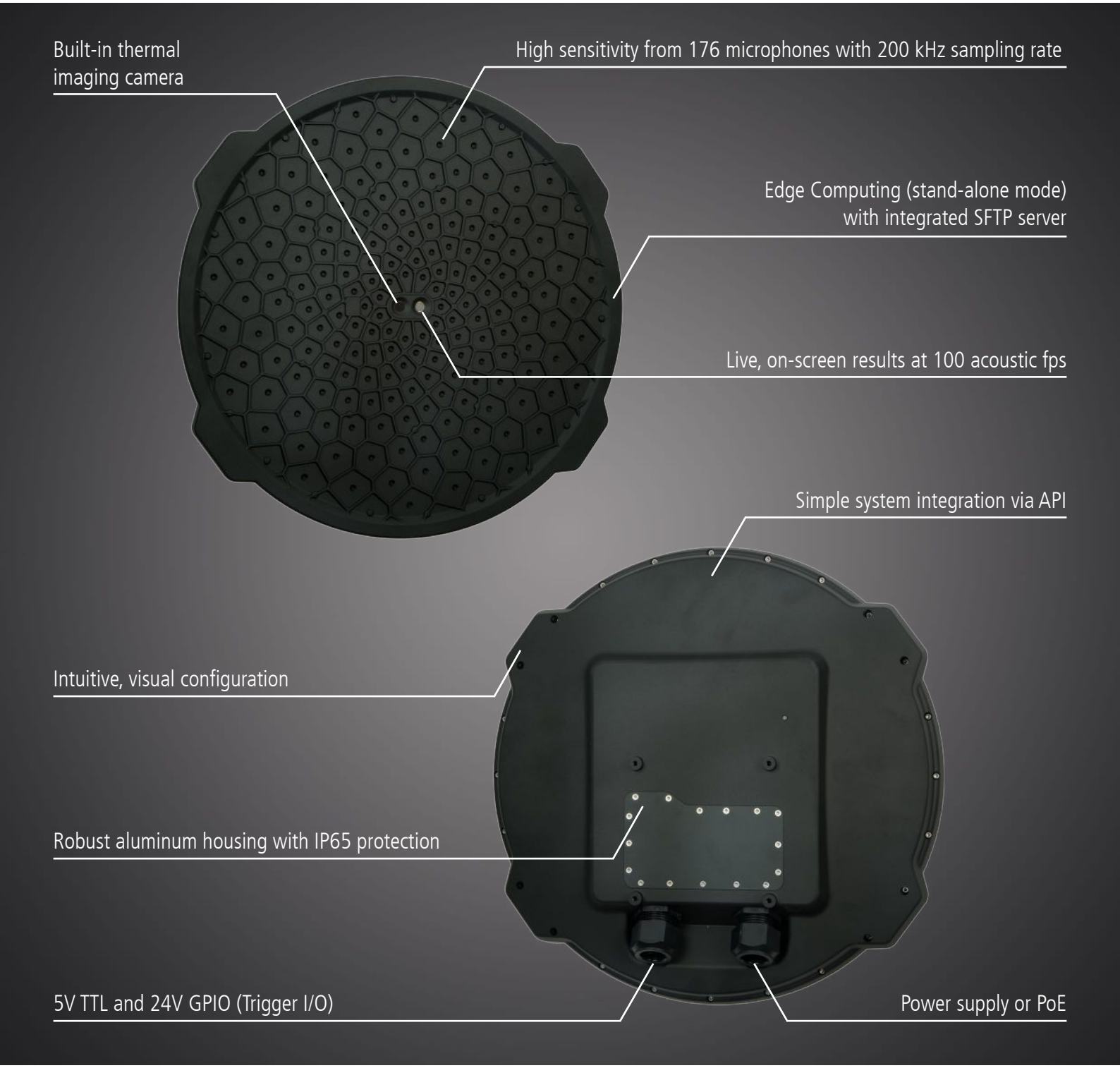
Product data

# SOUNDCAM 3 SENSOR

## Acoustic camera sensor: powerful, intuitive, versatile




### Typical applications

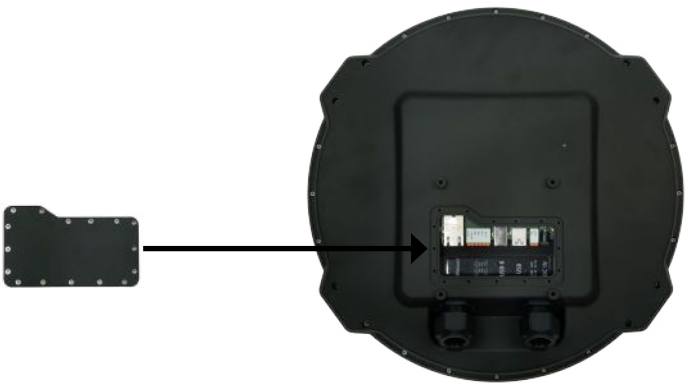
- Locating NVH and BSR
- Check soundproofing
- Localizing occupational noise
- Sound emission from devices and systems
- Diagnosis of electronic devices
- Pinpointing environmental noise

# **Hardware** High-performance

The **SoundCam 3 Sensor** is a compact, high-performance acoustic camera with real-time analysis in both the audible and ultrasonic frequency ranges. The large number of microphones generates high-resolution acoustic images with a wide dynamic range - allowing even weak sources to become visible alongside louder ones. An optical camera and a thermal imaging camera provide additional data for evaluations.
Thanks to its lightweight design and optional IP65 protection, the sensor is suitable for both stationary and mobile applications in harsh environments, such as on robots or drones. Typical applications include EOL testing of devices for objective acoustic quality assurance and drone detection for area protection, even from greater distances and in noisy environments.
USB, Ethernet with PoE, and programmable trigger I/Os enable easy integration into automation systems. The sensor can operate autonomously: triggers initiate measurements, data is stored locally, and can be transferred as needed. After power outages, the system restarts automatically.
The device combines precise acoustic monitoring, robust construction, and versatile interfaces in a compact system - making it ideal for demanding monitoring and automation tasks.

- Extremely high dynamic range and accuracy thanks to the optimized array with 176 microphones and a 200 kHz sampling rate at 24-bit resolution
- Wide frequency range for more sensitive detection and better noise suppression
- Suitable for harsh industrial environments thanks to IP65 protection
- Trigger I/O: Programmable 5V-TTL and 24V-GPIO for PLC integration and automation
- High frame rate of the acoustic video for detecting transient sounds
- Synchronization between acoustic and optical video for high analysis accuracy
- Global shutter and high frame rate of the optical video for fast-moving objects or rapid movements
- Simultaneous capture and recording of acoustic, optical, and infrared images

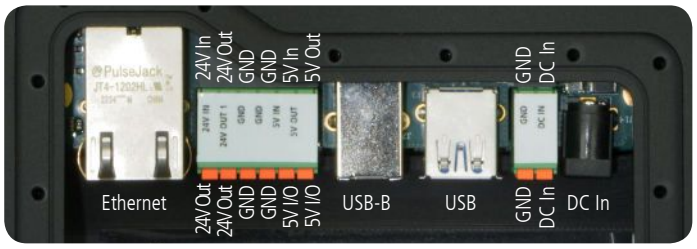
Available in black anodized and natural anodized



The back cover plate enables protection class IP65

## Hardware

| | | |
|---|---|---|
| **Microphones** | Number | 176 digital MEMS microphones |
| | Frequency range | Up to 90 kHz |
| | Sample rate | 200 kHz |
| | Sound pressure | Max. 120 dB |
| | Resolution | 24 bit |
| | Beamforming | 100 fps |
| **Optical Camera** | Resolution | 1280 x 800 px at 40 fps |
| | Aperture angle | 74° x 51° (FoV horizontal x vertical) |
| | Shutter | Global shutter |
| | Night vision | Yes (external IR illumination recommended) |
| **Thermal Imaging Camera** | Sensor Technology | Uncooled microbolometer |
| | Spectral Range | Longwave infrared, 8 µm to 14 µm |
| | Resolution | 160 x 120 progressive scan |
| | Frame Rate | 8,7 fps |
| | Sensitivity | <50 mK (0,050°C) |
| | T.-Compensation | Automatic |
| | Measuring Range and Accuracy | -10° to +140°C with +/-5°C or 5%<br>-10° to +400°C with +/-10°C or 10%<br>Larger value is to be applied |
| | Aperture angle | 57° x 44° (FoV horizontal x vertical) |
| | Temperature unit | Kelvin, Celsius, Fahrenheit |
| **Embedded Controller** | Internal memory | 1TB M.2 SSD |
| | OS | Linux |
| **Interfaces** | USB-B 3.0 | Data communication |
| | Ethernet | Data communication and PoE |
| **GPIO (Trigger I/O)** | 5V TTL I/O | 2x each selectable (specs as below) |
| | 5V TTL Input | 1x Wet-Contact Input 4,0V…5,5V |
| | 5V TTL Output | 1x Wet-Contact Output 5,0V |
| | 24V Input | 1x Dry-Contact Input 15V…24V |
| | 24V Output | 3x Wet-Contact Output 9V…24V<br>(same as Power Input Voltage,<br>PoE is 24V) |
| **Physical Properties** | Colour | Black anodized or natural anodized |
| | Dimensions | 35 x 35 x 6 cm / 14 x 14 x 2,4 inch |
| | Weight | 3 kg / 6,6 lb |
| | Protection class | IP65 |
| | Usage | Robot/drone or fixed installation |
| | Mounting points | VESA 100 x 100 with M4 thread |
| | Operating temp | -15°C to 50°C / 5°F to 122°F |
| | Storage temp | -30°C to 60°C / -22°F to 140°F |
| **Power** | Input | 9 to 24 V min. 20 W or PoE<br>(PoE+ [802.3at] or PoE++ [802.3bt]) |



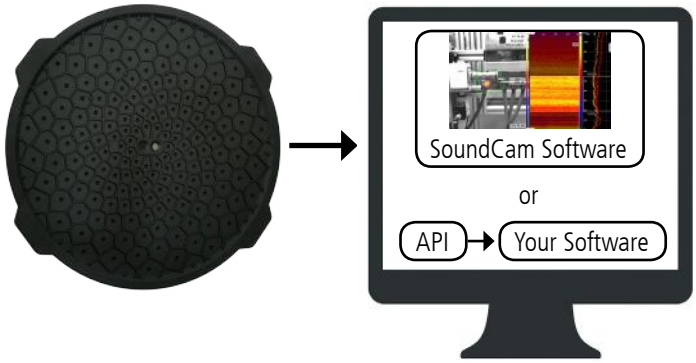
# **Software and API** Comprehensive and intuitive

The **SoundCam 3 Sensor** can be operated both via the supplied SoundCam Software and integrated into a custom application using the available API.

The SoundCam Software is intuitive and very easy to use. In addition to manual control of the sensor, it can also operate in **stand-alone mode**. In this mode, all processing takes place directly on the sensor. After one-time configuration via a PC, the connection can be disconnected - the sensor then continues to operate completely autonomously. If a trigger is activated, the measurement data is automatically stored and can be retrieved either via the software or through the integrated SFTP server.

The powerful **API** allows not only full integration into custom systems but also individual configuration of data streams. Additionally, the stand-alone mode can also be controlled via the API, allowing data to be processed and stored directly on the sensor (Edge Computing). As a result, only the required results need to be accessed.

This gives the SoundCam 3 Sensor maximum flexibility - from easy operation using the supplied software to seamless integration into custom systems via API - enabling efficient, application-optimized sound source analysis both locally and remotely.




- Stand-alone mode for autonomous sensor operation
- Trigger function for automated recording when exceeding a threshold level or frequency curve
- Real-time results with 100 acoustic frames per second
- Three acoustic scaling modes:
  - Smart: Suppression of background noise
  - Auto: Dynamic scaling
  - Manual: Comparison to a reference level
- Creation of measurement profiles to perform recurring measurements with the same settings
- Data retrieval via software, API, or SFTP server
- Parallel live view of multiple devices on a single computer

## Software

| | |
|---|---|
| **Modes** | **Standard:** Simplified mode for a quick start |
| | **Pro:** Expert mode with extended range of functions |
| | **Leak**: Optimized mode for the detection of leaks including **real-time display of the loss rate** |
| | **Partial Discharge**: Optimized mode for PD detection including **real-time display of the PRPD diagram** |
| | **Network**: Remote control of the device via the Windows software |
| | **Remote access**: Set the sensor to stand-alone mode so that it continues to work independently |
| **Functions** | **Local and global spectrum** (narrowband, 1/3rd octaves and octaves), **spectrogram**, acoustic, optical and thermal image |
| | Setting the distance |
| | Frequency filter (narrow band, 1/3rd octaves and octaves) |
| | 3 acoustic scaling modes: Smart, Auto, Manual |
| | Pinpoint listen-in (broadband or frequency-filtered) incl. making ultrasound audible |
| | Screenshot with comment option |
| | **Playback** in real time, slow motion or frame by frame |
| | Marking of events |
| | Adjustment of window sizes |
| | **Project-based work** via measurement series |
| | Creation and management of **measurement profiles/modes** |
| | File manager for copying, moving, deleting, exporting and viewing files |
| **Recording** | Ring buffer: 10 s, 30 s and additionally on Windows 60 s, 120 s, 180 s and 240 s |
| | Trigger recording: SPL- or spectrum-triggered up to 10 s with pre-run plus post-run time |
| | Long-term measurement: One image (average and peak hold) every 20 s to 900 s (adjustable) |
| **Export** | Photo(PDF), video, audio, measurement data |
| **Units** | Metric or imperial system |
| **Languages** | German, English, Spanish, Croatian, Italian, Japanese, Korean, Polish, Turkish, Chinese, Czech |
| **OS** | Linux (for the device), Windows (for laptop/PC) |

## API

| | |
|---|---|
| **Data Streams** | Video camera |
| | Acoustic image |
| | Thermal image |
| | Frequency spectrum |
| | Audio signal of the monitoring point |
| | Sound pressure level of all microphones |
| | Time data of all microphones (raw signals) |
| **Functions** | Create and edit measurement mode/profile |
| | Set measurement distance |
| | Set minimum and maximum frequency |
| | Set acoustic scaling mode and dynamics |
| | Activate/deactivate trigger |
| | Set trigger settings (pre-trigger and post-trigger time, data to be stored, and trigger method) |
| | Download and upload files |
| | Restart device |

# **EOL-Testing** Objective Acoustic Quality Control

Whether leak testing, functional verification or the detection of hidden defects – in end-of-line testing, the SoundCam 3 Sensor becomes an objective acoustic quality control system. The acoustic camera automatically and reproducibly detects deviations in sound patterns – independent of the operator, environmental influences or subjective assessment.
Integrated directly at the end of the production line, the solution delivers clear pass/fail decisions, supports digital quality processes and enables seamless documentation.
For maximum product quality and reliable inline quality assurance – within every production cycle.

Possible Applications of the Sensor Integrated into End-of-Line Testing:

- **Automated leak testing**: Detection and localization of leaks in components and assemblies directly at the end of the production line.
- **Quality inspection of devices**: Identification of abnormal noises in products as a key quality indicator.
- **Process monitoring and classification using acoustic pattern recognition:** Comparison of reference sound profiles with series production units for automated pass/fail evaluation.
- **Partial discharge testing in electrical assemblies**: Early detection of insulation defects, cable faults or high-voltage component irregularities.

Advantages of Using the Sensor in End-of-Line Testing:

- **Contactless and non-destructive testing**: Acoustic analysis without interfering with or altering the product.
- **Fast real-time inline quality inspection:** Acoustic measurement and evaluation within cycle time – ideal for automated production lines.
- **High test reliability and repeatability:** Objective, reproducible measurement results independent of operator influence or subjective assessment.
- **Early detection of production and assembly defects:** Identification of leaks, mechanical faults or electrical anomalies immediately after manufacturing.
- **Reduction of scrap and rework:** Defects are detected at an early stage before faulty products are delivered or further processed.
- **Automated pass/fail classification**: Comparison with reference sound profiles enables automatic quality decisions (OK/NOK).
- **Seamless documentation and traceability**: Storage of acoustic test data per component for quality verification and full traceability.

The SoundCam 3 Sensor can be integrated into end-of-line testing systems.

# **Drone Detection** Perimeter Protection

Whether industrial sites, critical infrastructure or sensitive security zones – with the SoundCam 3 Sensor, acoustic drone detection becomes a powerful security solution. The acoustic camera identifies drones based on their characteristic sound signatures and precisely localizes them – passively, automatically and independently of radio protocols.
Whether for perimeter monitoring, alerting or integration into existing security systems, the solution provides reliable early detection and continuous area protection.
For enhanced security, transparency and control – around the clock.

Possible Applications of the Sensor for Drone Detection:

- **Perimeter protection of industrial facilities and critical infrastructure:** Early detection of unauthorized drones above plant sites, power plants, refineries or logistics centers.
- **Security monitoring of sensitive areas**: Protection of research centers, military and government facilities, correctional institutions or data centers.
- **Monitoring of airports and no-fly zones**: Acoustic detection of illegal drone activity in the vicinity of runways and restricted airspace.
- **Protection of large events and public areas**: Detection of potential security threats at events, stadiums or public gatherings.
- **Border and coastal protection**: Identification of drones used for smuggling, espionage or unauthorized surveillance.
- **Monitoring of critical production and energy facilities**: Detection of drones operating near high-voltage lines, pipelines or manufacturing sites.

Advantages of Using the Sensor for Drone Detection:

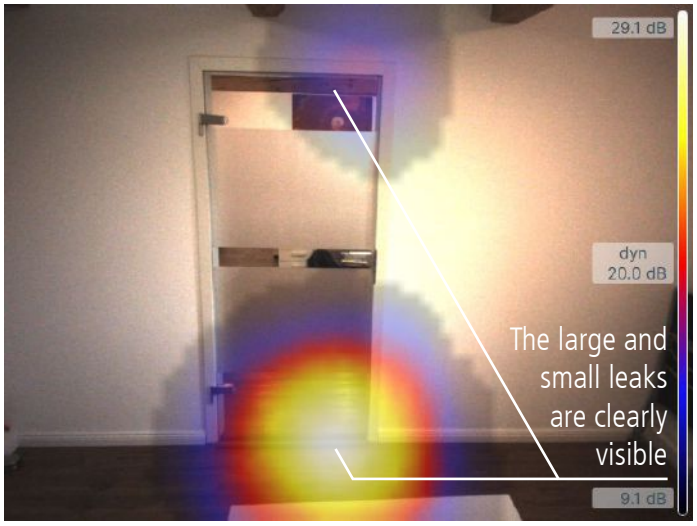
- **Passive and non-visible detection without signal emission**: No radar or radio transmission required – discreet and regulation-compliant monitoring.
- **Early detection without visual contact**: Acoustic detection operates reliably in darkness, fog or visually obstructed environments.
- **High directional and localization accuracy**: Beamforming enables precise direction finding of detected drones.
- **Independent of radio protocols and manufacturers**: Identifies drones based on acoustic signatures – even when GPS or radio transmission is disabled.
- **Automated classification capability**: Differentiation between drones, vehicles, machinery or ambient noise through acoustic signal analysis.
- **Scalable for large areas and 24/7 operation**: Suitable for continuous monitoring using multiple networked sensors.
- **Integration into security and control systems**: Interfaces allow seamless integration into existing monitoring and command systems.
- **Low installation and maintenance effort**: Robust sensor technology designed for outdoor applications with minimal service requirements.

Drone Detection with the SoundCam 3 Sensor

# **Performance** Well thought out to the last detail

- Very high sensitivity and dynamic range thanks to 176 microphones with 200 kHz sampling rate at 24 bit resolution
- Live, on-screen results at 100 acoustic fps
- Precise synchronization between acoustic and optical video for high analysis accuracy
- Simultaneous capture and recording of acoustic, optical, and infrared images
- Pinpoint listen-in, including making ultrasound audible, provides additional information
- Can be used in harsh industrial environments thanks to IP65 protection
- Control via Windows software or integration with the API
- Edge computing (stand-alone mode) for autonomous working
- Trigger function for automated recording when a level or frequency curve is exceeded
- Trigger I/O: Programmable 5V TTL and 24V GPIO for PLC connection and automation
- Data retrieval via software, API or SFTP server

# **Sensors** Extremely sensitive




Result of the SoundCam 2.0 Sensor, the predecessor model of the SoundCam 3 Sensor. This is a very good acoustic camera with 64 microphones. The large leakage is detected very well. The small leakage is not detected as it disappears in the image noise.

The 176 microphones and the optimized microphone array design of the SoundCam 3 Sensor increase the sensitivity and dynamic range immensely. As a result, the large and small leaks are clearly visible. Even at 20 dB dynamic range, no image noise is visiable.

More microphones, a higher sampling rate and high 24-bit resolution ensure better, more detailed and more reliable results.

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