LEAKSHOOTER-LKS 1000 / LEAKVIEWER PC SOFTWARE

ULTRASONIC DETECTION CAMERA (PATENTED)

USER MANUAL (VERSION 2.0)
WHAT IS LEAKSHOOTER LKS1000?

LEAKSHOOTER LKS1000 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, 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 IN PRESSION / DEPRESSION)

When a gas moves 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).

\[ P_{atm} \]
\[ P_{int} = 6 \]

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

- On/Off
- Increase of headset volume
- Decrease of measurement gain & escape
- Decrease of headset volume

- Photo capture
- Menu settings & validation
- Increase of measurement gain
• **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
- Headset with jack cable (SNR 31) - LKS EAR
- Universal battery charger – LKS POWER
- USB cable for PC – LKS USB
- User manual on CD – LKS MANUAL
- Software for PC – LKS PC VIEWER

FLEXIBLE 400 MM SENSOR OPTION AVAILABLE FOR LKS 1000:
**BATTERIE CHARGING:**

LEAKSHOOTER LKS1000 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).

Charging time is around 5 Hours.

**CAREFUL!**

Thanks to be careful when getting messages on LEAKSHOOTER LKS1000 screen about battery charging instructions.

LEAKSHOOTER LKS1000 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.

**LEAKSHOOTER LKS1000 SWITCH ON & OFF:**

**Switch ON:**

Press quickly the key **LEAKSHOOTER LKS1000 switch on 1-2 seconds after initialization.**

**Switch OFF:**

Press lengthily (1-2 seconds) the key **LEAKSHOOTER LKS1000 switch off.**

If the battery is fully empty, LEAKSHOOTER LKS1000 could not switch on. You should charge it fully (around 5-6 hours).
LEAK DETECTION SEARCH PROCEDURE WITH SCANNING METHOD AND CONE

LEAKSHOOTER LKS1000 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 IS EQUIPPED WITH A SPECIAL DETECTION 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.

• **AUTO GAIN MODE (DEFAULT MODE USED AFTER LKS1000 POWER ON):**

   THIS MODE IS USED FOR CLASSICAL APPLICATION (SMALL AND MEDIUM LEAKS), WHERE THE GAIN WILL BE AUTOMATICALLY ADJUSTED FACE TO THE ULTRASONIC SEVERITY LEVEL (RESULT IN AUTO MODE IS OPTIMAL FOR GAIN BETWEEN 70 dB TO 110 dB).

   IN THIS MODE, RMS VALUE WILL BE CALCULATED WITH COMPENSATION, TO HAVE THE BETTER REAL VALUE OF THE LEAK.

   **SCAN** THE MEASURED SCENE FOR EXAMPLE FROM LEFT TO RIGHT AND FROM HIGH TO LOW (SEE FIG 2), IN ORDER TO PASS NEAR THE LEAK AND THEN TO DETECT THE MAX VALUE, FROZEN ON SCREEN DURING A FEW SECONDS (VERTICAL LARGE BLACK LINE IN THE COLORED BARGRAPH).

   THEN, TRY TO COME BACK IN THE RIGHT DIRECTION TO FIND NEWLY THIS MAX VALUE (ALIGN REAL TIME RMS WITH MAX). YOU WILL SEE A SQUARED TARGET WITH A CROSS INSIDE; YOU ARE FACE TO THE LEAK.

![Fig 2](image_url)
• **MANUAL GAIN MODE** (used after LKS1000 power on and click twice on $→$ key):

This mode is used for big leaks or ultrasonic saturated zone.

Start at 110 dB and decrease gain value (minimum is 50 dB) until automatic target goes small to ignore the high saturated ultrasonic noise you have in your zone. Then use the same scanning method than before (fig 2.).

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 or in AUTO 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 mm sensor instead of the cone.

You can work with AUTO or 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.

![Image](image.jpg)

**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 = ± 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!

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 firmware (dynamic target, MAX and RMS values), it is possible not to use continuously the headphone.
**MENU AND SETTINGS:**

LEAKSHOOTER LKS1000 MENU IS ACCESSIBLE WITH **Valid. Menu** BUTTON ON THE KEYBOARD.

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

- **DETECTION FREQ:** FREQUENCY MIXER IN kHZ (VARIABLE FROM 34 TO 46 kHZ)

  ► THE FREQUENCY MIXER ALLOWS TO HAVE A BETTER FINEST SIGNAL RESULT, EFFICIENCY ON HEADPHONES LISTENING, BECAUSE OF THE CAPABILITY TO ADAPT MIXING FREQUENCY FROM 34 TO 46 kHZ FOR STANDARD LEAK APPLICATIONS.

- **STORED PHOTO:**

  ► FOR REVIEW OF THE PHOTO STORED IN LKS1000 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

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 or set by user (using the joystick) between 000 and 999) and time stamped.

**FIG C:** Then click on button, picture will be finally stored in memory with chosen number.

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 “DELET THIS PHOTO?” message.

If there is no photo in memory, a message “NO PHOTO” appears on screen.
ELECTRONIC STETHOSCOPE FUNCTION WITH LKS PROBE (OPTIONAL CONTACT PROBE)

**BEARING AND STEAM TRAP ANALYSIS**

LEAKSHOOTER LKS1000 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 LKS PROBE AND CONNECT IT ON THE LEAKSHOOTER LKS1000 ON THE EXTERNAL JACK PROBE

TO USE IT, PLEASE SWITCH ON THE LKS1000 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)
USER MANUAL FOR LS VIEWER PC SOFTWARE FOR LKS1000 / LKS100

1°) PREPARATION FOR INSTALLATION OF DRIVER AND PC SOFTWARE

DESCRIPTION:
LEAKSHOOTER Viewer is a PC software which gives you the possibility to view and store the
LEAKSHOOTER LKS1000/LKS100 memorized pictures.

INSTALLATION:
Before using the software, it is necessary to install an USB driver to recognize the LEAKSHOOTER
LKS1000/LKS100.

CONDITIONS:
PC with Windows XP / VISTA / Windows 7 / Windows 8, pro versions as preferred.
PC with free USB port and with ability to install a driver (administrator rights).
LEAKSHOOTER Viewer software.
USB cable delivered with LEAKSHOOTER LKS1000/LKS100
Fully charged LEAKSHOOTER LKS1000/LKS100.
If you use Windows 8, please program first your PC to start in the special mode “with deactivation of
obliged control of driver signature”.

METHOD TO INSTALL DRIVER:
Install the software on the PC (LS VIEWER INSTALL to copy on your hard disc). Do not launch .exe at this
time!
Connect LEAKSHOOTER to the PC via USB cable. Power ON the LEAKSHOOTER.
Press Valid.Menu key, go to Setup line. Press Valid.Menu key to valid Setup line. Go to USB Link, press
Valid.Menu key.
USB enabled is written on screen. Press Escape key (- left key on LKS1000/LKS100 joystick keyboard)
PC with Windows will detect “Leakshooter” device and will say you “not find driver for this device”.
You need to install manually the driver by giving the driver directory link to the PC.

Chose the directory ... \Leakshooter\Driver \ where you have installed the Software on PC and valid.

Windows will install this special driver dedicated to Leakshooter LKS1000/LKS100.

Then, Leakshooter LKS1000/LKS100 stop to work (ultrasonic work), screen become violet and USB Link is now written on LKS1000/LKS100 screen.

Software LS Viewer can now be used. Launch the LS Viewer.exe now (!!! make before a shortcut link on your desktop, not a copy of the .exe).

After this installation, every time you need to use the PC Leakviewer software, be sure to have the Leakshooter in USB link mode.

Note:

Please close correctly your Leakshooter Viewer software before to disconnect USB cable!

Now you are ready to use the Leakshooter PC Viewer software!
2°) **Use of the LeakViewer PC Software**

**PC with Win XP/VISTA/7/8 + LK31000 (Off) + USB Cable**

**Connect the USB Cable to the PC and to the LK31000 (Off)**

**Switch on the LK31000**
GO TO THE MENU 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 ENABLED" ON UP-LEFT OF THE SCREEN

WAIT A FEW SECOND, YOUR COMPUTER WILL DETECT YOUR LEAKSHOOTER. "USB LINK" APPEARS ON THE SCREEN (IT CAN BE BETWEEN 10-15 SECONDS FOR SOME COMPUTERS)
NOW, GO ON YOUR DESKTOP TO LAUNCH THE LEAKVIEWER.EXE

1st SCREEN OF LEAKVIEWER PC SOFTWARE, CLICK ON "PICTURES MANAGEMENT" ( )

2ND SCREEN OF LEAKVIEWER PC SOFTWARE, CLICK ON "OPEN LINK" ( )
NOW YOU CAN SEE YOUR LEAKSHOOTER LKS1000 WITH SN®, CLICK ON CHECK PHOTOS

YOU CAN SEE ALL PHOTOS WHICH ARE IN THE LKS1000 MEMORY

SELECT A LINE OF A PHOTO, HERE N°44
LKS1000 WILL DISPLAY THE PHOTO № 44

THEN CLICK ON Sel. COLUMN № 44

CLICK ON "GET THE PHOTOS"
WHEN FINISHED, GO TO "CLOSE"

AND GO TO "QUIT"

NOW, YOU CAN DISCONNECT THE USB CABLE FROM YOUR PC
NOTE: WHEN THE SOFTWARE IS CLOSED, THERE IS NO NEED TO DEACTIVATE USB MODE IN LKS1000, YOU CAN SWITCH OFF OR CONTINUE TO MEASURE.

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