PD20 Ex Acoustic Imaging Camera for Partial Discharge on Chemical Industry

Partial Discharge in a chemical industrial environment can cause loss of assets and life

Partial Discharge (PD) is a failure of part of the insulation system to withstand the electrical field. It can result from poor design, workmanship, defective materials, contamination, or ageing. This failure results in a high frequency, unipolar Discharge and accompanying current that flows through or on the surface of the insulation from the conductor to the ground. This current pulse is low energy due to its short (microsecond) duration, but it can negatively affect the insulation and eventually cause catastrophic failure.

Generally, PD happens on equipment including switchgear, transformers, stator windings, power cables and gas/pipelines. For PD to occur, a gas is present between the two conductors, whether air, sulphur hexafluoride (SF6) or hydrogen. In addition, a high voltage between the two conductors must create electric stress.

The discharge spark erodes the insulation from within through its heat and ionisation. If occurring on the surface, the Discharge also causes the breakdown of air molecules into oxygen (ozone) and nitrogen (nitric oxide). The nitric oxide forms nitric acid, which erodes the insulation from the outside.

When an internal PD occurs within the insulation, there is nothing to give this occurrence away, and the absence of any sound, odour or visual clue to an issue before failure is a real challenge. However, the pressure accumulation can cause a significant, disruptive and dangerous explosion.

Partial Discharge in a chemical industrial environment can cause loss of assets and life. Though it usually starts very small, once it begins, the deterioration of the insulation system is progressive. When voltage stress reaches a critical level, Partial Discharge will "bloom" and create a Corona. The ionised gas of a Corona is chemically active. In the air, this generates corrosive gases and causes extreme damage to the magnetic device and related circuit. Eventually, Partial Discharge will cause a system failure.





PD20 Ex, the acoustic imaging camera, is a professional product for sound source localisation. With 128 Low-noise MEMS microphones and an adjustable bandwidth range from 2 KHz to 65 KHz, PD20 Ex provides an easy and effective way to locate pressurised gas leaks and vibration localisations in chemical industrial environments or detect partial Discharge in high-voltage systems. Thanks to the intelligent design of the PD20 Ex taking care of electrostatic issues, sparks may arise from the device during the test, leading to possible explosion or fire risks in gas leak situations. Precaution circuitry is employed to eliminate such a risk. Using a large 7″ 1024 x 600 LCD touch screen, the results presented on top of a digital picture allow you to find the source of the problems quickly. The maximum operating distance could reach 100 meters, ensuring you stay in a safe space to inspect the high-voltage equipment. By adopting this lightweight and easy-to-use tool, you can discover potential safety risks, minimise troubleshooting, and save extra equipment failures and downtime costs.

Features

- 128 MEMS microphones
- Gas leak localization, vibration localization
- More flexible single-handed operation
- 2X zoom function, see more clearly the detection of abnormal areas
- Display real-time gas leak positions and abnormal vibration positions
- Intelligent software automatically determines leak intensity and vibration intensity based on device type
- 2KHz to 65KHz test frequency covers sound signals and ultrasonic signals
- 0.3m ~ 100m test range meets various sites
- With Photo and video functions, record abnormal points at any time





Why is acoustic imaging inspection necessary in the chemical industry?

The chemical industry is one of the crucial industries for national raw material production; the equipment within chemical plants is exceptionally complex as equipment's operation time increases, transport pipelines, valves and other equipment gradually age. That can easily lead to abnormal leaks and vibrations, which can cause production process problems, affect product quality or even cause security risks if the investigation is not timely.

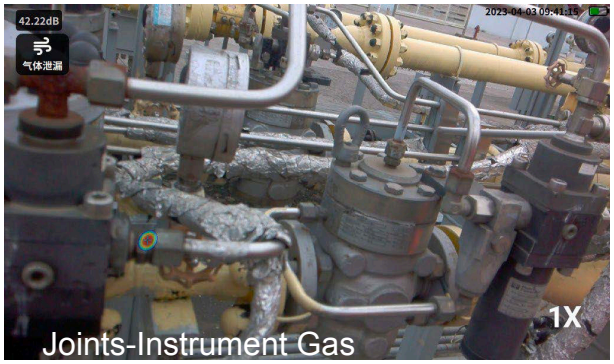
Why can the acoustic imaging camera effectively detect various chemical industry equipment?

The acoustic imaging camera can detect the tested equipment's overall condition, including partial electrical equipment discharges, gas leaks of pipeline equipment, and abnormal vibrations. The entire process is visualised, positioning no room to leave out detection. Additionally, the detection without contact is immune to electromagnetic and equipment vibration interference. Support multi-point sound source identification and improve speed and efficiency.

How do we determine whether there are abnormal defects in the tested equipment?

The regular gas pipelines and related valves have good sealing performance and usually do not have gas leakage points; the acoustic imaging camera will not see the signal gathering points generated by apparent gas leakage. However, suppose there are obvious gas leakage signal gathering points in the whole group of pipelines and valves in the detection process. It indicates abnormal leakage points at the pipelines and valves, which should be repaired according to the actual production situation. If there are multiple abnormal points, it is a severe defect that must be stopped and repaired as soon as possible to replace the damaged pipes and valves

Comprehensive Inspection Cases









Inspection case of a chemical plant- Gas leak



An inspection case of the natural gas area of an automobile factory- Gas leak



An inspection case of a pharmaceutical chemical plant- Compressed air leakage

Precautions for using acoustic imager for detection

- Pay attention to avoid excessive external noise interference during detection to prevent positioning deviation.
- Open the multi-point positioning mode of the acoustic imager to prevent missing abnormal positioning points.
- When testing the site, pay attention to safety measures and maintain a safe distance.

Usual methods for detecting gas leaks and abnormal vibrations

Leakage: Generally use soapy water

Vibration: Contact vibrometer

What are the problems with these standard methods?

Soapy water can only confirm the leakage of a few suspicious points but cannot investigate in a large area; the contact vibrometer cannot accurately locate the abnormal vibration position.

Due to our policy of continual product development, we reserve the right to amend the specifications of all mentioned products without notice.

TECHNICAL SPECIFICATIONS

ACOUSTIC PARAMETERS

Acoustic Measurement	128 Low-noise MEMS Microphones, Real-time Sound Visualisation
F.O.V.	70°
Dynamic Range	More Than 120dB
Bandwidth	2KHz ~ 65KHz
Acoustic Image Framerate	25 FPS
Measuring Distance	0.3m ~ 100m
Functions Type	PD & Noise Positioning Gas Leak Location

PHYSICAL & BATTERY DATA

Dimensions	316mm x 196mm x 106mm
Weight	1.1kg
Battery Capacity	6700mAH@7.2V
Battery Life	About 4 Hours
Port	USB Type-C, USB PD Protocol
Capacity Factor	Max 20W, Single Charge Max 16W

ENVIRONMENT PARAMETER

Working Condition	-10°C ~ +50°C, 10% ~ 95% Non-condensing
Storage Temperature	-20°C ~ +40°C
Charging Temperature	10°C ~ +45°C

USER INTERFACE

Display	Size: 7”, 1024 x 600; Colour: 24 Bit RGB; Brightness: 1,000cd/m^2
Input Device	Capacitive Touchscreen
Video Image Resolution	1640 x 1234 Video
Video Frame Rate	25 FPS (Max)
Acoustic Image Framerate	30 FPS (Max)

COMMUNICATION & STORAGE

External Storage	64GB SD Card
Internal Storage	8GB, Emergency Storage Only
Data Storage Format	JPG / MP4

CAMERA

F.O.V.	70°
Focal Length	3.04mm (Fixed)
Pixels	8 Million
Battery	Li-Ion, 6 Wh

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