CRYSOUND

IA3104

Contact Ultrasound Sensor

User Manual

Table of Contents

Revision History

Revision number	Description	Revision date
1.0	● Initial version	2025/05/19
1.1	● Add test precautions	2025/06/28
1.2	● Modify the software function description.	2025/12/15

01 User Notice

Legal Disclaimer

Warranty and Calibration

This product is covered by a free warranty repair service for abnormalities or malfunctions within two years from the date of purchase. The free warranty repair service does not cover issues caused by improper use or accidental damage such as drops. Unauthorized disassembly of the product will void warranty.

In case of malfunctions caused by improper use or accidental damage, we offer repair services at cost price. The device is calibrated during the manufacturing process. We recommend sending the device back to the manufacturer for calibration, testing, and maintenance every two years to ensure optimal performance during prolonged use.

Safety Usage Reminder

To prevent potential fire or personal injury, please note:

1. Please carefully read this safety notice before using the product.
2. Only use the product for its designated purpose.
3. Do not disassemble the product without authorization.
4. Discontinue use immediately if the product malfunctions or exhibits abnormal heating.
5. Please contact the manufacturer for product repair services.
6. Do not place the product near heat sources, flames, or in high-temperature environments.

02 Introduction

The Contact Ultrasound Sensor is purpose-built for leak detection in valves handling pressurized gases and liquids. Utilizing advanced ultrasonic sensing technology, it precisely capture high-frequency acoustic signals generated by internal leaks within the valve.

Powered by intelligent analysis algorithms and a process-driven inspection workflow, the system enables end-to-end automation—from data acquisition and feature extraction to leak identification. This significantly enhances detection efficiency and accuracy in complex industrial environments.

Ideal for predictive maintenance and fault diagnosis of critical assets such as oil pipeline valves and cooling system valves in nuclear power plants, the Contact Ultrasound Sensor empowers organizations to implement proactive and data-driven maintenance strategies.

Figure 2-1

03 Product Installation

Connect the contact ultrasonic sensor to the analog input interface of the Acoustic Imaging Camera through a connecting line, as shown in Figure 3-1.

Figure 3-1

The contact ultrasonic sensor supports the installation of magnetic and needle-type probes, with the ceramic probe used by default. The installation of ceramic and needle-type probes is shown in Figure 3-2.

Figure 3-2

04 Software Functions

4.1 Main Interface

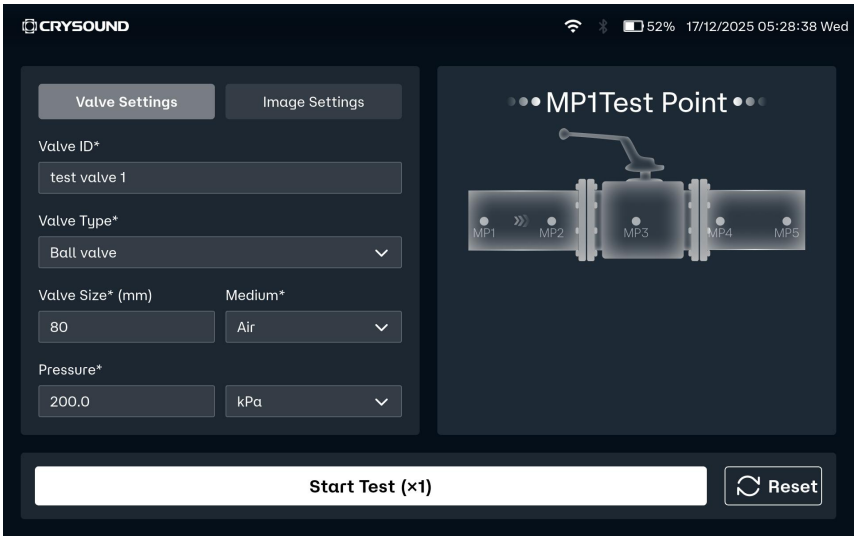

Figure 4-1

Valve Scene

Click the Acoustic Imaging Camera scene and switch to the Valve scene to start the valve test.

Valve ID

* This is a required parameter. The valve parameters below are linked to the valve number, facilitating valve identification during maintenance.

Valve Size

* This is a required parameter. Before testing, you must select the valve type that matches the actual valve being tested. Selecting the correct valve type will yield more accurate test results.

Medium

* This is a required parameter. Before testing, you need to select the same medium as the valve being tested for more accurate leakage rate estimation.

Pressure

* This is a required parameter; entering the pressure of the medium flowing through the valve will result in a more accurate estimate of the leakage rate.

Rest

Clicking the "↻" button will clear all measurement data, allowing you to start the test again.

Start Test

After clicking "Start Test," you will enter the test interface.

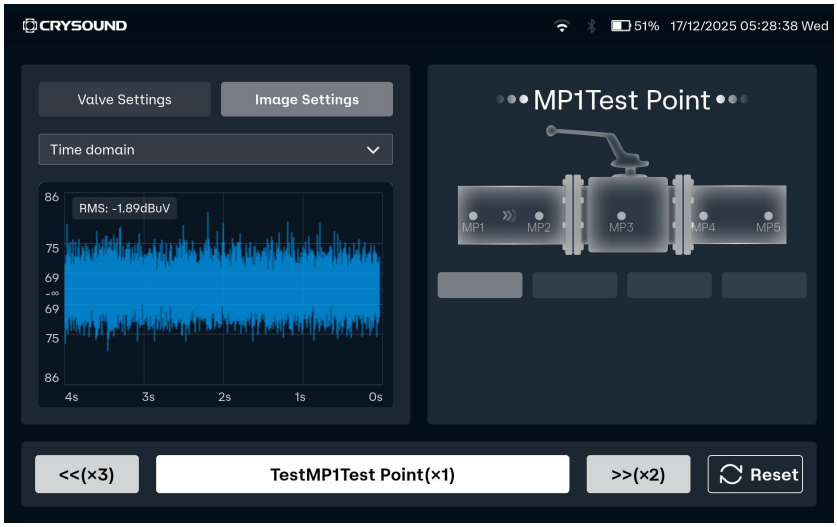

Figure 4-2

When the cursor is on the MP1 test point, clicking the "Test" button starts testing the ultrasonic energy level at the MP1 test point. Alternatively, you can start testing the MP1 ultrasonic energy level by briefly pressing the button on the contact ultrasonic sensor. Two short presses of the button will switch the test point to the adjacent test point on the right, and three quick short presses will switch the test point to the adjacent test point on the left. You can also select the test point by clicking on the valve model in the interface.

If you need to modify the valve parameters (such as valve type, medium, valve size, and pressure), click the "Valve Settings" button on the left to modify the valve parameters.

After completing two tests at each of the five test points, click the "Filtering Analysis" button or press the button on the contact ultrasonic sensor to begin the analysis.

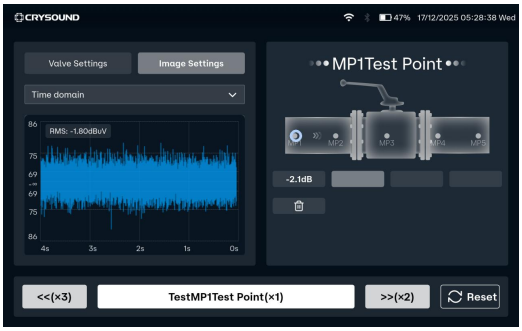

Figure 4-3

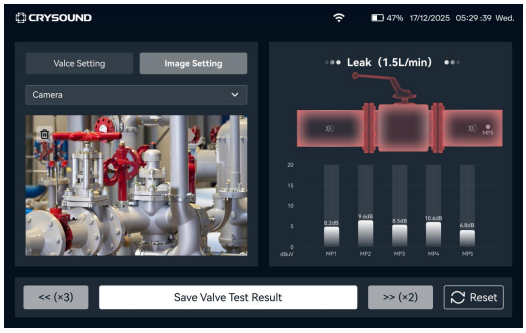

Figure 4-4

Measuring Point Selection

MP3 measurement point: Located at the valve core position.

MP2 measurement point: Located 1-2 pipe diameters upstream of the valve (the measurement point is on the pipe wall away from the valve, as shown in Figure 4-5).

MP1 measurement point: Located on the upstream pipe of the valve, 2-3 pipe diameters away from the MP2 measurement point (as shown in Figure 4-5). If there is insufficient distance, the distance between MP1 and MP2 can be shortened to 0.5 pipe diameters.

MP4 measurement point: Located 1 pipe diameter downstream of the valve (the measurement point is on the pipe wall away from the valve, as shown in Figure 4-5).

MP5 measurement point: Located on the downstream pipe of the valve, 1-2 pipe diameters away from the MP4 measurement point (it is recommended to place it on the pipe wall behind the valve flange). If there is insufficient distance, the distance between MP5 and MP4 can be shortened to 0.5 pipe diameters.

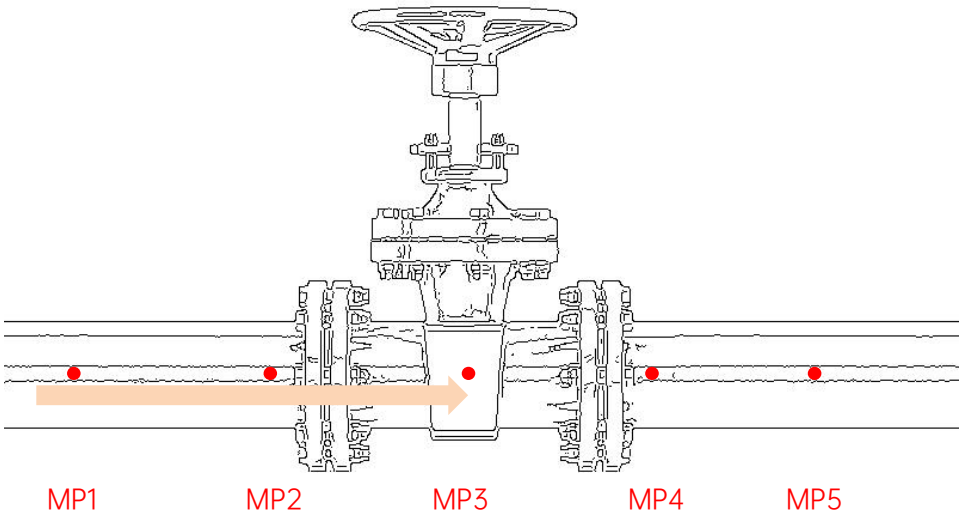

Figure 4-5

Note:

1. During testing, press the sensor onto each individual measurement point.
2. During measurement, ensure that the contact pressure at each measurement point is as uniform as possible.
3. Ensure the sensor does not slip during measurement, otherwise it will affect the test results.
4. Perform at least two measurements at the measurement points on the pipe (MP1, MP2, MP4, MP5).
5. After the measurement is completed, please point the camera at the tested valve to take a picture/video; otherwise, the test results will not be saved.

4.2 Valve parameters

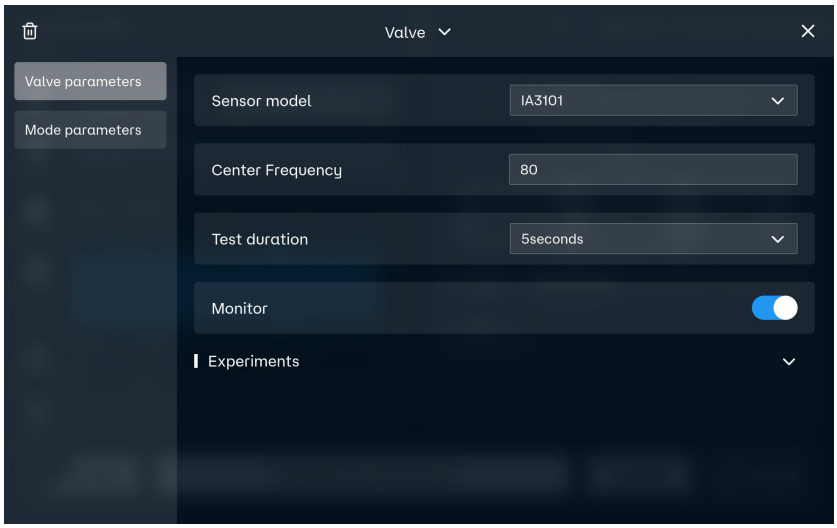

Figure 4-6

Sensor Model

Select sensor model IA3101.

Center Frequency

The center frequency is used as a reference RMS value during signal acquisition; the default setting of 80kHz is sufficient.

Test Duration

The default setting of 5 seconds is sufficient.

Ultrasonic Listening

When the ultrasonic listening function is enabled, the ultrasonic sensor will detect the ultrasonic signals generated by internal leakage in the valve and convert them into audible sound. With headphones connected to the Acoustic Imaging Camera, you can hear the sound of the valve leakage, such as a "hissing" sound, through the headphones.

Probe Selection

Ceramic Probe

The IA3101 ceramic probe features a white ceramic surface that acts as the signal receiving area. Before testing a valve, apply a coupling foil (transparent soft gel) to the surface. Be sure to remove the plastic film from the foil to ensure proper contact between the gel and the valve pipeline. The ceramic probe is recommended for detecting small leaks and should only be used on pipelines with temperatures between -20°C and 50°C. Usage beyond this range may cause irreversible damage to the sensor.

Magnetic Probe

The IA3101 supports the use of a magnetic probe. To install, align the probe clip with the groove on the ceramic surface, press down, and rotate clockwise. The magnetic probe is suitable for testing valves and pipelines made of ferromagnetic materials, helping to minimize interference from manual pressure. Before installation, remove the coupling foil and clean the white ceramic surface. This probe should also be used only within the -20°C to 50°C temperature range to prevent damage to the sensor.

Needle Probe

The IA3101 also supports a needle probe. Before installation, remove the coupling foil and clean the white ceramic surface. To attach the probe, align the clip with the ceramic groove, press down, and rotate clockwise. The needle probe is ideal for testing valves on pipelines with temperatures below -20°C or above 50°C, such as steam traps.

Pre-Test Preparation

1. Ensure the valve is fully closed before testing.
2. If the valve is covered with insulation or protective materials, remove them before testing. If removal is not possible, use an access hole (approximately 10 mm in diameter) through the insulation to reach the measurement point.
3. Identify the flow direction of the medium and map it accordingly to measurement points MP1 through MP5.
4. Confirm the presence of a pressure differential across the valve before testing (this may be indicated on a pressure gauge or via a process control system). A pressure differential greater than 0.05 MPa is required; lower pressure differences may result in undetectable leaks.

Notes1: Contaminated Coupling Foil

When using the ceramic probe, if the coupling foil becomes dirty (e.g., dust accumulation on the pipeline surface or no gel exposure), remove the foil. Clean the white ceramic surface of the sensor using a lint-free, anti-static cloth, then apply a new coupling foil.

Notes1: Noise Interference

S-type piping, T-junctions, and controllers may generate background noise. During testing, open the spectrum view and place the sensor on suspected noise sources to observe their frequency distribution. Adjust the center frequency to a quieter range, then re-run the test for more accurate results.

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