LC 600 LeakCam - The new generation of the leak detectors

CS INSTRUMENTS has been a leading global manufacturer of measurement technology for compressed air and gases for more than 20 years. Many years of feedback and experience from several thousand satisfied customers of the previous 300/400/450/500 series leak detectors have been incorporated into the development and research of the LeakCam 600.

Unlike many other manufacturers, CS INSTRUMENTS also has calibration stands and flow meters for precise consumption measurement and leakage measurement of compressed air and gases. This know-how, coupled with over 20 years of experience in the development of leak detectors, has gone into the development of the LeakCam 600.

During development, particular attention was paid to practicality and user-friendliness. What does it really mean for the service technician or maintenance engineer to search for and document gas leaks and compressed air leaks in the production process with a leakage camera in their hand for 8 hours, for example?

Unlike many other leakage cameras, the LC 600 was developed with these points in mind, such as:

- The unique integrated laser distance measurement automatically calculates the distance to the leak. There is no need for time-consuming and incorrect distance measurement as with other devices. Precise measurement of the distance to the leak is the most important parameter for accurate leakage calculation.
- Special camera module for wide-angle view, allowing the user to quickly gain an overview of larger rooms
- LED for illuminating dark rooms
- Carrying strap, included
- Battery replacement concept

Features

5" Touchscreen Display
1280 x 720 Pixel for precise leak localizationLeckage

Cost Quantification
Identifies critical leaks for efficient resource allocation and savings
Shows the leakage rate in l/min and costs in €

Neck Strap Loops
Comfortable and easy handling

Grip for One-Handes Operation
Leaving the other hand for the touchscreen

18 V Einhell Power X-Change
Two batteries with an external charger for up to 8 hours of use

64 MEMS Microphones (2 kHz - 80)
Detects minor leaks from up to 10 meters

13 Megapixel Camera
High-resolution images for clear leak documentation

Laser Distance Module
Precise ultrasound focusing and leak rate estimation

5 LEDs & Ambient Light Sensor
Enhance image quality in dark environments

POWER BEAM FORMING

“Power Beam Forming” sets new standards in leak detection

Cost and CO2 savings - but also safety aspects - are the driving forces behind leak detection in gas, compressed air or vacuum applications. With the LC 600 in combination with an ultrasonic transmitter, leak tests can also be carried out reliably.

The LeakCam 600 only requires 64 microphones for these tasks and achieves unique dynamics and sensitivity. This means that even very small leaks can be made visible in the presence of large, dominant ultrasonic sources. Dominant sources can be larger leaks, but also disturbing noises - caused by production machines.

Advantages of Power Beam Forming at a glance:

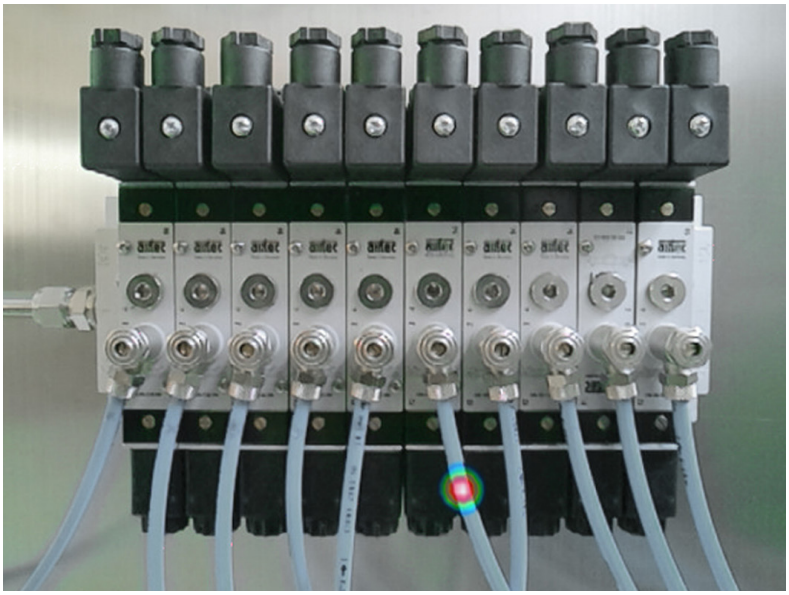
Reliability due to unique dynamics - small leaks are no longer overlooked in the presence of large leaks.
Even faster work: One look with the LeakCam 600 covers an approx. 50% larger area more reliably than competitor products.

How does an acoustic/ultrasonic camera for leak detection work?

Acoustic and ultrasonic cameras have several microphones whose signals are bundled by beamforming algorithms to make sound sources visible in the camera’s field of view. The selectable frequency range of the devices depends on the microphones used and their arrangement.

For leak detection of pressurized gases, the ultrasonic range around 40 kHz is typically used, as this is where the characteristic noises of gas leaks are best detected. Acoustic noises are completely filtered out so that leaks can be detected efficiently even in noisy production environments.

Threefold better leak detection through Power Beam Forming

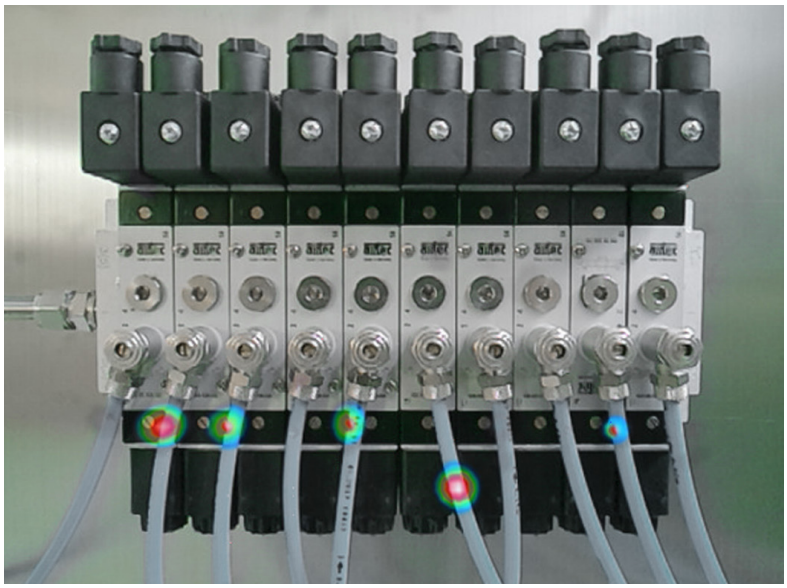


(Standard Beam Forming)

There are various beamforming methods, with standard beamforming being used in the ultrasonic cameras currently available, as it is relatively simple and does not require much computing power.

However, the dynamic range is limited to around 3 dB, which means that only the loudest leakage is detected, while quieter noises are overlooked.

The dynamic range therefore describes how much the volume of the sound sources may differ so that they can be reliably detected



LeakCam 600 with 64 microphones (Power Beam Forming)

The LeakCam uses the **Power Beam Forming**, which achieves a unique **dynamic range of 12 dB**. With Power Beam Forming, multiple sound sources can be detected simultaneously, even if they are at different sound levels

Thanks to the higher dynamic range, quieter ultrasonic noises can be detected in environments with ultrasonic interference signals, making it much easier to find leaks in automated systems or the compressor room.

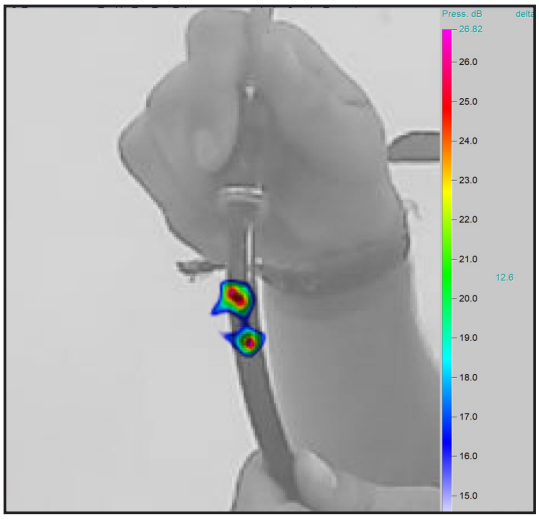
Power Beam Forming can therefore be used to search areas from a greater distance without overlooking “weaker” leaks!

Precision

Wide Microphone Spacing for Precise Leak Detection from Near to Far

The 20 cm microphone spacing of the LeakCam – measured as the diameter between the outermost microphones – ensures maximum precision in leak detection. In close range, it allows for pinpoint localization of even the smallest leaks, while in long-range applications, it provides reliable detection over greater distances. For enhanced focusing, the integrated laser distance module can be used. This ensures the LeakCam delivers clear and precise results – regardless of the distance to the leak.

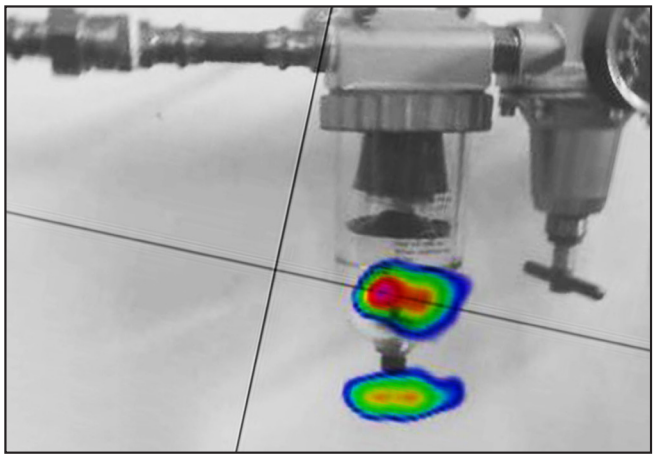
Precise leak detection from far distances with acoustic zoom



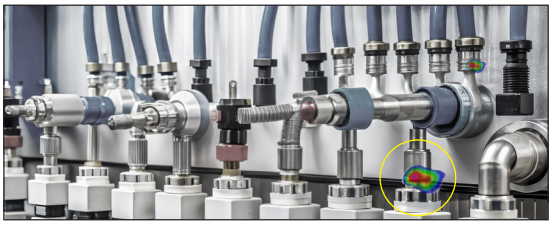
With the “acoustic zoom” of the LeakCam 600, leaks can be precisely localized from far distances by focusing ultrasonic noises even more strongly. In combination with the optical zoom (x2, x4, x8), this gives you a clear visual magnification of the inspected components. This allows you to detect leaks quickly and accurately - even in areas that are difficult to access

Highest precision even at close range - LeakCam 600 for distances from 10 cm

The LeakCam enables extremely precise leak detection at close ranges from 10cm and above due to the maximum transit time differences between the microphones and the ultrasonic source. Since the ultrasonic intensity increases with decreasing distance to the leak, smaller leaks can be found. This ensures a particularly precise coloration of the ultrasonic image, so that you can clearly distinguish between a leaking thread and a damaged coupling in the case of a quick coupling. This allows the cause of the leak to be determined quickly and precisely, even with the smallest defects.



Application



Application Pneumatics

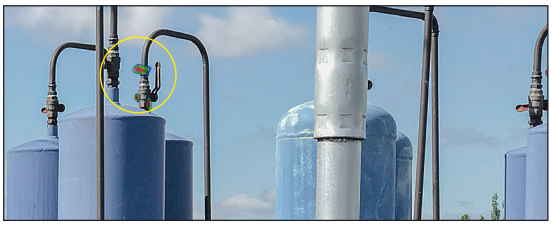
Particularly in the field of pneumatics, several leaks can often be found in the smallest of spaces. Thanks to Power Beam Forming, you can see all leaks at a glance. Small leaks are no longer overlooked in the presence of large leaks. The device therefore offers unique reliability and time savings.

Application technical Gases

In addition to compressed air, the LC 600 is used for a wide range of technical gases such as nitrogen, argon, carbon dioxide, helium or hydrogen. Leaks can be detected with pinpoint accuracy even from great distances. This is ensured by a very high sensitivity and the optical zoom, among other things.

Application Flammable Gases

The device works from the lowest system pressures of around 250 mbar and detects leaks even from a greater distance than conventional gas sniffers. Gases such as natural gas, methane, propane or biogas can be covered.

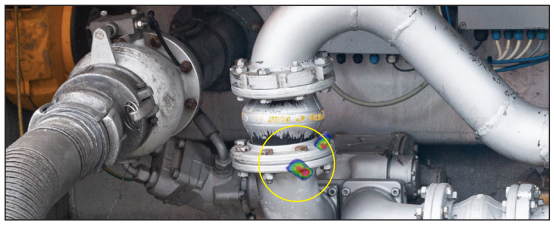


Application Refrigerant Systems

Ammonia and CO2 refrigerant systems where only the smallest leaks are tolerated can be tested with the LC600. Thanks to its unique sensitivity and range, even large systems can be checked effortlessly.

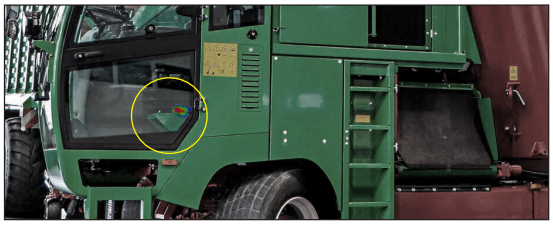
Application Discharge / Corona Effect

The LC 600 can detect partial discharges even in noisy environments and from a distance of up to 120 meters. Large area scanning and non-contact measurement save time compared to other methods.



Application Vacuum

Unlike compressed air leaks, where the sound generated by the leak is emitted into the environment, the sound generated by vacuum leaks enters the vacuum system. The LC 600 finds leaks here too thanks to its unparalleled sensitivity.

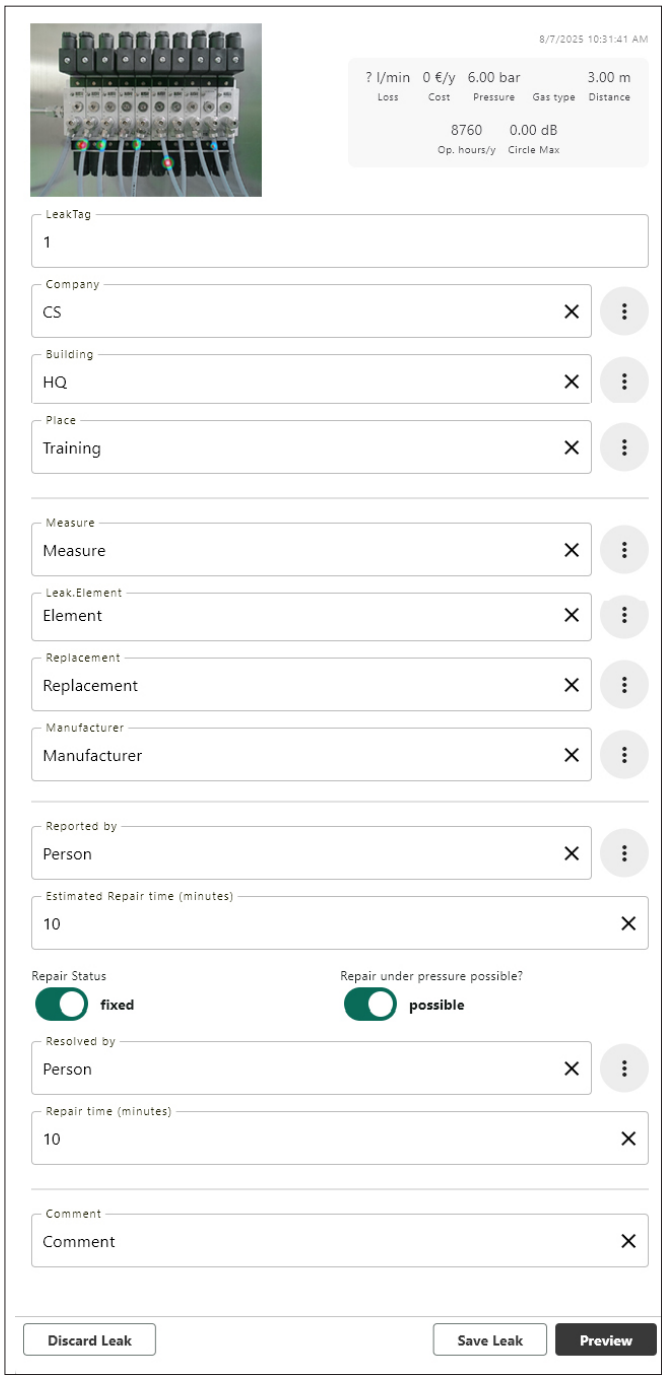


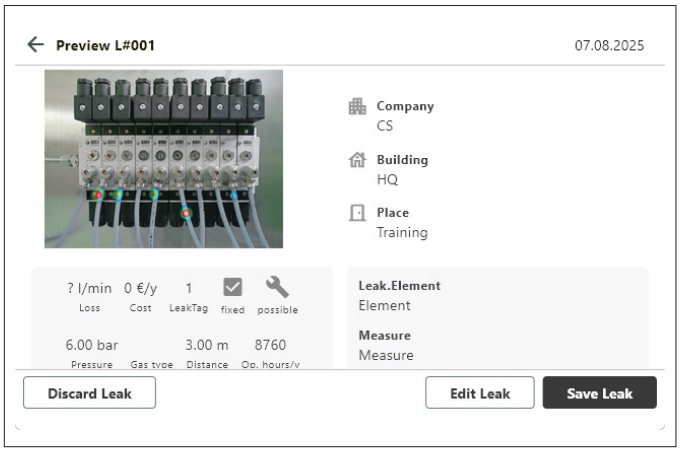
Application Leak Test

In combination with an ultrasonic transmitter, the LC 600 can be used to carry out leak tests. Acceptance of pressure vessels, commissioning of extinguishing systems, leak tests of driver's cabs or blow door tests can be made much easier and faster.

Documentation

Simple documentation in the LeakCam 600 directly on site





Define the location

The location of each leak can be stored: Company / building / location

Remedy the leak

Efficiency and clarity also for elimination of leaks. Definition of the necessary spare parts and maintenance work already on site.

Spare parts list in the device

The software can be used to transfer a custom spare parts list to the device. The device offers an intelligent search function with auto-complete feature.
The list with the required spare parts can be exported from the CS Leak Reporter software.

Reporting Software

Use the reporting software to quickly and efficiently produce an ISO 50001 report

CS Leak Reporter - cloud solution

Ideal for leak detection service providers and for companies/ major corporations with multiple locations.

- Each “user” in the leakage search team can be assigned a role (e.g. leakage search, leakage repair, monitoring, checking for success)
- Access rights to individual or all projects can be assigned individually to each user
- The browser-based software ensures a common database in real time and paperless documentation

CS Leak Reporter - PC solution

Creates detailed ISO 50001 reports. Provides an illustrated overview of the leaks found and their savings potential. Measures for elimination, including status display, can be defined for every leak – license for two computers

Leakage Report	Start: 15/04/2019	End: 25/04/2019	Duration: 10 day(s)
Contact details:	**Customer:**	**Auditor:**	
Company:	Acme	John Sample	
Address:	...	1 Sample St., 12345 Sampletown	
E-mail:	johnacme@sample.com	j.sample@acme.com	
Phone:	...	+49 1234 567890	
Logo:		AM	
Project master data:			
Import date:		CO_2 emissions:	0.527 kg/kWh
Cost calculation basis:	Energy costs (70%)	Specific output:	0.12 kWh/m³
Compressed air costs:	21.6 €/1000 m³	Electricity price:	0.18 €/kWh
Operating hours per year:	4350 h		
Results:		**Improvements:**	
Number of leaks:	141	Number remedied:	1
Total leakage amount:	718.126 ltr/min	Leakage amount saved:	3.468 ltr/min
Total costs per year:	4,048.49 €	Costs saved per year:	19.55 €
Total CO_2 per year:	11.91 tonnes	CO_2 saved per year:	0.06 tonnes

Leak tag:	1	
Building – location	COMPRESSOR ROOM 1	**Repair under pressure possible?** - No
Date and time:	15/04/2019 12:06:03	**Error:** Ball valve defective
Leakage rate:	< 1.395 ltr/min	**Spare part:** 1/2" ball valve
Costs per year:	< 7.86 €	**Action:** Replace
Total CO_2 per year:	0.02 tonnes	**Note:** -
Priority:	Low	**Status:** Open
Comment:	Replace ball valve	**Remedied on:** - **Remedied by:** -
Leak tag:	**2**	
Building – location		**Repair under pressure possible?** - No
Date and time:	15/04/2019 12:08:19	**Error:** Flange leaking
Leakage rate:	2.519 ltr/min	**Spare part:** DN 100 flange seal
Costs per year:	14.2 €	**Action:** Reestablish seal
Total CO_2 per year:	0.04 tonnes	**Note:** -
Priority:	High	**Status:** Done
Comment:	Reestablish flange seal	**Remedied on:** 16/04/2019 **Remedied by:** AM

Accessories included in the set:

Carrying-/ neck strap

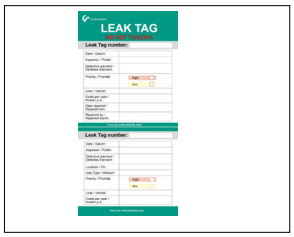
For ergonomic and safe working with the LeakCam 600

Transport case

LeakCam 600 and accessories always safely stowed away

Transport backpack

Backpack for easy transport



Leak Tags

for marking the leaks on site

Rechargeable battery

18 V 2 Ah
Einhell Power X-Change
- 400 g / 14.10 oz
- Min 2.5 hr operating time
- LED battery status

Rechargeable battery

18 V 4 Ah Plus
Einhell Power X-Change
- 595 g / 20.9 oz
- Min 5 hr operating time
- LED battery status

Battery charger

Einhell Power X-Charger 3A

40 min charging time for 2Ah batteries
75 min charging time for 4Ah batteries

Order no.

Set with transport case

Set with Transport backpack

DESCRIPTION	ORDER NO.
LeakCam 600 set consisting of:	0601 0305
LeakCam 600 leak detector, with integrated camera, 64 ultrasonic microphones for visualizing the leak on the screen, incl. 100 Leak Tags and Carrying-/neck strap	0560 0305
Rechargeable battery (18 V 2 Ah) Einhell Power X-Change	0691 0130
Rechargeable battery (18 V 4 Ah Plus) Einhell Power X-Change	0691 0131
Battery charger, Einhell X-Charger 3A	0691 0132
Transport case	0554 0206
Optional: Transport backpack instead of a transport case	0554 0207

Accessories

DESCRIPTION	ORDER NO.
Multi-Direction Ultrasonic tone generator for leak testing. A handy ultrasonic tone generator is available for detecting leaks in systems that are not under pressure. The transmitter is positioned so that the sound can enter the pipe system. The ultrasonic signal penetrates the smallest openings, which can then be detected with the LeakCam 600	0554 0203

DESCRIPTION	ORDER NO.
500 leak tags for marking the leaks on site	0530 0107

Software

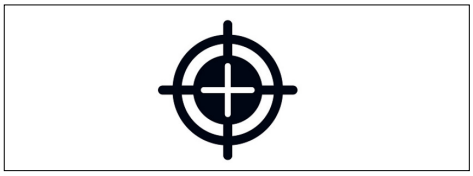
DESCRIPTION	ORDER NO.
CS Leak Reporter V2 Creates detailed ISO 50001 reports. Provides an illustrated overview of the leaks found and their savings potential. Measures for elimination, including status display, can be defined for every leak – license for two computers **New functions:** - Simple spare parts management - Histogram functions for documenting continuous improvement in accordance with ISO 50001 on the company or building level	0554 0205

DESCRIPTION	ORDER NO.
CS Leak Reporter V2 – additional licence for one computer	Z554 0205CS

DESCRIPTION	ORDER NO.
CS Leak Reporter – cloud solution **Basic package:** Browser-based access to the CS Cloud. **Advantages**: - Common database of all users in real time. - Cross-location work in a team - Paperless documentation. - Unlimited number of guest logins (read-only rights) can be set up. Only available in combination with at least one CS Cloud (0554 0306) user licence.	0554 0305

DESCRIPTION	ORDER NO.
User licence – CS Cloud 1 user / 12 months for CS Leak Reporter Cloud solution use.	0554 0306
Term extension - 1 user / 12 months for CS Leak Reporter Cloud solution use.	0554 0307

Calibration LeakCam 600



DESCRIPTION	ORDER NO.
Re-calibration / LeakCam 600	0560 4444

Calculation:

Costs per year						
Pressure	Size of leak – diameter (mm)					
	0.5 mm	1.0 mm	1.5 mm	2.0 mm	2.5 mm	3.0 mm
3 bar	€ 90	€ 361	€ 812	€ 1,444	€ 2,256	€ 3,248
4 bar	€ 113	€ 451	€ 1,015	€ 1,805	€ 2,820	€ 4,061
5 bar	€ 135	€ 541	€ 1,218	€ 2,166	€ 3,384	€ 4,873
6 bar	€ 158	€ 632	€ 1,421	€ 2,527	€ 3,948	€ 5,685
7 bar	€ 180	€ 722	€ 1,624	€ 2,888	€ 4,512	€ 6,497
8 bar	€ 203	€ 812	€ 1,827	€ 3,248	€ 5,076	€ 7,309

Table: Leakage costs in one year with 24-hour operation 365 days per year calculated with compressed air costs of 1.9 ct/Nm³.

Comfort

With the comfortable neck and carrying strap from Zeiss, you always have one free hand.

Transport backpack

for easy transport

Technical data

TECHNICAL DATA LEAKCAM 600	
Microphones:	**Quantity**: 64 MEMS mikrophones **Frequency range:** (2-80 kHz)
Measuring range:	**System pressure**: > 250 mbar **Distance**: 0,3...120 m **Sensitivity**: 2 l/h from 3 m
Camera:	**Resolution:** 13 MP **Field of View (FOV):** 77.3° diagonal 8x digital zoom Autofocus High Dynamic Range (HDR) **Illumination**: 5 LEDs
Laser:	**Wave lenght**: 630…660 nm **Output power**: < 1 mW (laser class 2)
Display:	**Size**: 5″ **Resolution**: 1280 X 720 Pixel **Touch screen:** capacitive **Brightness**: adjustable
Interface:	USB interface A+C
Data logger:	128 GB SD memory card (100 million values)
Power supply:	Internal rechargeable Li-Ion batteries approx. 2,5 hr. continuous operation (2 Ah) approx. 5 hr. continuous operation (4 Ah)
Operating temperature:	-5…+50 °C
EMC:	DIN EN 61326
Weight:	**LeakCam 600 main body (without battery):** 1130 g / 39.85 oz **18 V 2 Ah, Einhell Power X-Change battery:** 400 g / 14.10 oz **18 V 4 Ah PLUS, Einhell Power X-Change battery:** 595 g / 20.9 oz
Handling:	One-handed or freehand