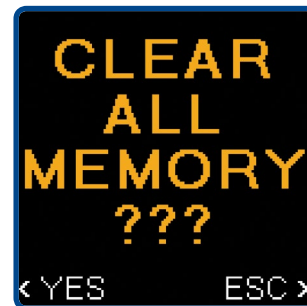
This removes all measured data. It removes route data and also the data saved manually (off-route). But the route structure (list of machines) is not removed and route can be collected again.

### CLR ALL

This clears all the data (readings and route structure) in the memory. It works like formatting.



Clear Data



Clear All

# Using Standards to Define Limits

## ISO 10816 as Default Factory Setting

**i** The default setting uses the limit values for machines groups 2 and 4 with rigid foundation. You can change the standards used. Four modes are available.

### CLASSIFICATION OF VIBRATION VALUES FOR MACHINES GROUPS 1 AND 3



Foundation class	RMS velocity values		border zone
	mm/s	in/s	
Rigid ( <b>R13</b> )	2.3	0.09	A/B
	4.5	0.18	B/C
	7.1	0.28	C/D
Flexible ( <b>F13</b> )	3.5	0.14	A/B
	7.1	0.28	B/C
	11.0	0.43	C/D

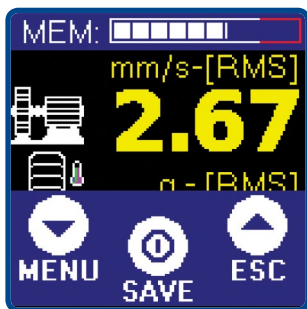
### CLASSIFICATION OF VIBRATION VALUES FOR MACHINES GROUPS 2 AND 4


Foundation class	RMS velocity values		border zone
	mm/s	in/s	
Rigid ( <b>R24</b> )	1.4	0.06	A/B
	2.8	0.11	B/C
	4.5	0.18	C/D
Flexible ( <b>F24</b> )	2.3	0.09	A/B
	4.5	0.18	B/C
	7.1	0.28	C/D




**DEFAULT FACTORY SETTING**

## Using Standards to Define Limits

-  Press the middle button  and the three buttons appear on screen. Now the three unit buttons have new functions (**MENU**, **SAVE**, **ESC**).



-  Press **MENU**. The list of menu items appears.

-  Select **SETUP** and press the middle button .
- Select **ALARMS** and press the middle button .



-  Select required group and press the middle button .



## Adash Standards Over the ISO 10816

**i** The factory setting of unit uses the ISO 10816 limit values for machine condition. But this standard does not use the speed for limit definition. All machines with speed in range 120 - 15 000 RPM use the same limit values. We are not satisfied with such approach too much. For example if the heavy spot exists on the rotor, then the mass has low effect on 120 RPM but destructing effect on 15 000 RPM. Additionally this standard define only limits for velocity, not for acceleration.

That is why we created the Adash standards for both vel+acc. Adash limits are not rewritten from any existing standard. It is a result of more than 20 years of the Adash engineering team's experience. It is difficult to invent a critical value definition which would be simple and reliable.

In the figures below you can see how to derive Adash limit values. All limit values are related to the speed value. Low speed machines should generate lower vibration than higher speed machines.

There are three levels of machine condition defined:

### **GOOD – GREEN COLOUR**

### **ALERT - YELLOW COLOUR**

Machines that lay in this range are not acceptable for a long period of operation, they can be operated until time when they can be repaired.

### **DANGER – RED COLOUR**

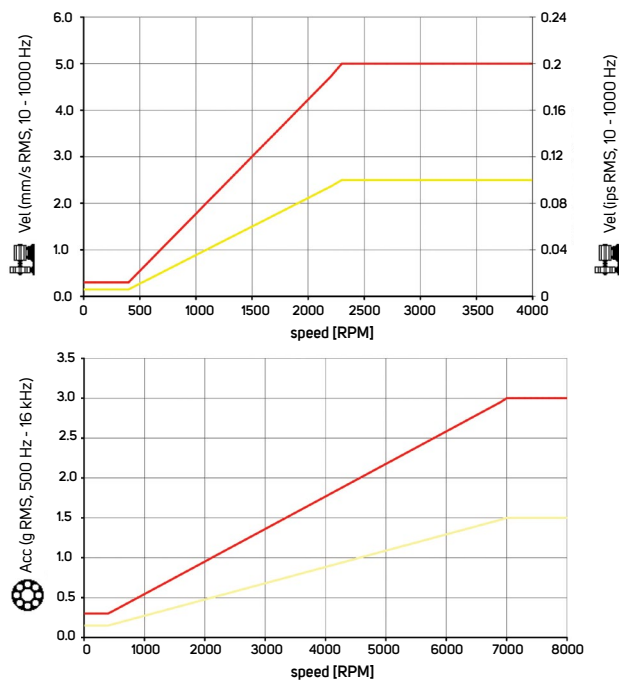
Vibration values in this range are considered as very dangerous and machines should not be operated.

[continue](#) ►

# Using Standards to Define Limits

## Adash Limit Values of Machine and Bearing Vibrations

**i** Below you can see graphs, according to which the instrument determines acceptable vibration limits depending on machine speed.



## Set Up the Adash Standard

Use the same procedure as for ISO 10816 class setting (see page 28).



Select **Adash** and press the middle button **Ⓢ**.

## Speed Detection

Adash limits require the speed information. The speed detection appears before the first vibration measurements (first screen).


After switching on the first screen (Overall values) appears, but without the vibration values. The speed value is required for the vibration measurements. The speed value is used for Warning and Alert limits calculation. The instrument runs the speed detection process (the red bar increases on the bottom of screen).

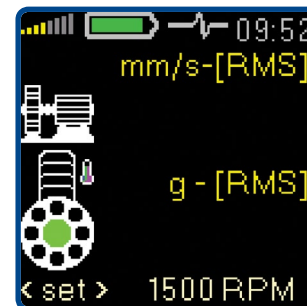
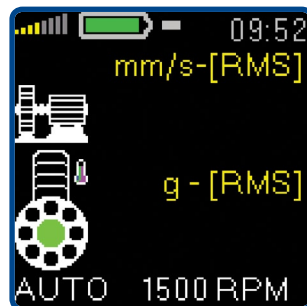
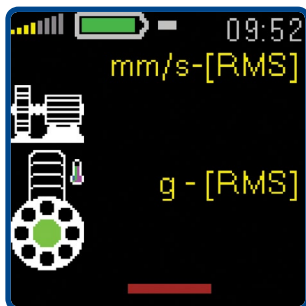
The user can switch off the automatic speed detection in Menu.

Detected speed value is displayed at the bottom. The word AUTO in front of the value informs, that automatic detection was used.

If the automatic detection is not successful, then the last speed value appears with word <set>. When no button is used in 4 sec, then the displayed value is accepted. Using left/right buttons change the speed to correct value. The step is 60 RPM.



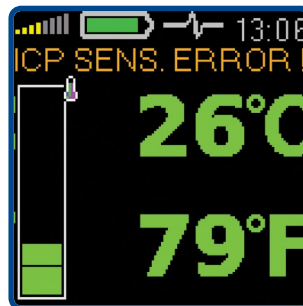
Set the speed and press middle button .



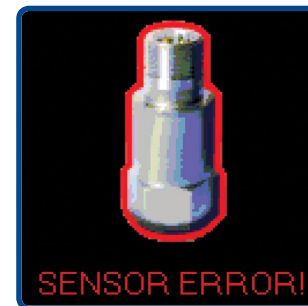
## Error Messages

### Sensor Connection Error

**i** When an incorrect sensor connection, unsuitable sensor type, broken cable etc. is detected, then the temperature screen appears and the error message is written above the values. Check the sensor, cable and connectors.



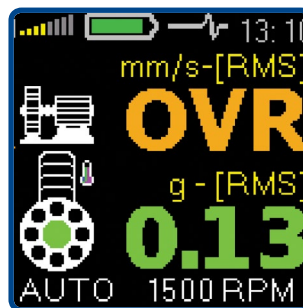
With temperature sensor



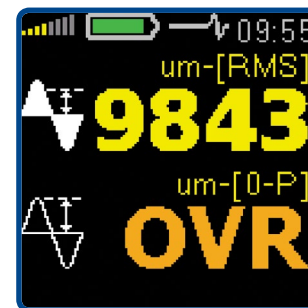
Without temperature sensor  
(e.g. Vibrio Ex)

### Overload

**i** When the value exceeds the range of display, then OVR is displayed.



Value is over 999



Value is over 9999



## Input Overload Error

**i** If the input signal voltage is too high (over +/-12 V range), the instrument cannot process it and the overload error is displayed. The instrument is not capable of using such signal.



---

## Unit Error

**i** This screen indicates an internal electronic part failure. Contact your distributor for instructions.



## Appendix A - Switch-OFF Screen

**i** Device information screen is displayed while holding the middle button ⓘ during the switch off.



**Ver.:** The firmware version

**S.N.:** The unit serial number

**Filt.:** The HP filters frequencies (acc/vel)

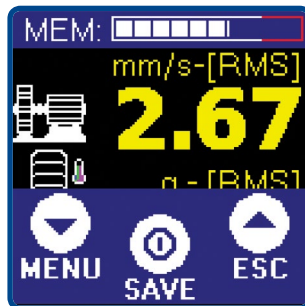
**Sen.:** The sensor sensitivity

## Appendix B - Special Setup Items

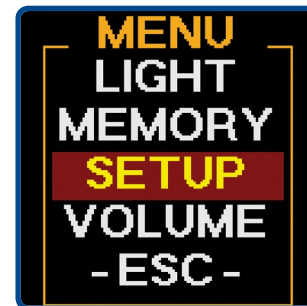


Press the middle button **Ⓢ**, new options appear on the screen.

Now the three buttons have new functions (**MENU, SAVE, ESC**).



Press **MENU**.  
The list of menu items appears.



Select the **SETUP** and press the middle button **Ⓢ**.



### SPEED

The speed detection can be done automatically (**AUTO**), manually (**MANUAL**) or switched off (**OFF**).

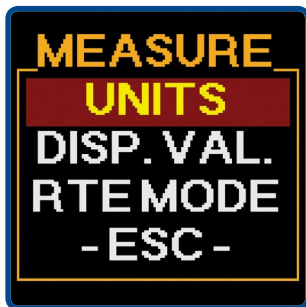
Remember that when the AUTO fails, then the speed can be entered manually. When the speed detection is OFF then manual entry is required before FASIT measurement.



continue ►

## Appendix B - Special Setup Items

### MEASURE

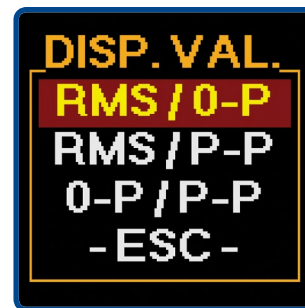


### UNITS



**i** The vibration velocity and displacement units can be chosen here:  
 mm/s (millimetres per second) and  $\mu\text{m}$  (micrometers) for Metric units,  
 ips (inch per second) and mils for Imperial units.

### DISPLACEMENT VALUES

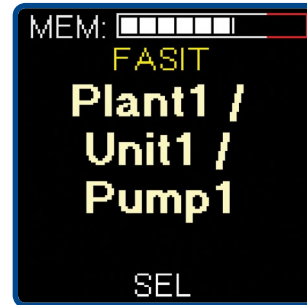


**i** Displacement values setup for displacement screen. There are two values displayed and you can select which two values fits your needs.

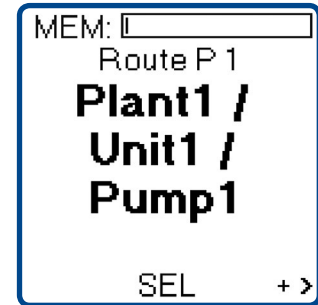
## RTE MODE (ROUTE MODE)



The background color is controlled by RTE MODE. When the route is collected on sunlight, then the white background and black text is better choice.



NORMAL ROUTE MODE



INVERSE ROUTE MODE


continue ►

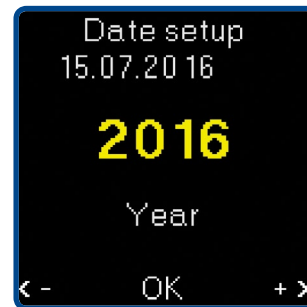
## Appendix B - Special Setup Items

### SET TIME

(For version with memory only)



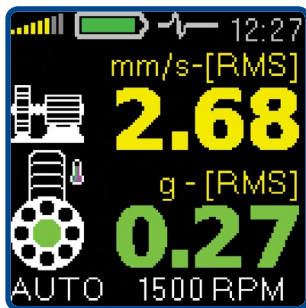
 By pressing the arrow buttons ▼ ▲ and the middle button ⓘ it is possible to move between screens to setup the date, month, year and time.



## Appendix C - How to Evaluate the Failure

**i** The instrument shows the measurement results on several separated screens. We will describe the basic rules for their use.

### Overall RMS values



**The machine symbol** - this line shows the RMS velocity vibration value in mm/s or ips, which is generated on the machine by mechanical phenomena related to:

- unbalance of rotational parts of the machine (fan wheel, impeller, clutch wheel etc.),
- incorrect axis alignment of the assembly - misalignment,
- mechanical looseness of individual machine parts,
- large free play in the seating of rotational machine parts (shaft - bearing, shaft - bearing housing),
- clutch free play (e.g. free play on a shaft, pressed out grooves and tongues),
- loose or worn out machine anchor bolts,
- defective base,
- insufficient frame or anchoring flange rigidity,
- damage to machine rotational parts - (bent shaft).



**Bearing symbol** - this line shows RMS acceleration vibration value in g, which is generated by the condition of the bearing. This condition is related to:



- time wear of the bearing,
- bad lubrication (with new bearings as well),
- incorrect installation (with new bearings as well),
- abrasion of bearing.

The thermometer symbol is displayed together with the bearing. The temperature color is used according to the actual measured value.

**SPEED** - The machine speed is displayed at the bottom of the screen (if it is available). RPM means revolutions per minute. The instrument performs automatic detection of the machine revolutions using the spectrum analysis. This function may not always be successful, because it may not be possible to detect the revolutions from every spectrum (for example in machines with gears).

continue ►

## Appendix C - How to Evaluate the Failure

If the speed is available, then  and  vibration values are coloured corresponding to vibration limits. The speed value is required only for Adash limits. The ISO 10816 works without speed.

Machine conditions are divided into 3 levels, which have the same colours as traffic lights:

### GOOD – GREEN COLOUR

The machine is in good condition, no defect is found. The operation is without restrictions.

### ALERT - YELLOW COLOUR

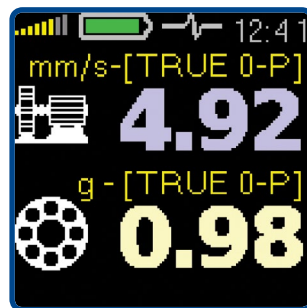
The beginning of a defect has been found on the machine. It is possible to operate the machine.


However, more attention must be paid to the machine and the repair must be planned.

### DANGER – RED COLOUR

There is a serious defect found on the machine. Machine should not be in operation.

## Overall PEAK Values



 The rules for evaluating the measured values are similar to the previous screen, with one difference; the peak (PEAK) vibration values are displayed. It is the highest measured value in certain time, which is important for transient shock events evaluation, especially in cases of developing bearing defects, such as:

- microscopic peeling of a hardened surface layer at the point of contact between a rolling element and a bearing ring (regular shocks),

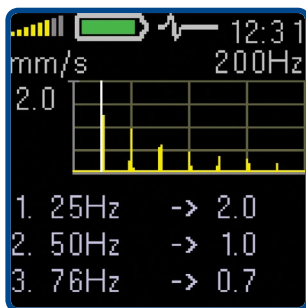
- contamination of the bearing space with metal particles (irregular shocks),
- cracks.

Shocks which cause these defects are also included in the RMS vibration values. However, the peak value of such a shock is hidden in a value which contains all other information about the vibrations, i.e. noise from possible abrasion, incorrect lubrication and overloading. To simplify, the RMS is an average value of all vibration values achieved in a certain time. If a large peak value (one shock) appears in this time period, it will be lost in the final recalculation of all the values.

Practically this means that during the increase of the bearing defect which causes the shock, the PEAK value of this shock will visibly increase, while the RMS value will only increase slowly. The initial defect time of the bearing can be discovered sooner but the PEAK value is not as stable as the RMS value. For bearing condition measurement the RMS measurement is sufficient.

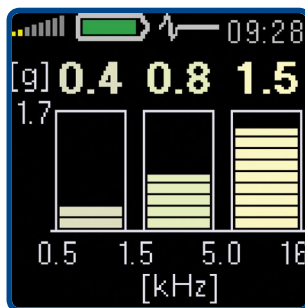


## Spectrum 200 Hz– Detection of Unbalance, Looseness, Misalignment



**i** When the graph contains only one high line on speed frequency, then the failure is unbalance. When the graph shows a number of lines (typically 3 or 4) with the same space between them (harmonics) and the first line is on the speed frequency mechanical looseness or misalignment are probably the machine problem. When the 2x speed line is very high, then the misalignment is more probable.

## Vibrations in Frequency Bands – Gearboxes/Bearings



**i** When we need to find a failure on more complex machines (e.g. gearboxes) then it is very useful to know the vibration values in several frequency bands. Screen shows acceleration value measurement in three frequency bands: 0.5 – 1.5 kHz, 1.5 – 5 kHz and 5 kHz – 16 kHz.

### Example:

Lets suppose gearbox with speed frequency of 25 Hz (1500 rpm) and with a 65 teeth gear. The gear mesh frequency is the multiplication of speed and number of teeth.

$$f_{GMF} = f_{speed} * z$$

$f_{GMF}$  gear mesh frequency

$f_{speed}$  speed frequency

$z$  number of teeth

In our example GME is 1625 Hz.

The 1.6 kHz is in the middle band. When the level of middle band is higher the other bands, then very probably the condition of 65 teeth gear is the failure.

When only the third band level is high and the small bearing is used, then there is probably bearing failure.

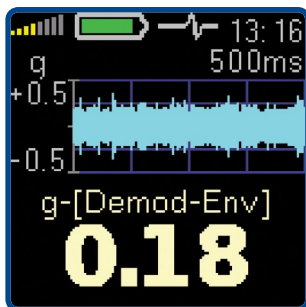
continue ►

# Appendix C - How to Evaluate the Failure

## Time Signal for Bearing Condition Evaluation

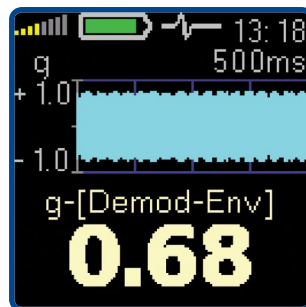
**i** The time signal of bearing vibrations is displayed. The  $g_{ENV}$  value is under the time signal (overall value of enveloped signal).

### BEARING IN GOOD CONDITION



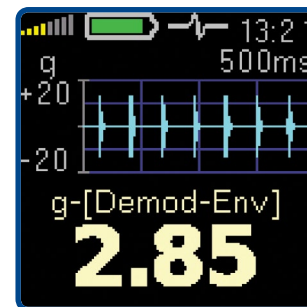
This bearing generates a low amplitude noise only ( $\pm 0.5$  g). Time signal shape is steady.

### BEARING WITH INSUFFICIENT LUBRICATION



The time signal shape is also steady, but it has a greater amplitude ( $\pm 1$  g). Because no shocks appear, then try to add the lubricant.

### DAMAGED BEARING



There are clearly visible shocks caused by elements rolling across damage such as pitting or a crack here. The shocks repeat themselves regularly and they have high level ( $\pm 20$  g).

# Appendix D - Adash 4900 – Vibrio M Specifications

<b>Input:</b>	1x ICP powered accelerometer	<b>Memory *:</b>	4 MB for data
<b>Sensor</b>	accelerometer AC150 (genuine CTC AC-150) sensitivity 100mV/g +/-15% frequency response +/-3 dB in 1 - 10000 Hz	<b>Data storing *:</b>	900 measurements of 800 line spectra or 2048 sample time signals may be stored
<b>Input range:</b>	60g PEAK with standard 100 mV/g sensor	<b>Interface:</b>	Off-Route Route with DDS Vibrio software for Windows (included)
<b>Measurements:</b>	Velocity RMS, Peak 10 - 1000 Hz [mm/s, ips] Acceleration RMS, Peak 500 - 16000 Hz [g] Velocity time 1 - 1000 Hz [mm/s, ips] 2048 samples Vel. spectrum 1 - 1000 Hz [mm/s, ips] 800 lines Acceleration time 1 - 16000 Hz [g] 2048 samples Acceleration spectrum 1 - 16000 Hz [g] 800 lines Acceler. Demod-Envelope RMS 500 - 16000 Hz [g] Acceler. Demod-Envelope time 500 - 16000 Hz [g] 2048 samples Acceleration Demod-Envelope spectrum 500 - 16000 Hz [g] 800 lines, 400 Hz Displacement RMS 2 - 100 Hz [ $\mu$ m, mil] Displacement 0 - Peak 2 - 100 Hz [ $\mu$ m, mil] Displacement Peak - Peak 2 - 100 Hz [ $\mu$ m, mil] Temperature non-contact measurement -70 – 380 °C (-94 – 716 °F)	<b>Software *:</b>	DDS software for Windows (free)
<b>Further functions:</b>	LED stroboscope (0.17 - 300 Hz, 10 - 18000 RPM) LED torch, non-contact temperature measurement vibration stethoscope	<b>Display:</b>	colour graphic OLED display 128 x 128 pixels, diagonal 1.5" (38mm)
		<b>Output:</b>	1x AC signal 8 $\Omega$ / 0.5 W for external headphones (signal listening)
		<b>Power:</b>	2xAA 1.5V batteries (alkaline, NiMH, Lithium - 8 hours of operation)
		<b>Temp:</b>	Operating: -5 °C to 55 °C
		<b>Dimensions:</b>	150 x 60 x 35 mm
		<b>Weight:</b>	330 g including batteries (without cable, sensor and magnet) 540 g including batteries, cable, sensor and magnet
		<b>Accessories:</b>	Accelerometer, cable, magnetic base, headphones, USB cable, measuring tip, transport case, manual

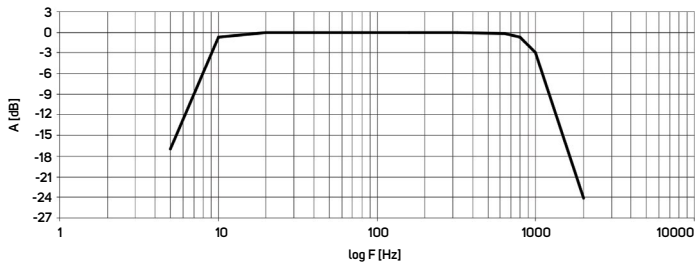
\* available only for version with memory (Vibrio M)

# Appendix E - Response Specification for Calibration

## Calibration

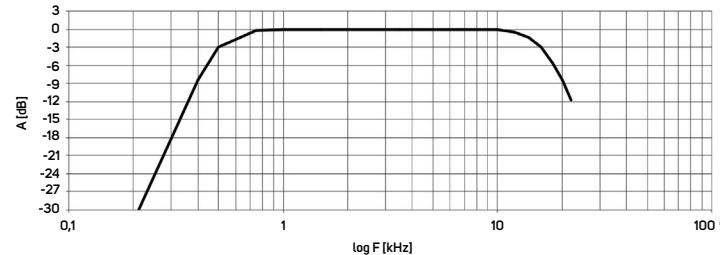
**i** Each unit is calibrated in AC voltage using a pure sine signal generator. All graphs and values below are measured in this way. The accelerometer is not used for the calibration, because the frequency response oscillates  $\pm 3$ dB (it is  $\pm 30\%$  or  $\pm 40\%$ ) in the 1 - 10 000 Hz range. This uneven property does not allow using it for calibration. The voltage accuracy of the instrument is high ( $\pm 2.5\%$  or  $\pm 5\%$ ) compared with the accelerometer.

## Vibration Velocity Measurement Frequency Response



The measurement accuracy (10 mm/s RMS input signal) is  $\pm 2.5\%$  (5 - 500 Hz frequency range) and  $\pm 5\%$  (500 - 2000 Hz range).

## Vibration Acceleration Measurement Frequency Response



The measurement accuracy (1 g RMS input signal) is  $\pm 2.5\%$  in the 0.2 - 20 kHz frequency range.

## Velocity Measurement Amplitude Response

**i** The measurement accuracy for RMS vibration velocity (0.1 - 100 mm/s range) on an 80 Hz reference frequency is  $\pm 2.5\%$

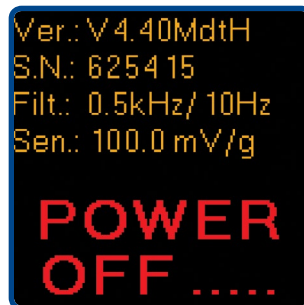
## Acceleration Measurement Amplitude Response

**i** The measurement accuracy for RMS vibration acceleration (0.1 - 10 g range) on an 8 kHz reference frequency is  $\pm 2.5\%$

## Sensor Sensitivity

**i** Before any calibration you need to know what exact sensitivity of the sensor is set in the instrument.

See the **Power OFF** screen, which contains this information. Keep the middle button **Ⓢ** pushed down and read the information.



### Description of numbers on the switch off screen:

1. Firmware version
2. Serial number
3. HP filter frequency for bearings (0.5 kHz), HP filter frequency for ISO (10 Hz)
4. Sensor sensitivity (100 mV/g)

The sensitivity of the sensor is usually in the 95 - 105 mV/g range.

## Basic Test with the A4801 Sensor Simulator

**i** If you have the A4801 unit, you can regularly test the unit on two frequencies - 80 Hz and 8 kHz.

On the initial screen RMS values of velocity and acceleration are displayed. The velocity value should be 10 mm/s and the acceleration should be 0.5 g.

The signal from the A4801 is adjusted for exactly 100 mV/g sensitivity. When the sensitivity of the unit is e.g. 95 mV/g, then the higher values (10.5 mm/s and 0.53 g) will be displayed. Expected values from the A4801 should be multiplied by a 100/95 coefficient.

## Basic Test with Sensor and Shaker

**i** The procedure should be the same as with the A4801. Set 10 mm/s at 80 Hz on the shaker and check the RMS velocity value on the initial screen. Then set 0.5 g at 1.2 kHz or higher and check the RMS acceleration. Below 1.2 kHz the HP filtering is applied and the result would be distorted.

continue ►

## Appendix E - Response Specification for Calibration

### Advanced Tests of Velocity Measurement

Use the shaker and sensor. You can measure the frequency response and the amplitude response.

Use a 10 mm/s amplitude for the frequency response test. Change the frequency from 6 to 1200 Hz and draw the curve. This is the exact response with the sensor.

Set 80 Hz for amplitude response. Change the amplitude from 0.1 to 100 mm/s and read the values.

### Advanced Tests of Acceleration Measurement

Use the shaker and sensor if you are able to shake high frequencies. If your shaker system does not allow it, use the signal generator and switch the ICP® off. Contact your re-seller for information on how to switch the ICP® off. That information is not written in this manual.

You can test the frequency response and the amplitude response.

Use a 1 g amplitude for the frequency response test. Change the frequency from 500 to 12000 Hz and draw the curve.

Set 1.2 kHz or higher for the amplitude response. Change the amplitude from 0.1 to 10 g and read the values.

### Envelope Demodulation Test

The envelope value is an RMS value. Do not compare it with peak values. Switch the ICP® off and use an 8 kHz pure sine signal with a 1 g (100 mV) amplitude. The ENV should display approx. 1.41 g.

When you use the A4801 Sensor Simulator do not switch off the ICP®. Remember, that the A4801 only generates 0.5 g. That is why the ENV will display one half of 1.41 g (0.70 g).

# Appendix F - Adash 4900 - Vibrio Ex - the ATEX Appendix (Option)

## Specification according to 94/9/EC (ATEX) directive:



**II 2 G Ex ib IIC T4 Gb**

**II** Non-mining

**2** ZONE A

**G** Gas atmosphere

**Ex ib** Principle of protection - Intrinsic Safety  
EN 60079-11, Zone 1

**IIC** Gas group - Hydrogen

**T4** Temperature class – 135 °C

**Gb** Equip. Protection level – Zone 1  
(high protection)

**IP65,  $-20\text{ °C} \leq T_a \leq 50\text{ °C}$**

**IP65** INGRESS PROTECTION,  
dust tight and against water  
jets

**$-20\text{ °C} \leq T_a \leq 50\text{ °C}$**  ambient temperature range

## Zones Categories

### Zone 0 (gases and vapours)

Explosive atmosphere is present continuously, for long periods or frequently.

### Zone 1

Explosive atmosphere is likely to occur under normal operation, occasionally.

### Zone 2

Explosive atmosphere is unlikely to occur in normal operation and, if it does, will persist for a short period only.

## Note:

Vibrio Ex does not contain the temperature sensor and stroboscope.

## Using the Instrument

The A4900 - Vibrio Ex unit is certified for use in explosive risk areas zones 1 and 2 with all gas group.

It means:

IIA (acetone, ethanol, ...),

IIB (formaldehyde, ether, ...),

IIC (hydrogen, acetylene, ...).

The following conditions must be complied with:

- 1. The accelerometer type must be AC90x or AC91x.**
- 2. Batteries type must be of Energizer L91 (1.5V / LiFeS technology).**
- 3. The instrument cannot be used in zone 0.**
- 4. Changing of batteries cannot be done in an explosive risk area.**
- 5. The USB communication cable cannot be used in explosive risk area.**
- 6. The operator must be grounded (earthed) and the unit must be grounded (earthed) through the operator.**

# Appendix F - Adash 4900 - Vibrio Ex - the ATEX Appendix (Option)

## Certificated accessories

### ACCELEROMETER AC90X/AC91X

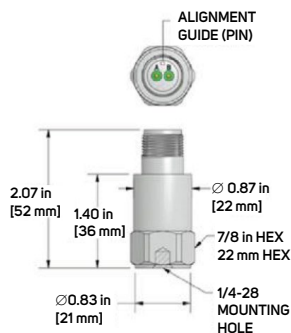


### AC915-1A

2 Pin Connector

#### Connector PIN Polarity

- A (+) Signal/Power
- B (-) Common



Specifications	Standard	Metric
Part Number	AC915	M/AC915
Sensitivity (±10%)	100 mV/g	
Frequency Response (± 3dB)	30-900 000 CPM	0,5-15 000 Hz
Frequency Response (± 10%)	60-60 000 CPM	1,0-10 000 Hz
Dynamic RAnge	± 50 g, peak	
<b>Electrical</b>		
Setting Time	<3 Seconds	
Voltage Source (IEPE)	18-28 VDC	
Constant Current Excitation	2-10 mA	
Spectral Noise @ 10 Hz	6,5 µg/√Hz	
Spectral Noise @ 100 Hz	2 µg/√Hz	
Spectral Noise @ 1000 Hz	1,8 µg/√Hz	
Output Impedance <100 ohm		
Bias Output Voltage	10-14 VDC	
Case Isolation	>10 <sup>8</sup> ohm	

Model	Description	Vmax	Ci	Imax	Li	Pi
AC90X/AC91X Series	Accelerometer	28 V	70nF	100 mA	51 uH	1 W



## BATTERY

## ENERGIZER L91

Ultimate Lithium




AA

## SPECIFICATIONS

<b>Classifications:</b>	„Cylindrical Lithium“
<b>Chemical System:</b>	Lithium/Iron Disulfide (Li/FeS <sub>2</sub> )
<b>Designation:</b>	ANSI 15-LF, IEC-FR6
<b>Nominal Voltage:</b>	1.5 Volts
<b>Compatible With:</b>	<b>EA91, E91, NH15, 1215</b>
<b>Storage Temperature:</b>	-40 °C to 60 °C (-40 °F to 140 °F)
<b>Operating Temperature:</b>	-40 °C to 60 °C (-40 °F to 140 °F)
<b>Typical Weight:</b>	14.5 grams (0.5 oz.)
<b>Typical Volume:</b>	8.0 cubic centimeters (0.49 cubic inch)
<b>Max Discharge:</b>	3.0 Amps Continuous
<b>Max Rev Current:</b>	2 µA
<b>Lithium Content:</b>	Less than 1 gram
<b>Typical IR:</b>	60 to 210 miliohms (depending on method)
<b>Shelf Life :</b>	20 years at 21 °C

## Certifications:


  
This battery has Underwriters  
Laboratories component  
recognition (MH12454)

  
Certified for intrinsic safety  
to UL913 7th Ed.,  
CAN/CSA-C22.2 No. 157-92

continue ►

# Appendix F - Adash 4900 - Vibrio Ex - the ATEX Appendix (Option)


## HEADPHONES


 In explosion risk area you can use headphones with an impedance of 4-32 Ohm and a maximum inductance of 1 mH.


## The Unit Sticker


Type: A4900 Vibrio Ex  
 SN: 625999

**A4900 Vibrio Ex**  
 Adash s.r.o., Hlubinská 32  
 702 00 Moravská Ostrava  
 Czech Republic  
[www.adash.com](http://www.adash.com)

 II 2 G  
 Ex ib IIC T4 Gb


 FTZÚ 14 ATEX 0130  
 1026  
 IP65, -20°C ≤ T<sub>a</sub> ≤ 50°C


 U<sub>o</sub> < 25.6V, I<sub>o</sub> < 92mA  
 L<sub>o</sub> < 60μH, C<sub>o</sub> < 100nF  
 Use only **AC90x** or **AC91x**  
 certificated sensor !

 U<sub>o</sub> < 5.4V, I<sub>o</sub> < 235mA  
 L<sub>o</sub> < 1mH, C<sub>o</sub> < 10μF

Use only 2x 1.5V, AA size  
**Energizer L91** (LiFeS<sub>2</sub>)  
 certificated batteries !

**Do not open  
 in a hazardous area!**

 2x Torx T-10





## Attention!

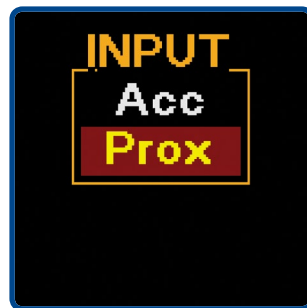
In explosion risk areas use only the authorized L91 batteries and accelerometer AC90x or AC91x!

## Appendix G - Adash 4900 - Vibrio MP (Proximity Option)

**i** The Vibrio MP contains more measurement options than the standard Vibrio M. These options are designed for measurement with contactless proximity sensors. Such sensors are usually used on protection systems from Bently Nevada, Emerson, Epro, etc. The buffered outputs on these systems are used for Vibrio MP connection.

### Switching the Instrument ON

After switching on, the first screen appears. It is different than the standard Vibrio M.



**👉** You need to select the mode. The Acc means the standard mode (the same as the Vibrio M) for measurement with an accelerometer.

The Prox mode is the optional mode for proximity sensors. The default sensor sensitivity is set to 7.87 mV/μm (you can change it in **SETUP**).

On the next screen you need to select the units to be used: the μm (metric) or mils (imperial).



continue ►

# Appendix G - Adash 4900 - Vibrio MP (Proximity Option)

## Screens

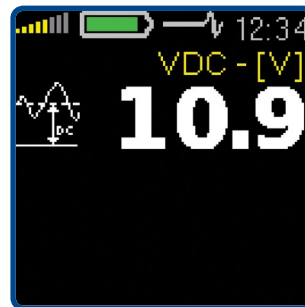
### SPEED ENTRY

It is required to define the speed in the Vibrio MP. The autodetect appears on the first screen. It works in the range of 3 - 200 Hz and you can switch it off in setup. When you press the middle button (USER) you can enter the speed manually (by using the arrow buttons).



### DC OFFSET

The measurement of the DC part in the signal (gap) is displayed in Volts (range +/- 24 V).



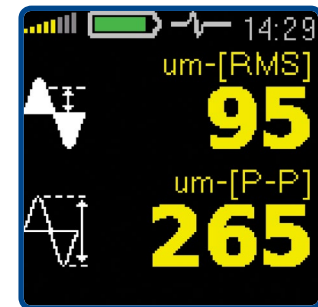
### DISPLACEMENT IN 1-1000 Hz RANGE

Three display options are available to set in setup:

RMS and TRUE O-PEAK

RMS and TRUE PEAK-PEAK

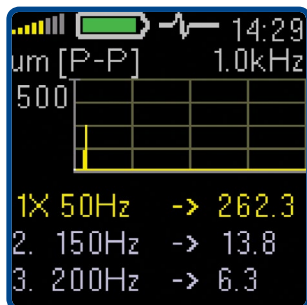
TRUE O-PEAK and TRUE PEAK-PEAK



### SPECTRUM 1000 Hz OR 2500 Hz

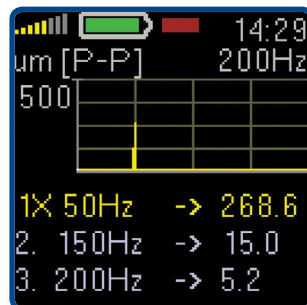
There are two ranges available in setup. You can choose between the ranges of 1000 Hz or 2500 Hz.

The PEAK-PEAK value on the speed frequency and the two maximum peaks in the spectrum are displayed below the spectrum.



### SPECTRUM 200 Hz

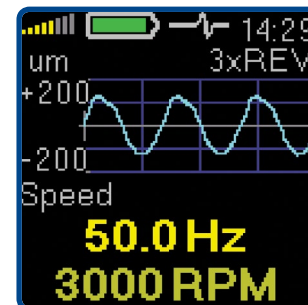
The next screen shows the spectrum with a 200 Hz range.



### TIME WAVEFORM IN 1 - 1000 Hz

The time waveform is displayed. The number of revolutions is displayed in this time waveform screen.

The number is defined in setup by the user; the default is 3, maximum is 6. Three revolutions are displayed on the example below.

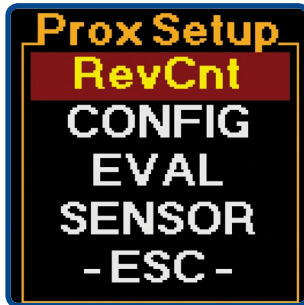


continue ►

## Appendix G - Adash 4900 - Vibrio MP (Proximity Option)

### Setup

Select the Setup item as in the standard Vibrio M. The following list of options appears.



#### REVCNT

On the following screen you can select the number of revolutions which will be displayed in time waveform screen; the default is 3, maximum is 6. In the example below it is 3.



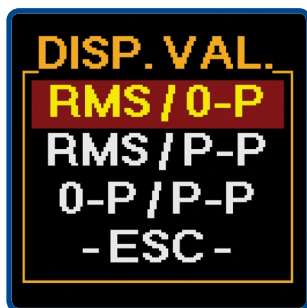
#### CONFIG

This screen contains the method of speed entry (manual/autodetect) and the range of the spectrum (1k/2k5).



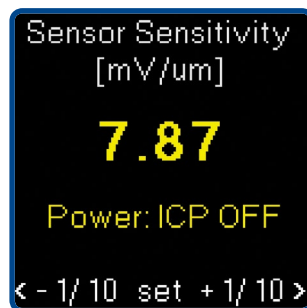
## EVAL

This screen shows options for selecting the type of displacement values.





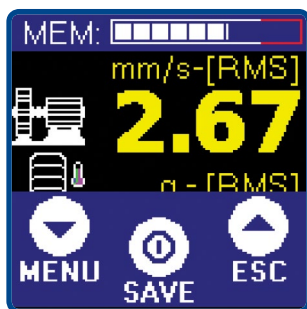
## SENSOR


The sensor sensitivity.

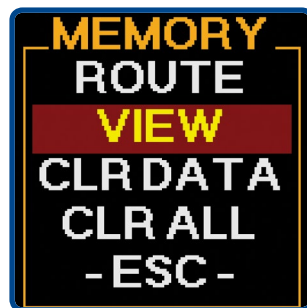
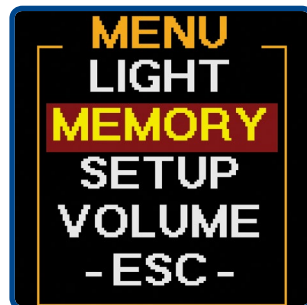





## Appendix H - Viewing Data in Memory

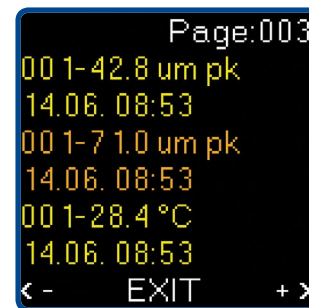
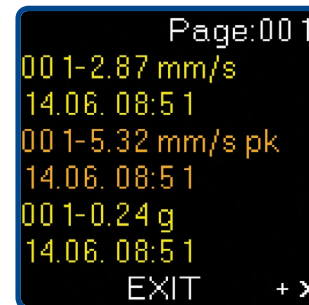
 Press the middle button  and the three buttons appear on screen.  
Now the three unit buttons have new functions (**MENU, SAVE, ESC**).



 Press **MENU**.  
The list of menu items appears.



 Select the **MEMORY** and press the middle button .  
Select **View** and press the middle button .  
The list of saved readings appears.



### USE ARROWS FOR LISTING.

Every readings is described in two lines.  
The Point ID and value are on first line and  
time/date of reading on the second.

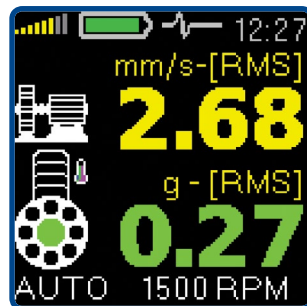


# Appendix I - Off-Route Measurements

**i** All Vibrio M measurement screens can be stored. Actually you **store even more data than you can see on the screen.**

See the description under the pictures to find out which measurements are being saved for individual screen.

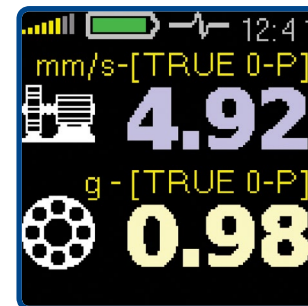
## SCREEN NR.1



### STORED DATA:

- Speed [Hz] (only if evaluated)
- Velocity RMS 10 - 1000 Hz [mm/s, ips]
- Velocity Peak 10 - 1000 Hz [mm/s, ips]
- Acceleration RMS 500 - 16 000 Hz [g]
- Acceleration Peak 500 - 16 000 Hz [g]

## SCREEN NR.2

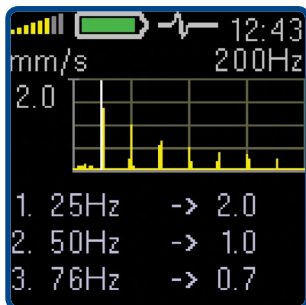


### STORED DATA:

- Velocity RMS 10 - 1000 Hz [mm/s, ips]
- Velocity Peak 10 - 1000 Hz [mm/s, ips]
- Acceleration RMS 500 - 16 000 Hz [g]
- Acceleration Peak 500 - 16 000 Hz [g]

# Appendix I - Off-Route Measurements

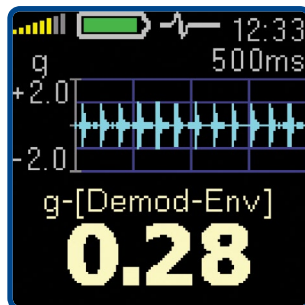
SCREEN NR.3

**STORED DATA:**

Velocity time 1 - 1 000 Hz [mm/s]  
2048 samples

Velocity spectrum 1 - 1 000 Hz [mm/s]  
800 lines

SCREEN NR.4

**STORED DATA:**

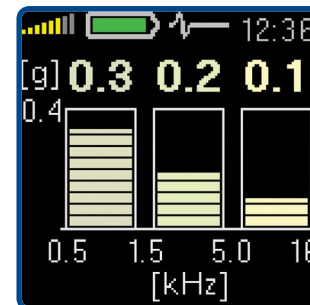
Acceleration Demod-Envelope  
RMS 500 - 16 000 Hz [g]

Acceleration Demod-Envelope Peak  
500 - 16 000 Hz [g]

Acceleration Demod-Envelope time  
500 - 16 000 Hz [g] 2048 samples

Acceleration Demod-Envelope spectrum  
500 - 16 000 Hz [g] 800 lines, range 400 Hz

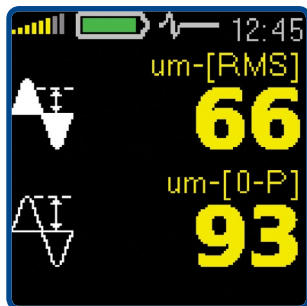
SCREEN NR.5

**STORED DATA:**

Acceleration time 1 - 16 000 Hz [g]  
2048 samples

Acceleration spectrum 1 - 16 000 Hz [g]  
800 lines

## SCREEN NR.6

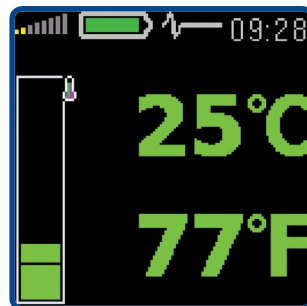
**STORED DATA:**

Displacement RMS 2 - 100 Hz [ $\mu\text{m}$ , mil]

Displacement 0-Peak 2 - 100 Hz [ $\mu\text{m}$ , mil]

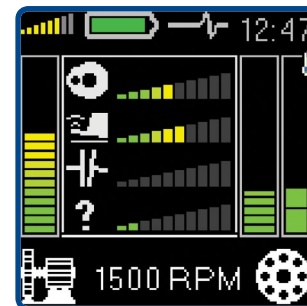
Displacement Peak-Peak 2 - 100 Hz [ $\mu\text{m}$ , mil]

## SCREEN NR.7

**STORED DATA:**

Temperature measurement -70 to +380°C  
(-94 to +716°F)

## SCREEN NR.8

**STORED DATA:**

The SAVE function saves two RMS values, four percentage severities of failures and speed.

## Notes:

A series of horizontal dotted lines for taking notes.

# Notes:

A series of horizontal dotted lines for taking notes.

**Adash spol. s r.o.**

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