VSHOOTER®

EASY VIBRATION ANALYZER WITH EMBEDDED CAMERA

www.synergys-technologies.com

USER MANUAL

SUMMARY

WITHOUT MCP MODE

WITH MCP MODE

MEMORY

SETTINGS

VIBRATION KNOWLEDGES

GENERAL SPECIFICATIONS :

- Developed and Manufactured by:

  SYNERGYS TECHNOLOGIES
  Quartier Plessier – 32, avenue du 8e Régiment des Hussards – Bâtiment 21
  68130 ALTKIRCH (France)
  www.synergys-technologies.com
- IP54
- Temperature of use: -5°C to +40°C for device, max +120°C for sensor on machine
- Battery: Typically 7 hours of use, recharged in 5 hours with provided charger
- Certified (With EMC following standards EN55011-EN61000/4-2+/4-3+/4-4+/4-6)
- Charger: 230V-50/60 Hz > 5VDC/2A (VSHOOTER® power consumption is about 6W)
- Size (case): 426 x 290 x 159 mm (16.77 x 11.41 x 6.26 inch), Weight (with case): 4.8 kg
- 2 years warranty for VSHOOTER® VBS1T device, 1 year warranty for its accessories (internal battery, charger, headphones and vibration ICP sensor)

VIBRATION SENSOR:

- ROBUST ICP ACCELEROMETER WITH FLAT MAGNET
- SENSITIVITY OF 100 mV/g
- FLEXIBLE CABLE 0,5-2m WITH BNC OUTPUT
- IP68
- F RESPONSE: 0,5-14.000 Hz (±3 dB)
- DYNAMIC RANGE: MAX 80g
- MAX T°: 120°C (CONTINUOUS)
- CALIBRATION CHECK: 5g@160 Hz

PACK DETAIL:

- 1X VSHOOTER® VBS1T DEVICE
- 1X CARRYING STRAP
- 1X UNIVERSAL POWER CHARGER 230 V - 50 Hz/60 Hz > 5 V/2 A
- 1X USB CABLE FOR PC CONNECTION
- 1X ICP ACCELEROMETER 100 mV/g WITH FLEXIBLE BNC CABLE
- 1X STRONG FLAT MAGNET FOR ACCELEROMETER
- 1X STRONG PLASTIC ABS CASE
- 1X STEREO HEADPHONE
- 1X USER MANUAL
- CALIBRATION & MANUFACTURER CERTIFICATES

FRONT FACE

Photo capture

Validation

Navigation

Home

On / Off

Data viewing
(Overall, FFT, Trend)

Machine default information
(Unbalance, Misalignment, Looseness, Bearing shock, Bearing lubrication)

REAR FACE

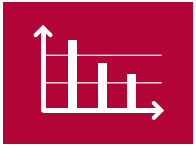

6x LEDs
for stroboscope
ICP Accelerometer
for vibration
Infrared pyrometer
for temperature
Camera for vision
Network power in
for battery charging
USB in / out for PC
connection & battery
charging

OVERALL VALUES (METRIC/IMPERIAL)

- **Vibration acceleration A** (g) in RMS from 1.000 to 10.000 Hz (for bearing condition).
- **Vibration acceleration A** in CREST=(0-P/RMS) from 1.000 to 10.000 Hz (for bearing condition).
- **Vibration velocity V** (mm/s) in RMS from 2 or 10 to 1.000 Hz according to ISO 10816.
- **Vibration displacement D** (µm) in P-P from 2 to 1.000 Hz (only in Multimeter mode).
- **Temperature T°** from 0 to 150°C with non contact infrared pyrometer (ε=1).
- **SPEED** from 30 to 30.000 RPM (0,5 Hz to 500 Hz) with LEDs stroboscope.

FFT SPECTRUM & AUTO DIAGNOSTIC (MET/IMP)

FFT SPECTRUM VALUES



- V (mm/s) in RMS from 2 to 500 Hz with detection of the 3 highest amplitude frequencies (Max3)
- A (g) in RMS from 2 to 10.000 Hz with information of shock (S) or lubrication (L) problems for bearing

AUTO DEFAULT DETECTIONS

- Imbalance (1x), often in radial
- Angular misalignment (1x), often in axial (if existing COUPLING)
- Offset misalignment (2x), often in radial (if existing COUPLING)
- Looseness (3x4x5x6x7x8x), often in radial
- ? = Any other default, amplitude and frequency (F1 or F2 or F3) will be detailed (mm/s, Hz)
- Bearing shock (S) if RMS in Alert(Orange)/Alarm(Red) and CREST >4
- Bearing lubrication (L) if RMS in Alert(Orange)/Alarm(Red) and CREST <3,9

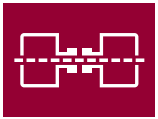
HOME

VIBRATION ANALYSIS PROGRAMS (With or without MCP): It launches vibration analysis programs. You can work with or without MCP (Machine condition picture).

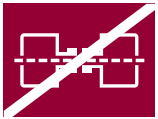
MEMORY (Data viewing or deleting or searching or trending or reporting): It allows access to all data stored in the memory.

SETTINGS (Date/Clock, Sensor sensitivity, Brightness, USB mode, Units, Headphones): It allows access to standard device settings.

COUPLING OR NO COUPLING?



MACHINE WITH COUPLING: It allows to check shaft alignment problems in AUTO DIAGNOSE mode via detection of angular or/ and offset gap vibration problems.



MACHINE WITHOUT COUPLING: It forbids to check shaft alignment problems in AUTO DIAGNOSE mode (no angular and no offset gap vibration problems).

VIBRATION ANALYSIS MODES

MCP MODE (Machine Condition Picture MODE with photo capture): It allows to start MCP measurement mode. Measurements with MCP can be saved in memory.

MULTIMETER MODE (Without MCP, so without photo): It allows to start MULTIMETER measurement mode. Measurements without MCP can not be saved in memory.

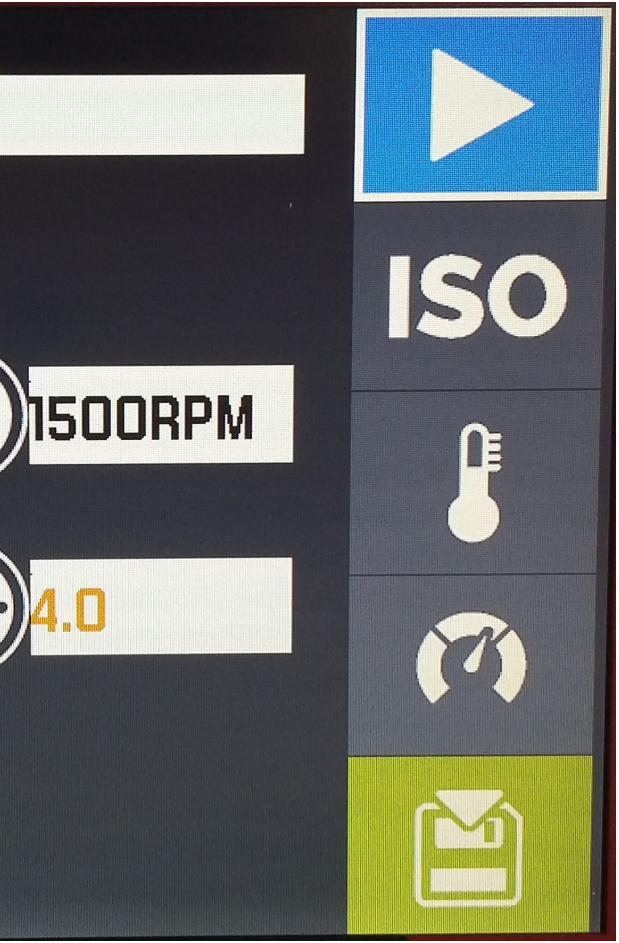
“MEASUREMENT” ICONS

Vibration measurement (RMS-V(mm/s) with 2 or 10-1000 Hz filter or Peak to Peak-D(µm) with 2-1000 Hz filter (only in Multimeter mode), chosen during “ISO Settings” Menu)

Bearing condition measurement (RMS-A(g) 1000-10000 Hz & CREST-A(w/o unit) 1000-10000 Hz)

Rotation speed measurement ((Rpm & Hz), using INTERNAL STROBOSCOPE or MANUAL ENTRY)

Temperature measurement (T° Celsius or T° Fahrenheit, using INTERNAL PYROMETER)



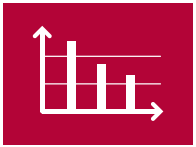
START / WAIT for measurements

SPEED measurement, T° measurement and ISO SETTINGS (CLASS + FILTER + ALARM activation or deactivation (V, A, T))

STORE DATA IN MEMORY (for each measurement point)

CAREFUL: FFT AUTO DIAGNOSE is taken because of Alert (orange) or Alarm (red) in V and/or A. This icon only appears after Alert (orange) or Alarm (red) detection in V and/or A. Only appears during measurement in place of WAIT icon.

FFT AUTO DIAGNOSE



Check on your machine if there is more Axial or Radial vibration at x1RPM, to confirm if it is more an unbalance or more a misalignment problem.

Possible Unbalance detected (often radially) **(H1;x1RPM)**

Possible Offset misalignment detected (often radially) (H2;x2RPM)

Possible Angular misalignment detected (often axially) **(H1;x1RPM)**

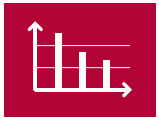
Any ordinary frequency (F1-F2-F3), ≠ Harmonics

Possible Looseness detected (H3 to H8;x3RPM to x8RPM)

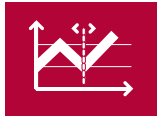
Possible Bearing problem detected (L for possible lubrication problem and S for possible shock problem)

GENERAL ICONS

ADD NEW MEASUREMENT POINT to be placed on the MCP (Machine Condition Picture): It places the measurement point on the picture with the joystick aim. Maximum is 10 points for one MCP.



FFT AUTO DIAGNOSE results: It gives detailed information regarding the machine defaults. Can be taken under alarm condition or always (see FFT Settings). Available in WITH and in WITHOUT MCP modes.



TREND VIEW: It shows the trend evolutions of V(RMS)-A(RMS & CREST)-T; TREND **CURSOR**: It shows the value/date for each measurement in one trend.

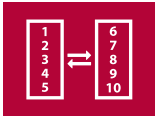
MEASUREMENT RESULTS DETAIL: It shows all measurement values in a table (if with only one date) and with TRENDS (if with several dates). You also have access to FFT AUTO DIAGNOSE if you got an Alert (orange) or an Alarm (red).

FILE DELETION: It allows to delete a selected file in memory.


STROBOSCOPE MODE or MANUAL RPM MODE: It is used when you need machine RPM information (necessary for AUTO DIAGNOSE FFT).

GO BACK TO MCP VIEW: It allows to go back to MPC view when you are on RESULTS DETAILS page.

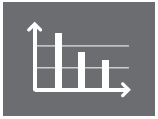
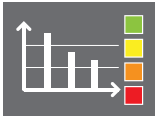
VALIDATION: It validates the settings you have made in a page.



ALTERNATE between table 1 (5 first measurement points) and table 2 (1 to 5 measurement points). Alternation is made by selecting this icon and clicking on buttons.

DATA REPORT EDITION: It is used to edit a report (.rpt) from an existing project (.prj). You can download this report file on your PC (via USB) to edit/store/print it (HTML file) or to open/edit it in WORD to make your own report.

ALARM REPORT EDITION: It is used to edit an alarm list report (.rpt) from global in memory machine list. You can download this report file on your PC (via USB) to edit/store/print it (HTML file) or to open/edit it in WORD to make your own report.

FFT SETTINGS: Always measured or under alarm conditions.

GENERAL SETTINGS

AUTO Power off settings



UNITS, BRIGTHNESS, CLOCK settings

USB MODE: It allows to connect VSHOOTER® VBS1T to PC with USB cable (REPORTING, DATA SAVING).


HEADPHONES SOUND LEVEL setting, SENSOR SENSITIVITY setting.

W/O ALERT/ALARM
To be setted under

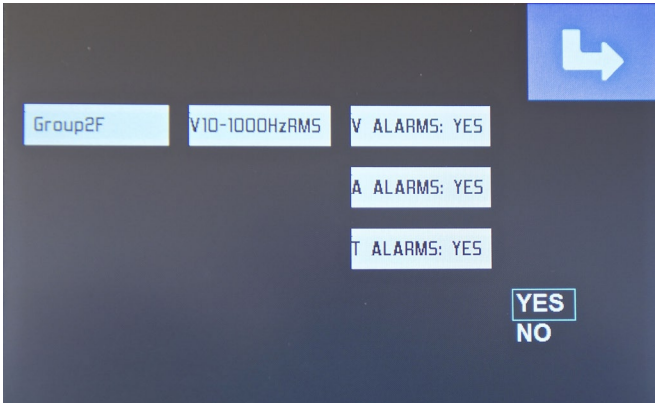
ISO

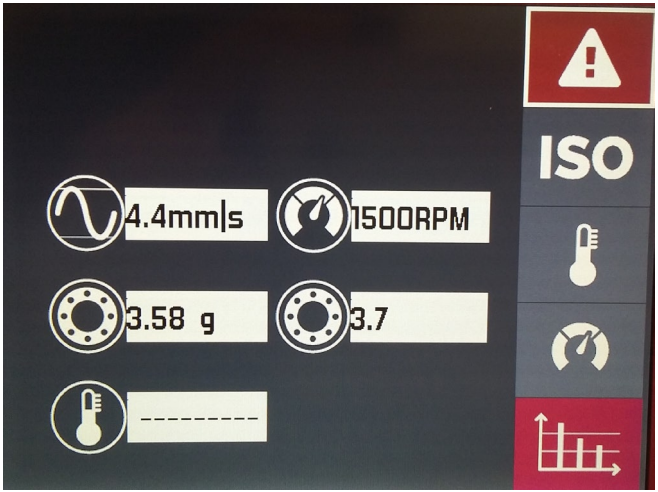
- You can deactivate V, A, T alert/ alarm threshold limits in your VSHOOTER®. Measurements will be so taken with grey/black color.

- Spectrums are taken automatically if you have deactivated V and A alarms.

- Go under **ISO**, select CLASS, FILTER, ALARM with joystick keyboard and (**OK**). After each modification (**OK** for each), click on (>) to move to next (CLASS to FILTER to ALARM V to ALARM A to ALARM T to ↳).

Ex: V(mm/s) and A(g) alarms are deactivated here.





ALERT/ALARM WITH ISO 10816-3 and ISO 10816-7

ISO

ISO GROUP DETAIL: 10816-3 for Motor/Screw compressor/Blower/Fan and 10816-7 for Pump

ISO 10816-3 (for Motor, Screw compressor, Blower, Fan):

- **Group1** = Large machine with power > 300 KW and < 50 MW (With foundation r=rigid, f=flexible)
- **Group2** = Medium machine with power < 300 KW (With foundation r=rigid, f=flexible)

ISO 10816-7 (for Pump):

- **Cat1** = Critical rotodynamic pumps (With power L < 200 KW , H > 200KW)
- **Cat2** = Less critical rotodynamic pumps (With power L < 200KW, H > 200KW)

For speed > 600 RPM use 10 - 1000 Hz filter.

For speed > 120 RPM use 2 - 1000 Hz filter (with V-RMS).

ISO (V(mm/s) - RMS):

On 2 or 10 - 1000 Hz filter

GROUP 1 & 2	OK	ACCEPTABLE	ALERT	ALARM
RIGID F1	2.3	4.5	7.1	> 7.1
FLEXIBLE F1	3.5	7.1	11.0	> 11.0
RIGID R2	1.4	2.8	4.5	> 4.5
FLEXIBLE F2	2.3	4.5	7.1	> 7.1

CAT. 1 & 2	OK	ACCEPTABLE	ALERT	ALARM
CAT1L < 200 kw	2.5	4.0	6.5	> 6.5
CAT1L > 200 kw	3.5	5.0	7.6	> 7.6
CAT2L < 200 kw	3.2	5.1	8.5	> 8.5
CAT2L > 200 kw	4.2	6.1	9.5	> 9.5

ALERT/ALARM
Bearing condition

Bearing condition (A(g) - RMS)

On 1000 - 10000 Hz filter

RPM	OK	ACCEPTABLE	ALERT	ALARM
< 499	0 to 0.2	0.21 to 0.5	0.51 to 1.7	> 1.71
500 to 749	0 to 0.35	0.36 to 0.7	0.71 to 2.1	> 2.10
750 to 999	0 to 0.5	0.51 to 1.0	1.1 to 3.5	> 3.50
1000 to 1249	0 to 0.6	0.61 to 1.1	1.2 to 4.5	> 4.50
1250 to 1499	0 to 0.8	0.81 to 1.3	1.31 to 5.1	> 5.10
1500 to 1749	0 to 0.9	0.91 to 1.5	1.51 to 6.0	> 6.00
1750 to 1999	0 to 1.0	1.1 to 1.7	1.71 to 7.0	> 7.00
2000 to 2499	0 to 1.0	1.1 to 1.8	1.81 to 7.5	> 7.50
2500 to 2999	0 to 1.2	1.21 to 2.0	2.1 to 8.0	> 8.00
3000 to 3499	0 to 1.35	1.36 to 2.2	2.3 to 10.0	> 10.00
3500 to 3999	0 to 1.5	1.51 to 3.0	3.1 to 11.0	> 11.00
4000 to 4999	0 to 2.0	2.1 to 4.0	4.1 to 14.0	> 14.00
5000 to 7499	0 to 3.0	3.1 to 6.5	6.6 to 20	> 20.00
7500 to 9999	0 to 4.5	4.6 to 8.0	8.1 to 26.0	> 26.00
> 10000	0 to 4.5	4.6 to 8.0	8.1 to 26.0	> 26.00

Bearing condition (A-CREST):

On 1000 - 10000 Hz filter

(CREST = O-PEAK/RMS)

1 TO 2,5	OK	≈ Lubrication
2.6 TO 3.9	ACCEPTABLE	
4.0 TO 5.9	ALERT	≈ Shock
> 6	ALARM	

Temperature (°C ε = 1)

On « bearing housing »

< 35	OK
36 to 46	ACCEPTABLE
47 to 67	ALERT
> 68	ALARM

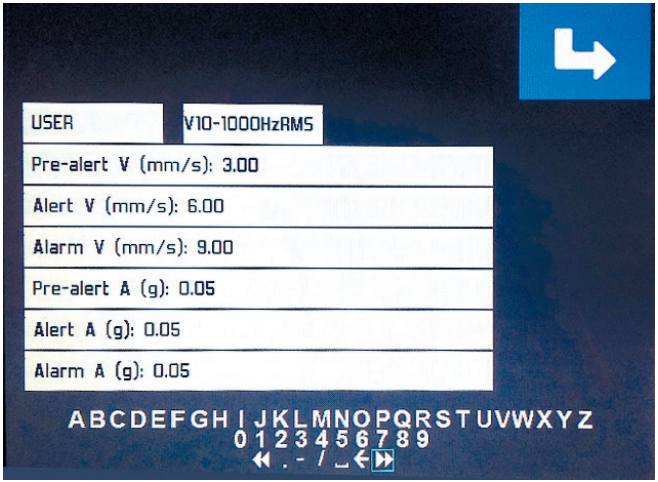
USER ALERT/ALARM

Select **ISO** and select **USER** to create your own tresholds:

3X for pre-alert, alert, alarm dedicated to v (mm/s).

3X for pre-alert, alert, alarm dedicated to a (g).

Put the desired value for each line and valid it with ▶▶ or with the blue icon ↳.



In MCP creation, each measurement point has it own USER Settings to be created (no automatic copy).

HOME

MEASURE ICON

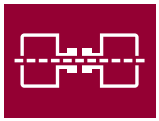
Switch ON with ⏻, wait about 5 seconds.

Start a new project with or without MCP (Machine Condition Picture) by selecting the icon with < > and valid it with OK.

You can also see, in the up & right corner, the battery status in %. “Load” information if in charge.

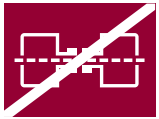
COUPLING OR NOT COUPLING ?

To be selected with > and OK. < will go back to HOME screen.



MEASURE COUPLING

Your machine has a direct coupling.

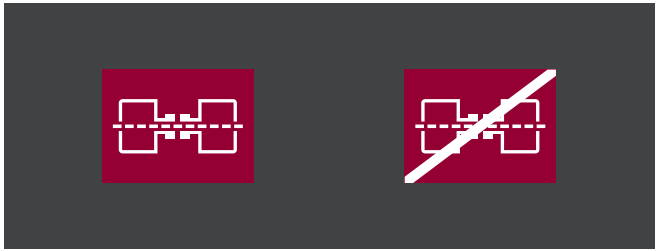


MEASURE WITHOUT COUPLING

Your machine has no direct coupling (belt transmission or else).

This will help to valid or not the presence of MISALIGNMENT in the AUTODIAGNOSE.

(Angular and Offset misalignment at 1x, 2x)



MEASURE WITHOUT MCP

To be selected with > and OK. < will go back to COUPLING screen.

MEASURE WITHOUT MCP

You can measure all data, without Machine Condition Picture (MCP).

Here, it is not possible to store data in memory. It is a only special MULTIMETER MODE for a fast checking.

Auto Diagnose Alarm FFT is made (please inform your RPM machine speed (± 30 RPM)).

WHAT CAN YOU MEASURE ?

- ISO V-RMS vibration (mm/s) or D-Peak-Peak vibration (µm)
- RPM (Manual or Stroboscope)
- A-RMS bearing (g)
- A-CREST bearing (no unit)
- T°(infrared pyrometer)
- FFT : V & A (for bearing)

HOW DOES IT WORKS GENERAL?

Before starting measurement , please check the ISO settings* ISO (ISO ALARM or NO ALARM or USER ALARM).

RPM is also important to be checked if you want a right AUTO DIAGNOSE RESULT** .

You can also take the temperature T° .

(*) Standard ISO is Group2F with 10-1000 Hz filter.
(**) Standard RPM value is 1500.

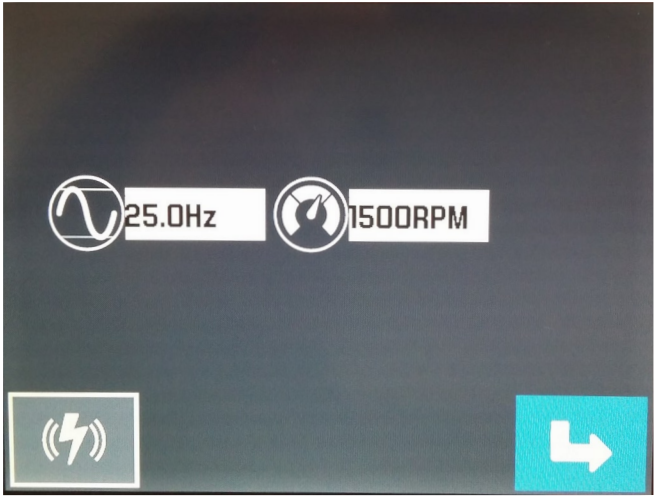
HOW DOES IT WORKS ?

RPM

When you click on RPM , you will have this menu.

With OK, you switch between MANUAL and STROBOSCOPE .

Modify RPM values with and keyboard buttons. When it is OK for you, valid with , with & OK.



HOW DOES IT WORKS ?

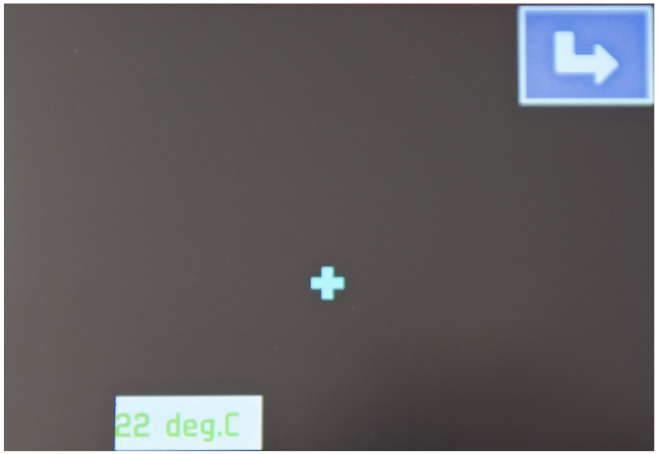
TEMPERATURE

When you click on T° icon , you will have this menu. T° is colorized thanks to its value.

You can measure the temperature T° with the infrared sensor, T° is taken around cross ✚.

It is an approximate T° measurement with a Ɛ=1 (emissivity factor). Valid value with OK.

The best capture distance is from 0,15m to 0,3m.
Valid page with .



MEASURE WITH MCP

MEASURE WITH MCP

You start by taking the machine picture, then by collecting all measurements points to create your MACHINE CONDITION PICTURE (MCP). This MCP can be stored in the memory and can be updated in time (TRENDING).

Of course, you can also make a report of it.

MACHINE NAME ?

You are invited to give a machine name with the joystick keyboard and OK.

Then you valid name with *.

(*) With , you will get . Then click on OK.

PHOTO CAPTURE

You are invited to take machine picture with . If photo is not OK, you can take it again with . If machine photo is finally OK, you valid it with OK. You will then have this screen.

POINT CREATION

You are invited to place the 1rst measurement point on the photo with the joystick keyboard. Then, you valid its position with OK. The following is created with and OK.

You can put 10 measurement points on a MCP.

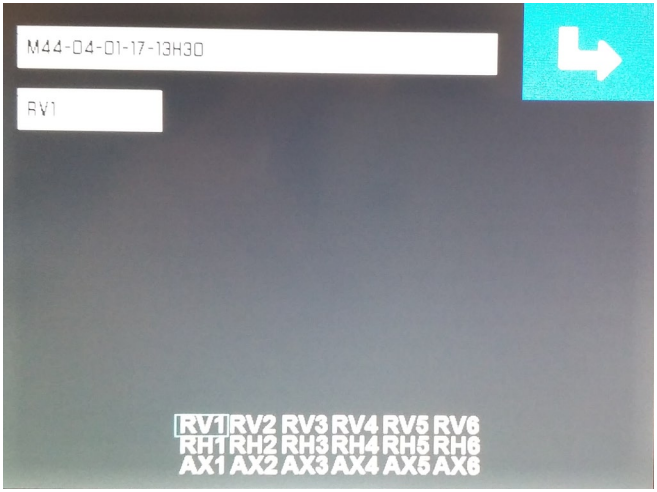
POINT NAME

Machine is time stamped. You are invited to choose a name* to your measurement point with the joystick keyboard.

Valid this name with OK. Then valid ↳ with OK.

It is not possible to have a same name for different points (↳ and OK will not be valide if two same name).

(*) RV for radial vertical, RH for radial horizontal, AX for axial.



MEASUREMENT

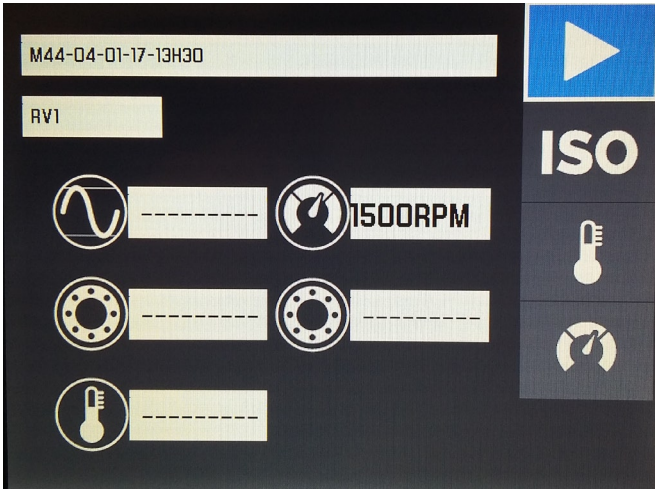
Put your accelerometer sensor on the right place.

Fulfill RPM and T° (if needed).

Lets start measurement with START ▶ (via OK). Then store the result with green SAVE icon with OK *.

In ISO ISO, you can define ISO class and vibration filter (V-RMS 2 & 10-1000 Hz) and alarms threshold levels. To be done before START if special ISO or USER is needed.

(*) SAVE icon will only appear when the measurement is finished.



REPEAT OR FINISH

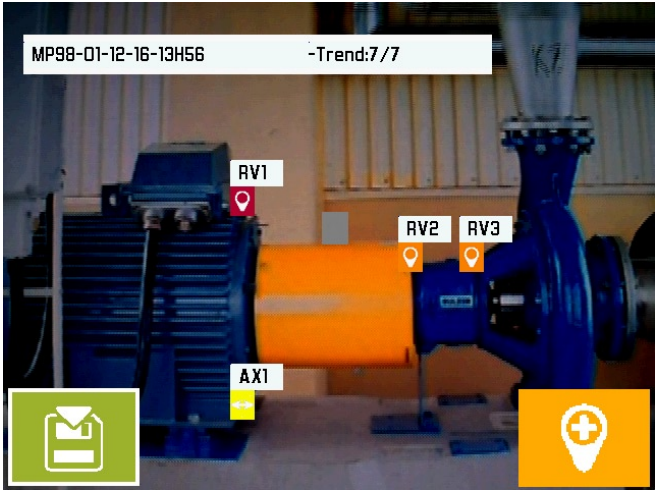
Repeat the procedure for each point (10 maximum).

RPM will be automatically updated for each point.

When MCP is finished, click with on the green SAVE to save the MCP in memory.

CAREFUL !

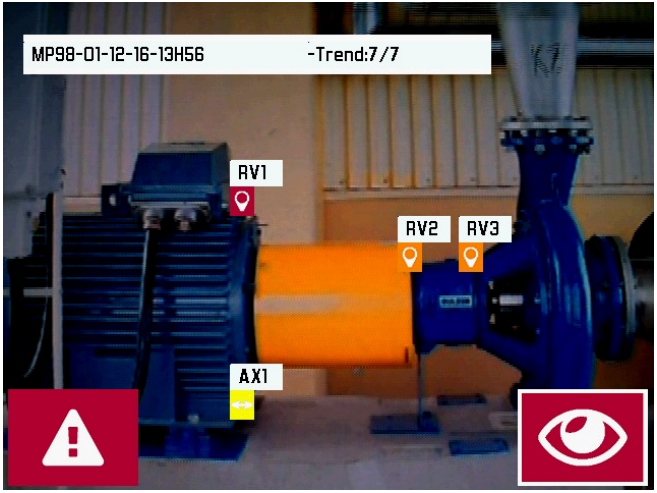
You can not add new measurement point when MCP is finished and saved. Only new measurements can be done (TRENDING) on saved measurement points.



DEFAULTS AND DATA

Then, you will see the final MCP with 2 icons: the EYE icon to see results details and the CAREFUL icon to see defaults details, calculated from AUTO DIAGNOSE FFT.

Of course, if you want to stop the job on this machine, you can click on button.

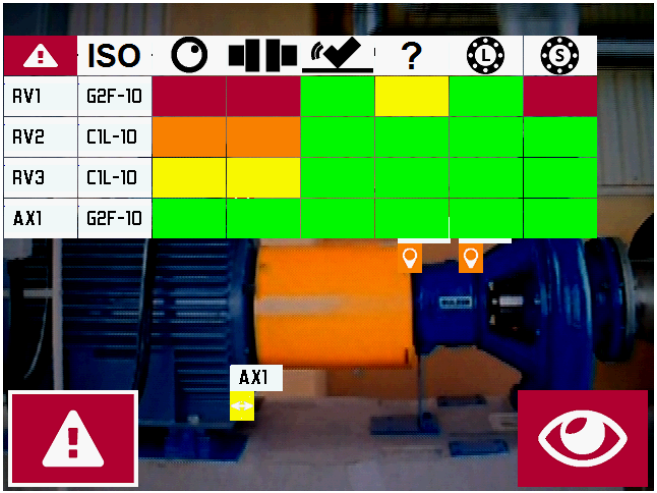


DEFAULTS DETAIL (max 10 points)

If you click on the CAREFUL , you will see a table with the point names and default details (Imbalance, Misalignment, Looseness, Other, Bearing Lubrication, Bearing Shocks, calculated from AUTO DIAGNOSE FFT).

Alert is **orange**, Alarm is **red**.

If you click on the EYE , you will see all overall value measurement data.



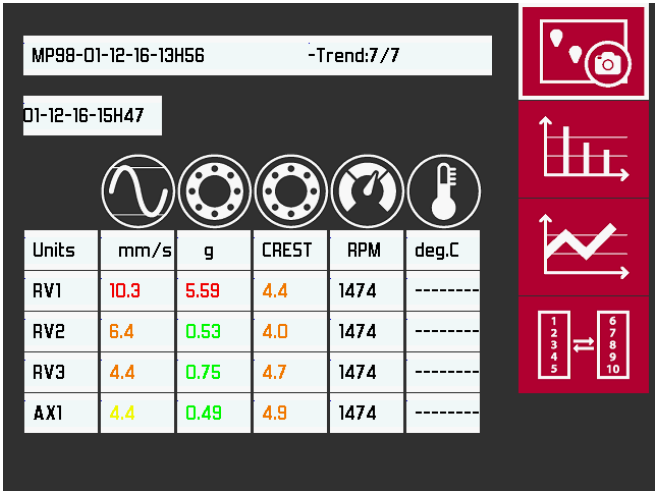
DATA DETAIL

With and or OK, alternately, you see all points (5 per table, 10 maximum).

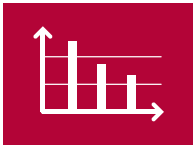
If you have "multidate" data, you can also see trends by clicking on TREND icon .

If you need to see AUTO DIAGNOSE FFT for a measurement point, click on FFT icon .

Go back to the MCP with MCP BACK icon .



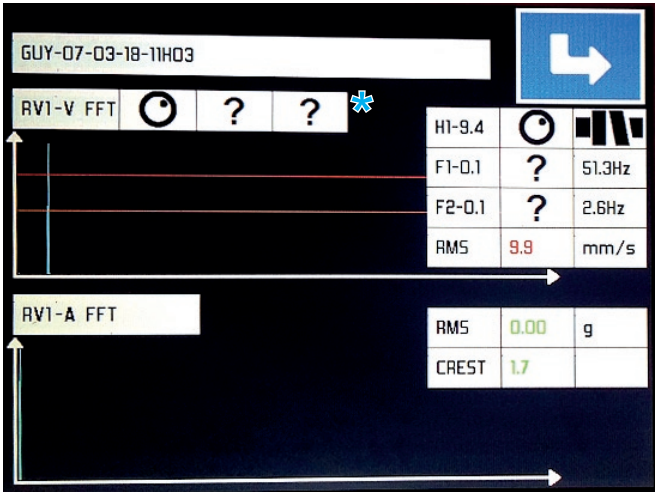
FFT DATA DETAIL



Depending on GENERAL SETTINGS - FFT, FFT data will be taken under alarm condition or always. Only the last FFT is stored in memory.

2x FFT spectrums are taken: V-Velocity (mm/s) on 2-500 Hz & A-Acceleration (g) on 2-10000 Hz.

To view all the machine point FFTs, use < and >.



MAX3 DATA DETAIL (mm/s)

Only the 3 highest amplitude frequencies are presented (Max3) in the V-FFT *.

These Max3 frequencies can be or any ordinary F.

Any ordinary ? will be detailed with F1-F2-F3 (Hz) and their amplitude (mm/s) values.

You can also see RMS overall values.

DATA AND FFT INFORMATION

CAREFUL !

You can have an overall vibration level V-RMS in ORANGE or RED, but with GREEN or YELLOW standard defaults (imbalance, misalignment, looseness), because the major default may also be different than x1, x2, x3, x8 harmonics.

Of course, in this case, you will see the value of its amplitude and its frequency in the ALARM FFT SPECTRUM information icon .

So, a measurement point on the MCP can be **ORANGE** (RMS-V overall ISO value), with YELLOW Imbalance default for example

Do not forget RMS-V is calculated on 10-1000 Hz, so several YELLOW defaults can result in a ORANGE RMS-V value.

MEMORY ACCESS

Review a stored file or update a stored file (trending). File deletion is also possible.

You can store about 1000 projects.

Select this icon with < > and valid it with OK.

MEMORY DELETION

You have selected a file in the list (in green), you have clicked on DELETION icon .

You need to confirm DELETION with or and OK for validation.

MEMORY DETAIL

OK TO OPEN A SELECTED FILE FOR DATA VIEWING

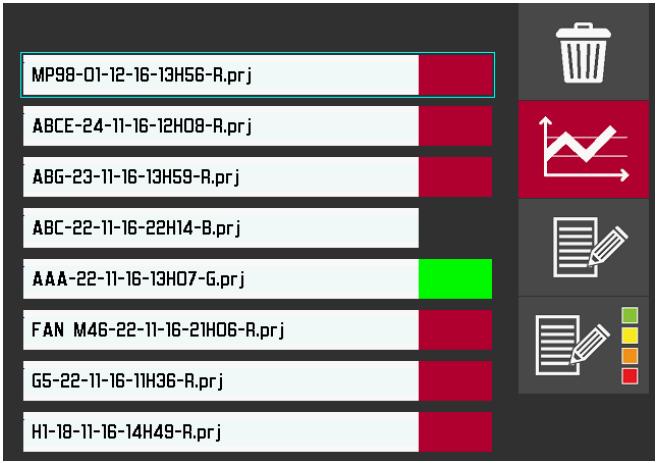
FOR PROJECT FILE DELETION

TO OPEN A PROJECT FILE FOR TRENDING

FOR REPORT EDITION (for one selected file)

FOR ALARM REPORT EDITION (for all files)

You can select/open DELETION or TREND with a preselected file (green) and < > OK buttons.



MEMORY TREND VIEW

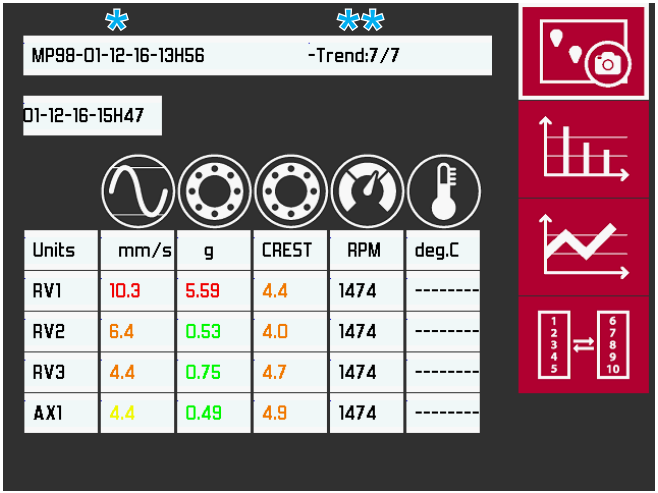
TREND VIEW

You have selected a file in the list (green), you have clicked on OK.

* is project creation date.

** is last point measurement date (7/7).

You can select & view last results of FFT or TRENDS with for validation. You can go back to MCP .



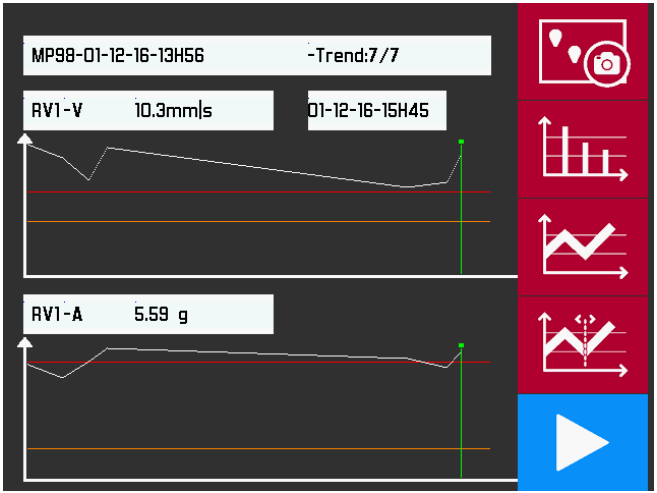
ALL POINTS

You have clicked on TREND icon .

If you select again TREND icon and , you can view all MCP TRENDS.

Only last date measurement (green line) will be shown as values.

1 file = V-RMS;A-RMS;A-CREST and T° if taken.



ALL IN DETAIL

You have clicked on TREND icon .

If you select TREND DETAIL icon and , you can view details for a selected TREND.

All measurements (green line) will be shown as values.

NEW MEASURE

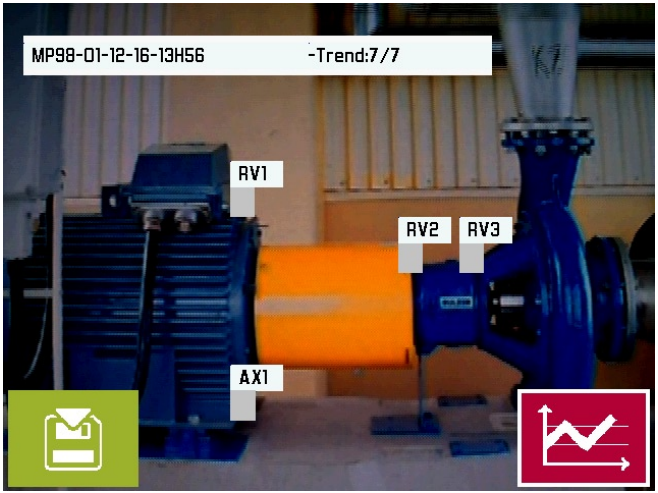
You are ready to start new TRENDING measure .

Now, you have to click on TREND icon to select a point (in any order) and start new measurements.

All location points will be firstly grey and will become colorized when measurement will be done.

At the end, select SAVE icon and valid it with OK.

TREND curves will be updated in the memory.



SETTINGS ICON

You can access here to all VBS1T settings.

Select this icon with < > and valid it with OK.

DETAIL

Setting of sensor SENSITIVITY
(Please do not change it! For calibration check)

USB MODE for PC connection

Screen BRIGHTNESS

CLOCK/DATE

UNITS (mm-°C or inch-°F)

HEADPHONES LEVEL

FFT Mode: Standard (always) or under alarm conditions

AUTO Power Off Settings

USB PC CONNECTION

Connect VSHOOTER® to your PC via USB.

Click on PC USB MODE icon  and wait WINDOWS connection.

It can take some seconds depending of WINDOWS version. If VSHOOTER® reboot, please do it again.

After data/report PC download, disconnect your USB cable from your PC, VSHOOTER® will reboot automatically after some seconds.

REPORTING ON PC

Do not forget to transform your Project file (.prj) into Report file (.rpt) with  ***before downloading the report to your PC.***

If your USB connection is OK, you can view all your data on your PC.

Copy & Paste the .rpt files you want to print or save (REPORT directory). You can view each report by clicking on the .html (you can also edit it in WORD, if you want to modify or personalize the report).

You can also save your .prj for data security saving (PROJECT directory).

Report files are named: xxx.rpt (Reports) and Alarmlist.rpt

Original project data files are named : xxx.prj (Projects).

***CAREFUL !** ON VSHOOTER USB MEMORY :*

Do not touch/delete "no_erase_please" directory.

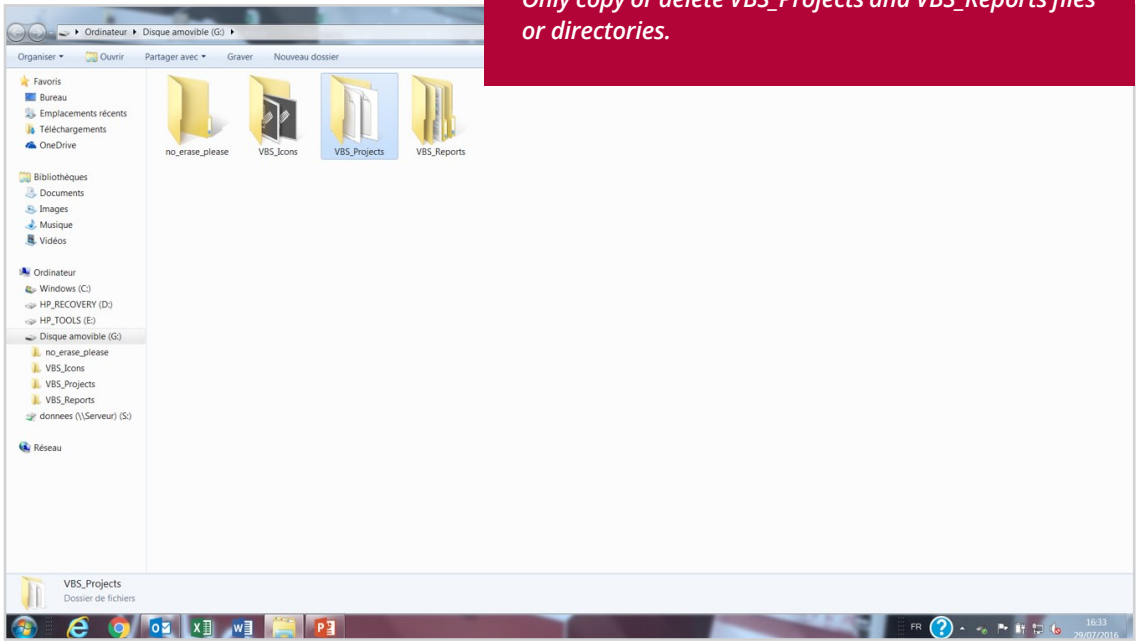
Do not touch/delete "VBS_Icons" directory.

Only copy or delete VBS_Projects and VBS_Reports files or directories.

VBS Projects are your data, you can make a copy for security.

VBS Reports are your reports, you can make a copy for reporting.

You can copy/paste them to your PC for data and report saving.



INTRODUCTION

VIBRATION ANALYSIS

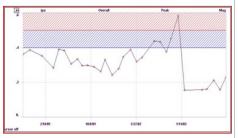
Predictive maintenance with vibration measurements for rotating machine can be taken following measurements:

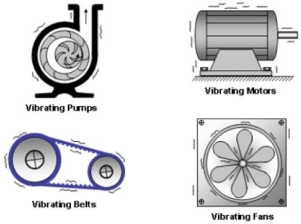
- Velocity (mm/s) for Free Body Vibration detection like Unbalance, Misalignment, Looseness, Resonance
  We use for that, low frequency filters like 2 or 10 -1000 Hz (ISO 10816)
- Acceleration (g) for shock/friction detection like in Bearing, Cavitation
  We use for that, high frequency filters like 1000-10000 Hz

We can follow machine condition in time with LEVEL 1 measurements (TRENDING-OVERALL VALUES).

When LEVEL1 measurements are excessive, you can analyze machine condition with LEVEL 2 measurements (FFT SPECTRUM or else).

75% of vibration problems on standard machineries are coming from Unbalance, Misalignment, Looseness and Bearing condition.





STANDARD DEFAULTS

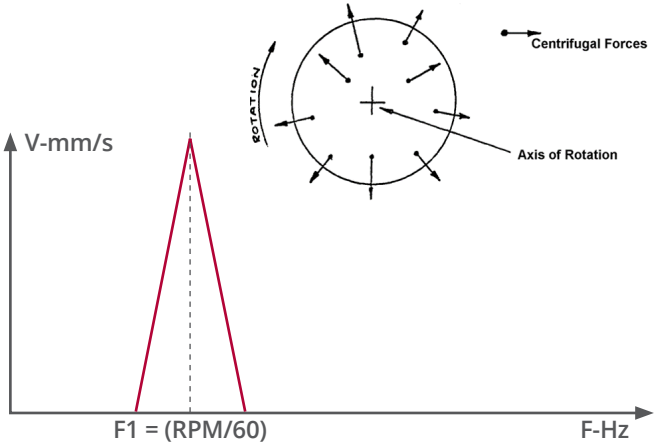
UNBALANCE

A rotor is unbalanced when the mass center is different than the rotation center.

Unbalance is the most common cause of rotating shaft failure or mechanical breakdown.

It appears in **radial direction** and it is often dominant in horizontal plan.

Value of Unbalance vibration frequency is at x1 (RPM/60), also called Fundamental.



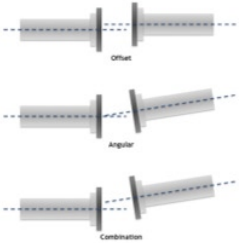
MISALIGNMENT

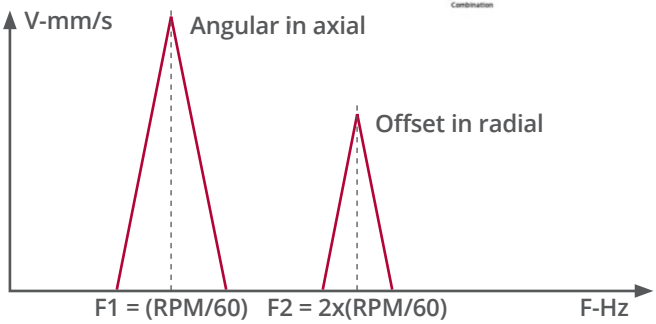
Misalignment is a combination of horizontal and vertical Offset and Angular gaps you can have between 2 machine rotation axes.

Misalignment creates large forces to the bearings.

It appears in **radial direction (OFFSET at x2 RPM)** and in **axial direction (ANGULAR at x1 RPM).**

Values of Misalignment vibration frequencies are at x1 (RPM/60), also called Fundamental and at x2 (RPM/60) called Harmonic 2.





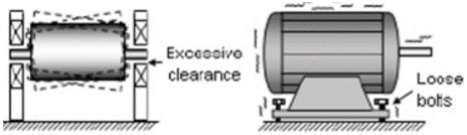
LOOSENESS

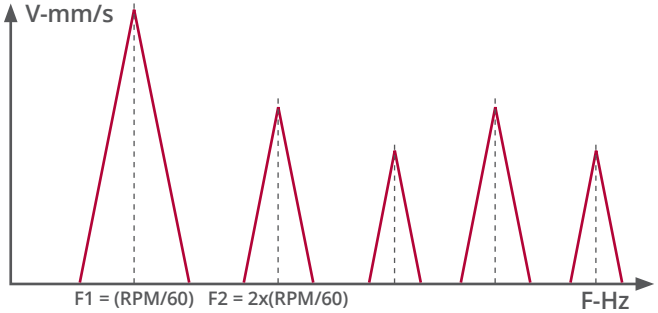
Looseness is coming from a mechanical loose foot, a foundation fixation problem, when rotation components do not fit correctly.

Looseness can create large vibration on all machine. Check on bearing and on fixation.

It appears in **radial direction** with a special high level of harmonics frequencies (x2x3x4x5x6x7x8).

Values of Looseness vibration frequencies are at x1 (RPM/60), 2x (RPM/60), 3x (RPM/60)





BEARING CONDITION (SHOCK AND LUBRICATION)

Bearing condition can be measured on a rotating machine with overall acceleration value (A-RMS in g).

RMS value with a high frequency filter (ex: 1000-10000 Hz) will give a global condition of it.

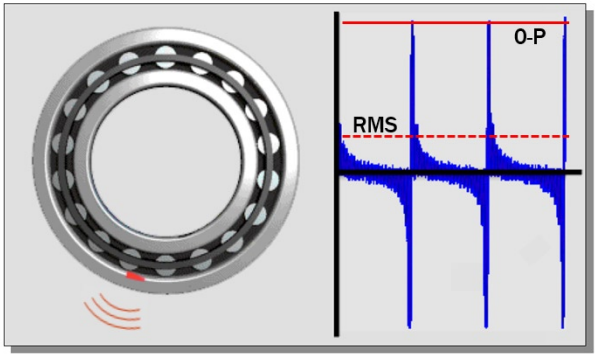
0-PEAK or CREST values can help to check if there is more lubrication or shocks problems in it.

For bearing condition, we will only follow the LEVEL1 (TRENDING) in RMS and CREST.

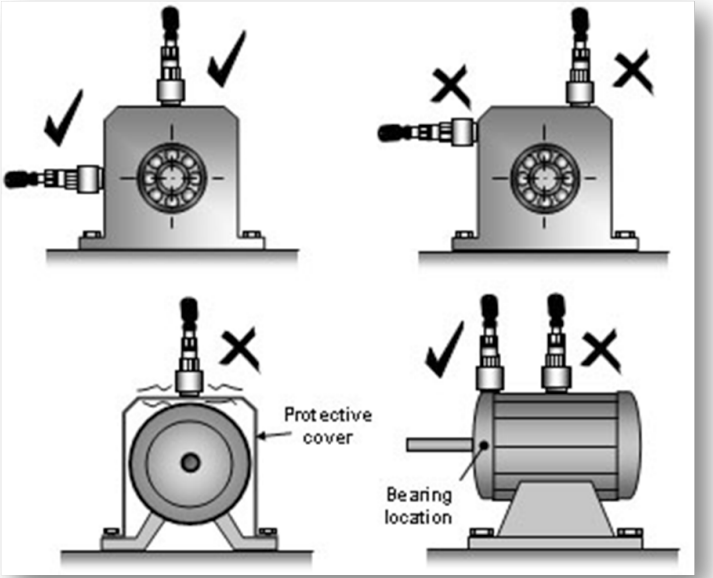
T° trending curve can also help you to take a decision before to repair.

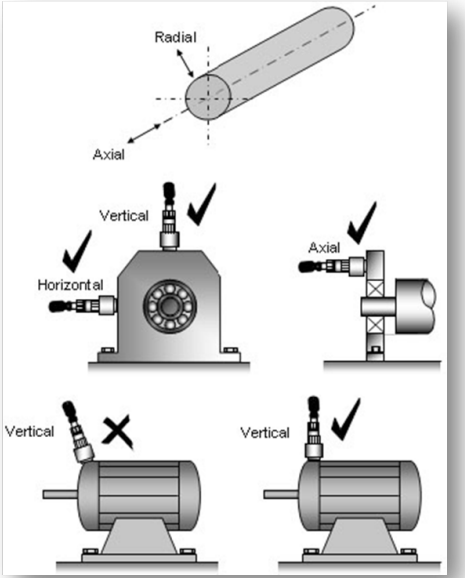
For a good bearing analysis, please be careful about your contact point quality.

Impulses from a damaged bearing



BE CAREFUL ABOUT SENSOR POSITION !





LEAK**SHOOTER**®

LKS**1000-V.2**

Synergys Technologies is also the inventor of the ultrasonic compressed air, gaz and vacuum leak detector with camera LEAKSHOOTER**®.**

Film, view and photograph the precise spot where compressed air, steam, pressurised gas and vacuums are leaking using the LEAK**SHOOTER**® LKS**1000-V.2**.

Extremely sensitive, it is capable of finding all leaks, even the smallest, including those no bigger than the size of a syringe needle, at a distance of 15 metres.

The LEAK**SHOOTER**® LKS**1000-V.2** is used like a camera. When it comes near a leak, a dynamic yellow target appears on the large colour screen.

It is then possible to photograph and save the precise location of the leak. Each photo is numbered, dated and timed and shows the dB RMS level of the leak. The photos can be uploaded directly onto a PC via a USB cable.

Various accessories are available for the LEAK**SHOOTER**® LKS**1000-V.2** enabling it to be used for other applications as well as leak detection.

SYNERGYS TECHNOLOGIES has been established in 1996 in France, to offer innovative and professional solutions for preventive and predictive maintenance.

SYNERGYS TECHNOLOGIES is the inventor of the ultrasonic visualization concept with the LEAKSHOOTER® and of the MCP (Machine Condition Picture) concept with the VSHOOTER®.

We are present worldwide with professional and trained distributors.

SYNERGYS
TECHNOLOGIES