

LEAKSHOOTER-LKS1000-V.2

ULTRASONIC DETECTION CAMERA (PATENTED)

USER MANUAL (VERSION 3.0)



WHAT IS LEAKSHOOTER LKS1000-V.2?

LEAKSHOOTER LKS1000-V.2 IS A PORTABLE DEVICE WHICH GIVES YOU THE POSSIBILITY TO HEAR, MEASURE, VIEW AND STORE THE LEAKS.

MAIN FUNCTIONS:

- DETECTION AND LOCALIZATION OF ULTRASOUND THANKS TO AUTOMATIC DYNAMIC TARGET
- LISTEN TO THE ULTRASOUND WITH HETERODYNE TECHNIQUE (40kHz > 2.5kHz)
- MEASURE AND DISPLAY OF RMS IN REAL TIME AND MAX RMS ON A COLORED BARGRAPH
- VISUALIZATION ON SCREEN OF ULTRASONIC WAVES PRESENCE (EXACT LOCATION OF LEAK)
- NUMBERED AND STAMPED RECORDING OF THE BITMAP WITH ALL ULTRASONIC INFORMATION

LEAKSHOOTER LKS1000-V.2, THE FIRST ULTRASONIC DETECTION CAMERA DEDICATED TO LEAKS, THOUGHT AND DEVELOPED BY LEAKSHOOTER, A DIVISION OF SYNERGYS TECHNOLOGIES (FRANCE).



BENEFIT OF ULTRASOUND TECHNIQUE TO FIND GAS LEAK (COMPRESSED AIR OR OTHER ELSE GAS UNDER PRESSURE / DEPRESSURE)

WHEN A GAS MOVE FROM A HIGH PRESSURE STATE (COMPRESSED AIR IN A PIPE AT 6 BAR FOR EXAMPLE) TO A LOW PRESSURE STATE (LEAK IN A PIPE FOR EXAMPLE, WITH EXTERNAL ATMOSPHERE PRESSURE), THERE IS A DEPRESSION PHENOMENON WHICH CREATE A TURBULENCE (SEE FIG 1).

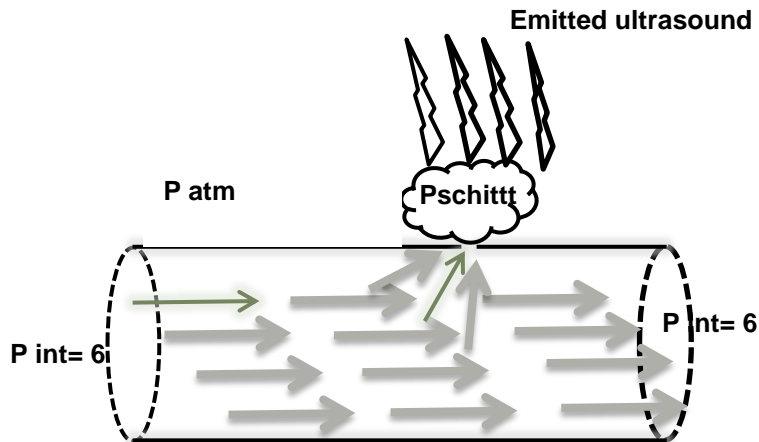


FIG 1

THIS TURBULENCE GENERATES A NOISE WITH LARGE FREQUENCY SPECTRUM WHICH CONTAINS THE ULTRASOUND, DUE TO THE FRICTION OF THE MOLECULES (AIR FOR EXAMPLE) THROUGH THE ORIFICE.

HUMAN HEARS CORRECTLY UP TO 20 KHZ. SO, HUMAN DOES NOT HEAR THE ULTRASOUND WHICH ONLY START AT THIS FREQUENCY.

THIS IS WHY, BY USING VERY SENSITIVE ULTRASONIC DETECTOR AND HETERODYNE TECHNIQUE, OFTEN CENTERED AROUND 40 KHZ, IT IS POSSIBLE TO FIND AND LISTEN TO THE LEAK, EASILY.

WHY ULTRASONIC WAVES ARE EASY TO FIND WITH AN ULTRASONIC DETECTOR?

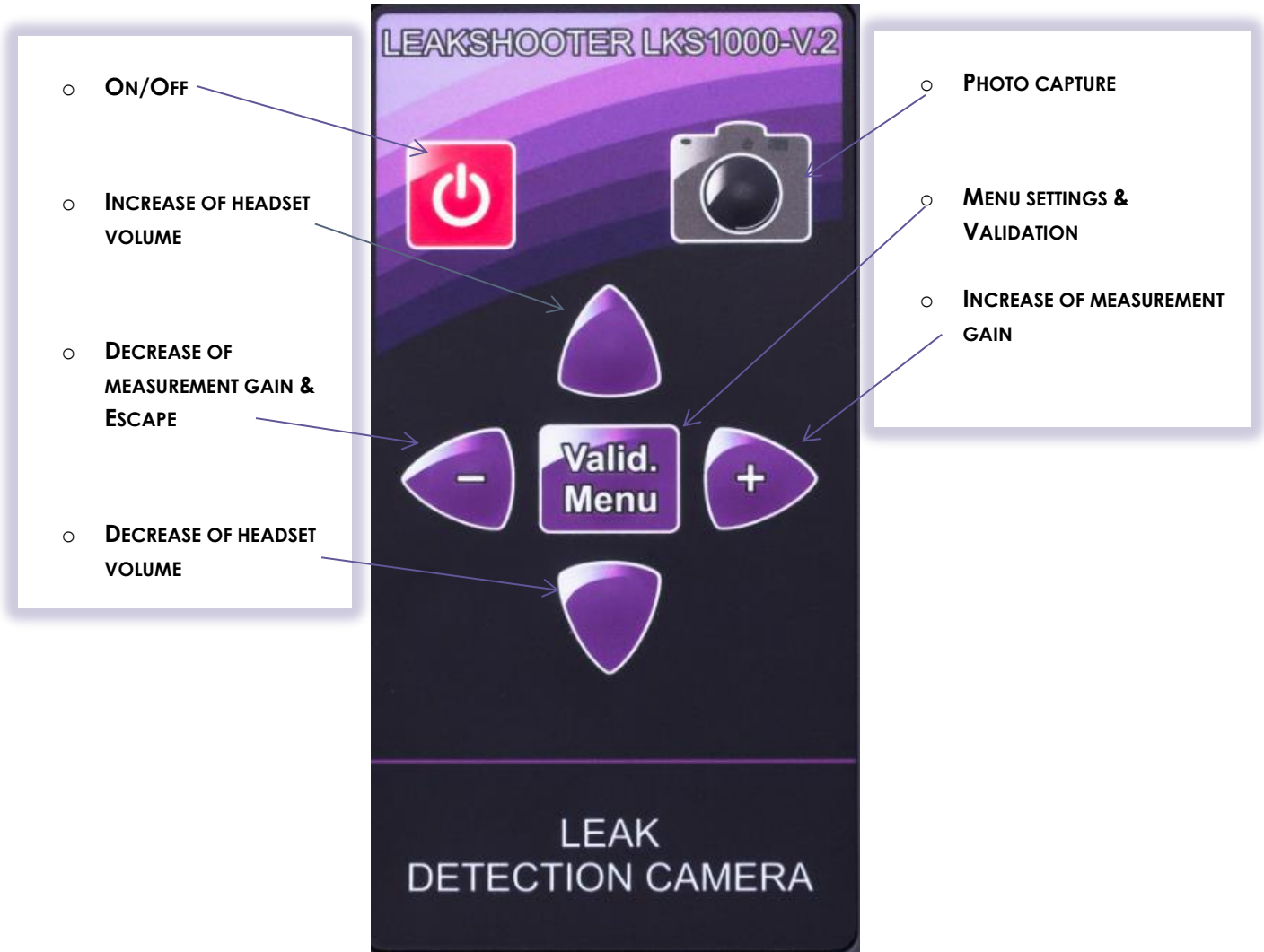
- THEY ARE VERY DIRECTIONAL, THEY EMIT IN A PRECISE DIRECTION
- THEY GENERATE A STRONG ULTRASONIC INTENSITY NEAR THEIR EMISSION SOURCE, DECREASING QUICKLY WHEN LEAVING AWAY FROM THE LEAK
- THEY CAN BE EASILY HEARD THANKS TO HETERODYNE TECHNIQUE (DEMODULATION OF A HIGH FREQUENCY WAVE (HERE, ULTRASOUND NOT AUDIBLE FOR HUMAN) TO LOW FREQUENCY (AUDIBLE FOR HUMAN))
- THEY CAN BE DETECTED IN A NOISY INDUSTRIAL ENVIRONMENT, CORRECTLY FILTERED BY THE DETECTOR



ULTRASOUND TECHNOLOGY HAS THE MAJOR ADVANTAGE TO BE EASY TO USE AND ACCESSIBLE TO EVERYONE.

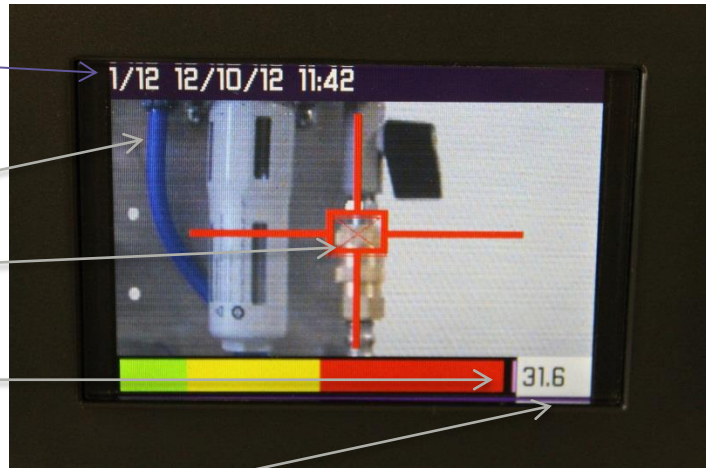
DESCRIPTION OF LEAKSHOOTER LKS1000

- **KEYBOARD**



- **COLOR SCREEN**

- **PHOTO NUMBER AND TIMESTAMP STORED IN MEMORY**
- **CAMERA REAL TIME VIEW**
- **DYNAMIC TARGET SHOWING LEAK ZONE**
- **REAL TIME RMS AND MAX RMS VALUES**
- **RMS MEASUREMENT VALUE**



- **CONNECTORS ON BOTTOM VIEW**

- **POWER**
- **USB PC**
- **JACK FOR AUDIO HEADPHONE**



- **CONNECTOR ON TOP VIEW**

- **JACK FOR EXTERNAL PROBE**



LEAKSHOOTER LKS1000 KIT DETAILS:

- ALUMINUM TRANSPORT CASE - LKS CASE
- ULTRASONIC DETECTION CAMERA – LKS 1000-V.2
- HEADSET WITH JACK CABLE (SNR 31) - LKS EAR
- UNIVERSAL BATTERY CHARGER – LKS POWER
- USB CABLE FOR PC – LKS USB



FLEXIBLE US SENSOR 400 MM OR 1500 MM AND CONTACT PROBE ARE OPTIONS FOR LKS1000-V.2:



BATTERIE CHARGING:

LEAKSHOOTER LKS1000-V.2 IS EQUIPPED WITH A LITHIUM-ION BATTERY. ITS CAPACITY IS AROUND 6 HOURS, DEPENDING OF SETTING USES (CAMERA ACTIVATED OR NOT, SCREEN BACKLIGHT...).

IT CAN BE CHARGED WITH ONLY DELIVERED UNIVERSAL BATTERY CHARGER KIT (5V DC, 2A) OR WITH USB UNIVERSAL CHARGERS (5V DC, 1 OR 2A) LIKE FROM YOUR PC, CAR ADAPTER, EXTERNAL BATTERY...

FOR EXTERNAL USB BATTERY, WE DELIVER IN OPTION, LKSBATT WHICH IS A POWERFUL 5V DC AND 2 A PORTABLE USB BATTERY.

YOU CAN USE LKSBATT FOR USING (THEN YOU WILL HAVE MORE THAN 12 H OF USE) OR FOR CHARGING YOUR LKS1000-V.2

CHARGING TIME IS AROUND 5 HOURS.

CAREFUL! :

THANKS TO BE CAREFUL WHEN GETTING MESSAGES ON LEAKSHOOTER LKS1000-V.2 SCREEN ABOUT BATTERY CHARGING INSTRUCTIONS.

LEAKSHOOTER LKS1000-V.2 AUTOMATICALLY SWITCH OFF, WHEN VOLTAGE BATTERY IS TOO LOW (BATTERY EMPTY).

TO HAVE THE BEST CHARGING TIME, THE BEST CAPACITY, YOU SHOULD CHARGE BATTERIES ONLY WHEN MESSAGE APPEARS.

IMPORTANT: IF YOU DO NOT WANT TO USE THE LKS1000-V.2 MORE THAN 1 MONTH, PLEASE CHARGE IT FULLY BEFORE TO STORE IT!

LEAKSHOOTER LKS1000-V.2 SWITCH ON & OFF :

SWITCH ON:

PRESS QUICKLY THE KEY , LEAKSHOOTER LKS1000-V.2 SWITCH ON 1-2 SECONDS AFTER INITIALIZATION.

SWITCH OFF:

PRESS LENGTHILY (1-2 SECONDS) THE KEY , LEAKSHOOTER LKS1000-V.2 SWITCH OFF.

IF THE BATTERY IS FULLY EMPTY, LEAKSHOOTER LKS1000-V.2 COULD NOT SWITCH ON. YOU SHOULD CHARGE IT FULLY (AROUND 5-6 HOURS).

LEAK DETECTION SEARCH PROCEDURE WITH SCANNING METHOD AND CONE

LEAKSHOOTER LKS1000-V.2 HAS BEEN DESIGNED TO SHOW YOU IN REAL TIME ON A VISIBLE SCENE CAPTURE (MEASUREMENT SCENE), THE COMPRESSED AIR LEAK LOCATION OR OTHER GAS, THANKS TO VISUAL DYNAMIC REAL TIME TARGET.

REGARDING THE LEAK IMPORTANCE (ULTRASONIC WAVES RECEIVED AT AROUND 40 KHZ), THE DYNAMIC TARGET WILL BE IN YELLOW OR IN RED COLOR.

LEAKSHOOTER LKS1000-V.2 IS EQUIPPED WITH A SPECIAL DETECTION IN REAL TIME FUNCTION OF MAX VALUE, WHICH WITH THE TARGET, SHOW YOU IF YOU ARE MORE NEAR THE LEAK (SIMPLE SQUARED TARGET) OR EXACTLY FACE TO THE LEAK (SQUARED TARGET WITH A CROSS INSIDE).

THE METHOD IS TO SCAN THE MEASUREMENT SCENE, QUIETLY AND CONSCIENTIOUSLY.

- MANUAL GAIN MODE (USED AFTER LKS1000-V.2 POWERED ON):

THIS MODE IS USED FOR INDUSTRIAL MEDIUM AND BIG LEAKS OR FOR ULTRASONIC SATURATED ZONE.

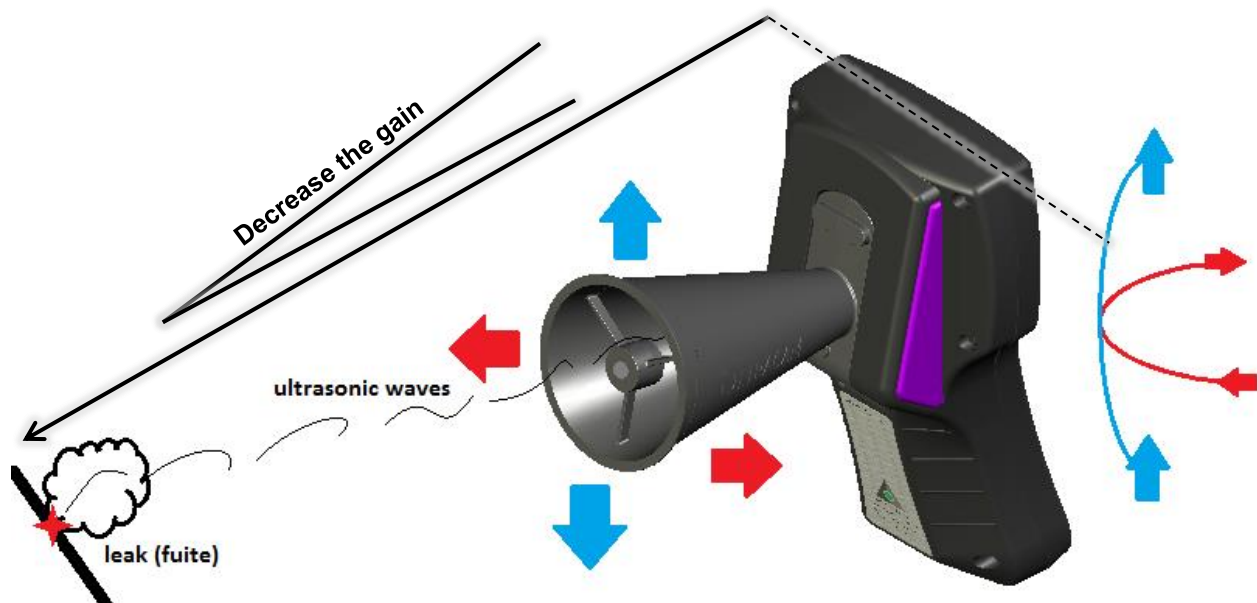
START AT MAXIMUM SENSITIVITY (110 DB). THEN USE THE SCANNING METHOD TO FIND A DIRECTION TO GO.

IF IT IS ALWAYS RED, EVERYWHERE, IT MEANS THAT YOU HAVE TOO MUCH GAIN. THEN, PLEASE LOOK ON THE GROUND WITH THE CONE AND DECREASE GAIN SLOWLY TO MAKE THE TARGET DISAPPEAR. THEN SCAN AGAIN YOUR INSTALLATION WITH THIS NEW GAIN, YOU WILL FIND THE DIRECTION TO GO.

THE MORE YOU WILL USE A LOW GAIN, THE BETTER YOU WILL DETECT THE BIG LEAKS (BETTER DIRECTIVITY).

WHEN YOU START TO BE NEAR FROM THE LEAK, TARGET WILL BE YELLOW, IF YOU ARE FACE TO THE LEAK, TARGET WILL BE RED WITH A CROSS INSIDE.

DO NOT FORGET TO READJUST THE GAIN TO THE MAX WHEN YOU CHANGE YOUR LEAKS RESEARCH!

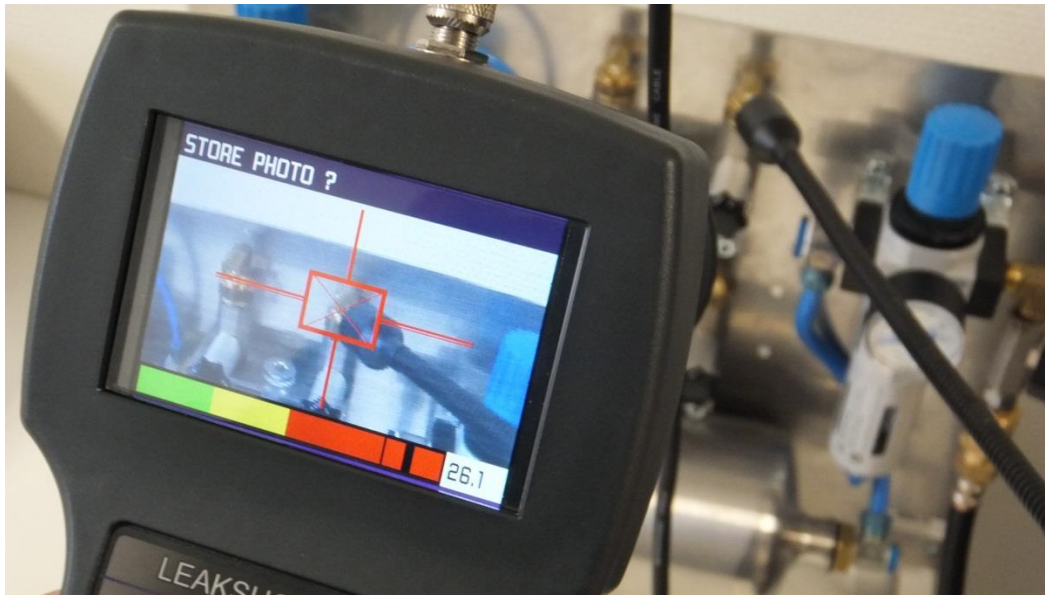


LEAK DETECTION SEARCH PROCEDURE WITH FLEXIBLE SENSOR

WHEN YOU ARE WORKING ON VERY SMALL CONNECTORS OR WHEN YOU HAVE A DIFFICULT ACCESS TO A CONNECTOR, YOU CAN USE THE FLEXIBLE 400 OR 1500 MM SENSOR INSTEAD OF THE CONE.

YOU CAN WORK WITH **MANUAL MODE** AS BEFORE.

THE BEST IS TO FIND THE LEAK WITH THE FLEXIBLE SENSOR AND THEN, TO PUT THE CAMERA IN THIS DIRECTION TO TAKE A PICTURE OF YOUR LEAK.

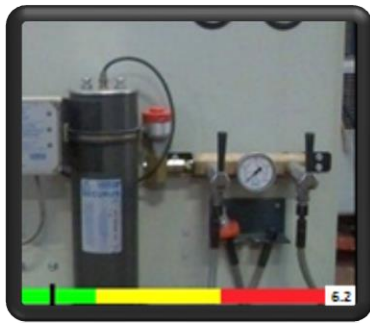


REMARK:

YOU CAN ALSO USE THE HEADPHONE. IT GIVES YOU THE LEAK AUDIBLE WHEN YOU ARE NEAR OR FACE FROM IT.

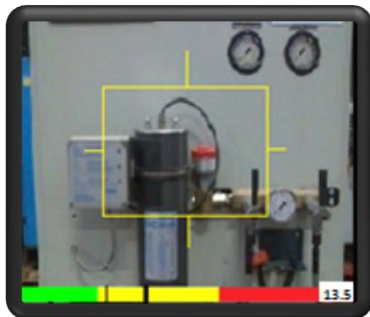
DIFFERENT POSSIBLE MEASUREMENT SCREENS

CASE N°1: NO LEAK



- REAL TIME RMS = \pm MAX AND IN GREEN COLOR
- NO NOISE IN THE HEADPHONES

CASE N°2: NEAR A SMALL LEAK

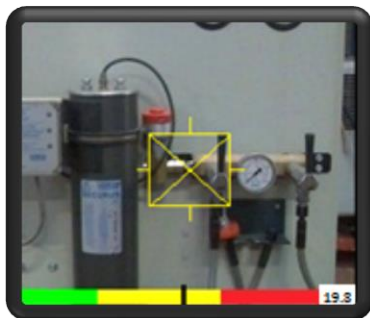


- REAL TIME RMS < (MAX -3DB) AND IN YELLOW COLOR
- **YELLOW TARGET** SHOWING YOU APPROACH THE LEAK
- LIGHT LEAK NOISE IN THE HEADPHONES

REMARK:

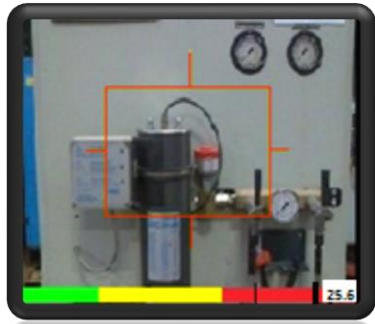
THE MORE THE REAL TIME RMS APPROACH THE MAX, THE MORE THE TARGET SHRINK INTO ITS CENTER. WHEN THE REAL TIME RMS WILL BE LESS THAN 3 DB UNDER THE MAX, THEN YOU ARE FACE TO THE LEAK LOCATION (SEE BELOW, CASE N°3).

CASE N°3: FACE TO A SMALL LEAK



- REAL TIME RMS > (MAX -3DB) AND IN YELLOW COLOR
- **YELLOW TARGET WITH CENTERED CROSS** SHOWING THE LEAK LOCATION
- LEAK NOISE IN THE HEADPHONES

CASE N°4: NEAR AN IMPORTANT LEAK

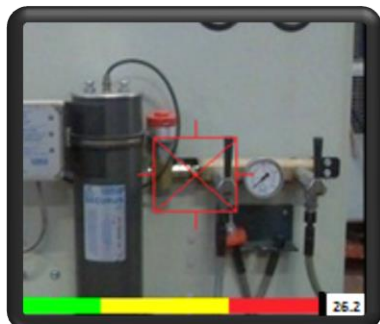


- REAL TIME RMS < (MAX -3DB) AND IN RED COLOR
- **RED TARGET** SHOWING YOU APPROACH THE LEAK
- HEAVY LEAK NOISE IN THE HEADPHONES

REMARK:

THE MORE THE REAL TIME RMS APPROACH THE MAX, THE MORE THE TARGET SHRINK INTO ITS CENTER. WHEN THE REAL TIME RMS WILL BE LESS THAN 3 DB UNDER THE MAX, THEN YOU ARE FACE TO THE LEAK LOCATION (SEE BELOW, CASE N°5).

CASE N°5: FACE TO AN IMPORTANT LEAK



- REAL TIME RMS > (MAX -3DB) AND IN RED COLOR
- **RED TARGET WITH CENTERED CROSS** SHOWING THE LEAK LOCATION
- VERY HEAVY LEAK NOISE IN THE HEADPHONES

REMARK FOR THESE 5 DIFFERENT CASES:

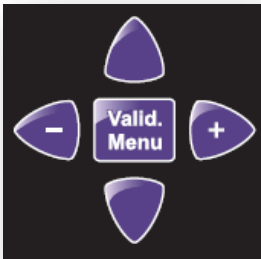
IT IS POSSIBLE TO ADJUST THE HEADPHONES VOLUME DURING THE MEASURE. PLEASE JUST CLICK ON HIGH AND LOW BUTTONS ON THE KEYBOARD (VOLUME SETTING FROM 0 TO 10). BE CAREFUL NOT TO LISTEN DURING A LONG TIME WITH A HIGH LEVEL VOLUME ON YOUR EARS! **STANDARD VOLUME IS ON 3 OR 4 LEVEL.**

SYNERGYS TECHNOLOGIES WILL NEVER BE RESPONSIBLE OF AN INAPPROPRIATE SETTING OF THE HEADPHONES VOLUME WHICH CAN CAUSE ON A LONG TERM, AUDITION PROBLEMS.

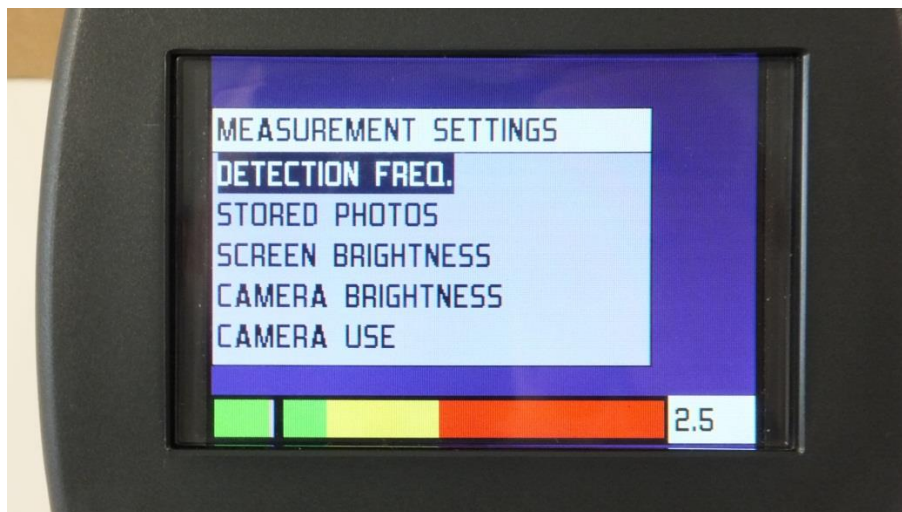
DUE TO THE EFFICIENCY OF LEAKSHOOTER LKS1000-V.2 FIRMWARE (DYNAMIC TARGET, MAX AND RMS VALUES), IT IS POSSIBLE NOT TO USE CONTINUOUSLY THE HEADPHONE.

MENU AND SETTINGS :

LEAKSHOOTER LKS1000-V.2 MENU IS ACCESSIBLE WITH  BUTTON ON THE KEYBOARD.



YOU CAN WITH IT, ACCESS TO: (BY SELECTING WITH  . AND UP AND DOWN BUTTONS, ESCAPE WITH LEFT KEY )



- DETECTION FREQ : FREQUENCY MIXER IN KHZ (VARIABLE FROM 34 TO 46 KHz)

► **EACH LKS1000 HAS ITS OWN STANDARD DEFAULT FMIXER WHEN DELIVERED TO YOU. PLEASE DO NOT CHANGE FOR LEAK DETECTION. DEFAULT FMIXER IS OPTIMIZED FOR LEAK DETECTION FOR YOUR OWN LKS1000. IF YOU CHANGE IT, PLEASE CORRECT IT AFTER USE TO YOUR DELIVERY SETTINGS BY CHECKING IT ON YOUR MANUFACTURER CERTIFICATE (FREQUENCY IN KHz).**


- STORED PHOTO:

► FOR REVIEW OF THE PHOTO STORED IN LKS1000-V.2 MEMORY.

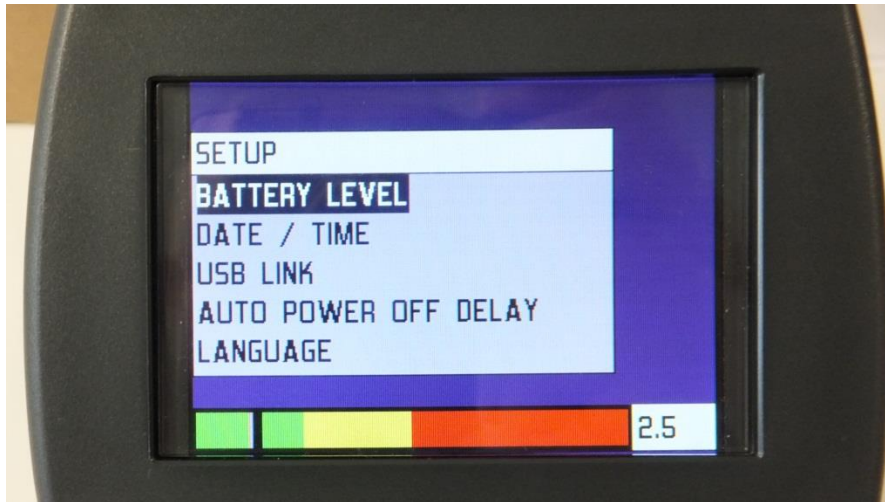
- SCREEN BRIGHTNESS (0 TO 10)

- CAMERA BRIGHTNESS (0 TO 10)

- CAMERA USE: DEACTIVATION/ACTIVATION OF THE CAMERA, FOR BATTERIES ENERGY SAVING.

NOW IF YOU CONTINUE TO GO DOWN "CAMERA USE", YOU CAN SEE **SETUP**, CLICK ON IT WITH  BUTTON.

- **SETUP SCREEN**



- **BATTERY LEVEL** : YOU WILL SEE THE VOLTAGE OF THE BATTERIES AND TIME APPROXIMATION REMAIN USE
- **DATE/TIME**
- **USB LINK** : TO PREPARE USB CONNECTION WITH PC
- **AUTO POWER OFF DELAY** : TIME DELAY TO SWITCH OFF THE DEVICE AUTOMATICALLY
- **LANGUAGE (FRENCH, ENGLISH, DEUTSCH)**

TO NAVIGATE THROUGH THE MENU, USE UP AND DOWN BUTTONS ON THE KEYBOARD.

TO MODIFY AND VALID A SETTING, CLICK ON  BUTTON.

TO ESCAPE THIS SETTING MENU, CLICK ON ESCAPE LEFT BUTTON .

HOW TO CATCH AND STORE PHOTOS TAKEN BY LEAKSHOOTER LKS1000-V.2

STORE A PHOTO:

FIG A: WHEN YOU ARE IN FRONT OF THE LEAK (TARGET AND CROSS INSIDE ON SCREEN, REAL TIME RMS=MAX), CLICK

ONE TIME ON  BUTTON. PICTURE IS FROZEN ON SCREEN AND READY TO BE STORED.

IF YOU WISH ESCAPE NOW AND NOT STORE THE PICTURE, THEN CLICK ON ESCAPE LEFT BUTTON



FIG B: OTHERWISE, CLICK ONE MORE TIME ON  BUTTON. PICTURE IS NOW WAITING A NUMBER INFORMATION.

PICTURE WILL BE NUMBERED (NUMBER SET BY DEFAULT BETWEEN 000 AND 999) AND TIME STAMPED.

FIG C: THEN CLICK ON  BUTTON, PICTURE WILL BE FINALLY STORED IN MEMORY WITH CHOSEN NUMBER.



FIG A




FIG B



FIG C

DELETE A PHOTO:

TO DELETE ALL PHOTO (BE SURE BEFORE DELETION) IN MEMORY, PLEASE SELECT A ONE SETUP/STORED PHOTO BY USING UP

AND DOWN BUTTONS AND CLICK ON  BUTTON DURING 2 SECONDS, THEN VALID FOR DELETION.

TO DELETE ONE PHOTO IN MEMORY, PLEASE SELECT A ONE (SETUP/STORED PHOTO) BY USING UP AND DOWN BUTTONS AND

CLICK ON  BUTTON.

PLEASE CONFIRM WITH  BUTTON AFTER "DELETE THIS PHOTO?" MESSAGE.

IF THERE IS NO PHOTO IN MEMORY, A MESSAGE "NO PHOTO" APPEARS ON SCREEN.

ELECTRONIC STETHOSCOPE FUNCTION WITH LKSPROBE (OPTIONAL CONTACT PROBE)



BEARING AND STEAM TRAP ANALYSIS/LISTENING

LEAKSHOOTER LKS1000-V.2 HAS ALSO BEEN DESIGNED TO LISTEN TO ULTRASONIC WAVE EMITTED IN DEFECTIVE BEARING, DEFECTIVE STEAM TRAP... IT IS AN ULTRASONIC ELECTRONIC STETHOSCOPE WITH CONTACT TECHNOLOGY.

PLEASE USE THE LKSPROBE AND CONNECT IT ON THE LEAKSHOOTER LKS1000-V.2 (ON THE EXTERNAL JACK PROBE)

TO USE IT, PLEASE SWITCH ON THE LKS1000-V.2 IN A SPECIAL MODE (NAMED LKS100) BY CLICKING AND STAYING ON



BUTTON AND CLICK ON



BUTTON IN THE SAME TIME. SPECIAL MODE LKS100 WILL NOW START AS DESCRIBED

BELOW.



PLEASE NOW LISTEN (CONNECT YOUR HEADPHONES) TO YOUR BEARING OR YOUR STEAM TRAP WITH THE POSSIBILITY TO ADJUST THE GAIN TO OPTIMIZE THE LISTENING AND ANALYZE WITH SOUND AND VALUE RESULTS.

YOU HAVE JUST TO PUT THE CONTACT PROBE ON THE SURFACE YOU WANT TO LISTEN WITH A SINGLE/STANDARD HUMAN FORCE.

IF YOU GET ULTRASONIC WAVES DUE TO DEFECT IN A BEARING OR STEAM PRESENCE IN A STEAM TRAP, YOU WILL SEE VALUE IN YELLOW OR RED COLOR AND STRONG SOUND IN YOUR HEADPHONES.

YOU CAN WORK WITH MAX RMS AND RMS VALUE TO IDENTIFY DEFECTS.

PLEASE DO NOT CAREFUL TO THE MESSAGE ON SCREEN WITH IS ONLY USED FOR GAS LEAKS (THIS PROGRAM CAN ALSO BE USED FOR LEAK DETECTION WITHOUT THE NEED OF CAMERA).

YOU CAN OF COURSE TAKE A PHOTO OF THE SCREEN WITH THE  BUTTON. (2 TIMES AND VALID TO PUT IN MEMORY)

HOW TO DOWNLOAD A PHOTO FROM LKS1000-V.2 TO WINDOWS PC ?

1°) CONNECTION OF LKS1000-V.2 TO WINDOWS PC VIA UNIVERSAL USB CONNECTION (USB MASS STORAGE FUNCTION)

DESCRIPTION :

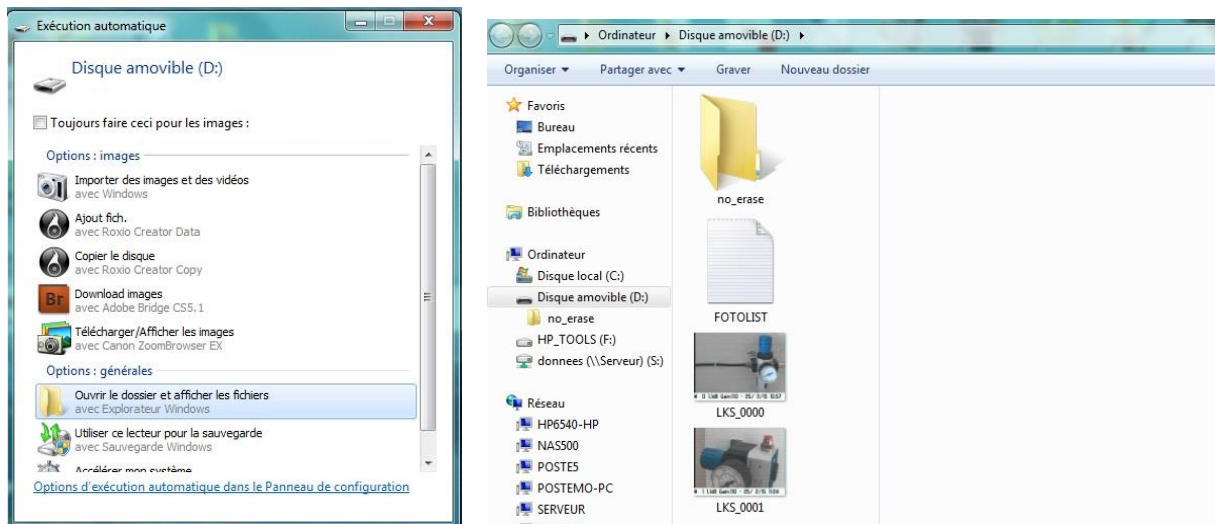
LEAKSHOOTER LKS1000-V.2 MEMORIZED PICTURES CAN BE DOWNLOADED TO PC WITH WINDOWS XP/7/8, WITHOUT ANY SOFTWARE, WITHOUT NEED TO INSTALL A SPECIAL DRIVER.

INSTALLATION :

PLEASE CONNECT YOUR LKS1000-V.2 (ON) TO THE PC ON A FREE USB PORT.

THEN GO TO THE LKS1000-V.2 MENU, SELECT SETUP IN MEASUREMENT SETTINGS, THEN SELECT USB LINK.

WINDOWS PC WILL DETECT USB MASS STORAGE (MSD) AUTOMATICALLY AND WILL OPEN IT.



YOU WILL SEE ALL LKS1000-V.2 PHOTOS IN BMP (BITMAP) FORMAT. PLEASE COPY/PASTE THEM ON YOUR PC. (**PLEASE NOT DELETE THEM OR CUT THEM FROM THE PC!!!**).

YOU WILL ALSO SEE A .TXT FILE (FOTOLIST) WHICH CONTAINS ALL DATA WITHOUT PHOTO (DATE, DB RMS, GAIN VALUE). YOU CAN OPEN IT INTO WORD, EXCEL...

DO NOT TOUCH TO NO_ERASE FOLDER!!!

TO DELETE PHOTO, PLEASE DO IT FROM YOUR LEAKSHOOTER LKS1000-V.2, NOT FROM YOUR PC!!!

USE OF THE LKS1000-V.2 PC USB CONNECTION :

PC WITH WIN XP/7/8 + LKS1000-V.2 (ON) + USB CABLE (DELIVERED WITH LKS1000-V.2)

CONNECT THE USB CABLE TO THE PC WITH LKS1000-V.2 (ON)



GO TO THE MENU "MEASUREMENT SETTINGS" VIA VALID.MENU BUTTON



GO TO THE LOWEST LINE "SETUP" ON SCREEN WITH THE "LOW" BUTTON OF THE KEYBOARD



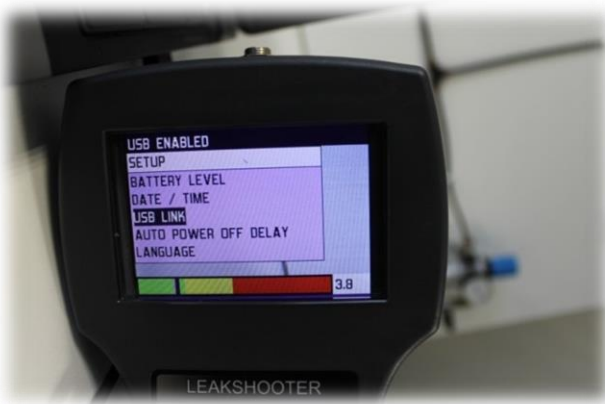
CLICK ON SETUP WITH VALID.MENU BUTTON



GO TO USB LINK AND VALID WITH VALID.MENU BUTTON



NOW YOU CAN SEE "USB CONNECTION IN PROGRESS" ON UP-LEFT OF THE SCREEN



WAIT A FEW SECOND, YOUR COMPUTER WILL DETECT YOUR LKS1000 AS A USB MASS STORAGE MEMORY. IT WILL OPEN WINDOW WITH ALL LKS1000 MEMORY DATA.

NOW, YOU CAN DISCONNECT THE USB CABLE FROM YOUR PC.

LEAKSHOOTER LKS1000 WILL SWITCH OFF AND ON AUTOMATICALLY AND ALSO RESTART IN MEASUREMENT MODE.

LEAKHOOTER IS A DIVISION OF:

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