ARD421 Vibration Detector User Manual (V1.0)

The ARD421 Vibration Detector is a specialized security system designed for the financial sector. Utilizing piezoelectric ceramic sensors, it converts mechanical vibrations into electrical signals for digital spectral analysis. The system can effectively filter out vibrations generated by the normal operation of ATMs as well as those caused by passing vehicles.

The detector features a tamper-proof design on both sides and a dual-color LED status indicator. Its all-metal construction allows it to effectively detect vibrations caused by instant explosions, hammering, impact drills, and electric drills. It can also sense rapid rises in environmental temperature over a short period.

I. Features:

1. Detects vibrations caused by knocking or hammering.
2. Capable of identifying vibrations from instantaneous explosions.
3. Sensitive to vibrations from impact drills, electric drills, and pneumatic cutters.
4. Adjustable sensitivity and knock count settings.
5. Alerts if the environmental temperature rises by 10°C within 30 seconds.
6. Dual-color LED lights indicate different operating statuses.
7. Low voltage alarm triggered when voltage drops below 8V.
8. Suitable for both ATMs and vault walls; modes are selectable.
9. Alarm output options include normally open and normally closed.
10. Anti-tamper design for both the casing and wall mounting.

II. Electrical Specifications:

1. Power Consumption: DC 12V, operating current 18mA.

Alarm current is 15mA when set to normally closed.

2. Operating temperature: -25ºC to 60ºC; up to 95% humidity, non-condensing.

3. Dimensions: 85*37*28mm; Weight: 395g.

4. Alarm Output: Normally closed, alarm open-circuit output duration >2 seconds (either normally open or normally closed is selectable).

5. Relay Power Consumption: DC 12V, 100mA.

III. Wiring and Installation Diagram

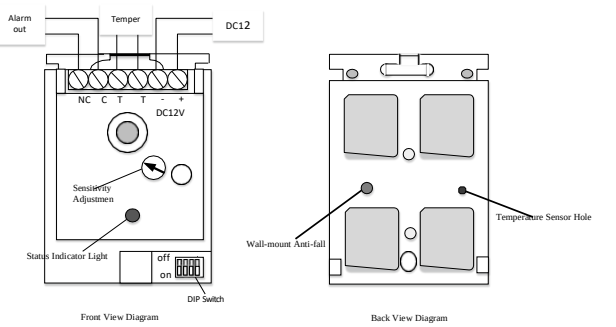

Figure 1

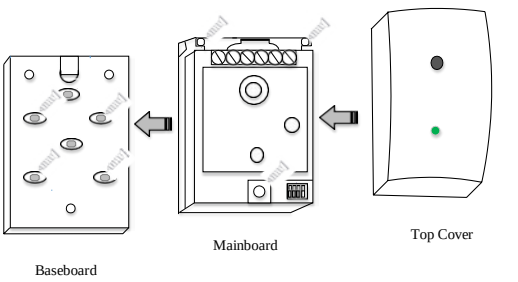

Figure 2

IV. Calibration and Usage

4.1 Application of DIP Switch

1	2	Meaning	3	Meaning	4	Meaning
Off	Off	Count 5 Times	Off	ATM Mode	Off	Normally Closed, Alarm Open
On	Off	Count 4 Times	On	Wall-mount Mode	On	Normally Open, Alarm Closed
Off	On	Count 3 Times				
On	On	Count 2 Times				

4.2 Indicator Lights

Alarm Indicator Light	Green Flashing (Interval of 2 Seconds)	Green Flash for 1 Second	Red Light Constant On	Red Light Flashing for 3 Seconds
Meaning	Normal Standby	Valid Knock	Low Voltage Alarm	Alarm

4.3 Installation Method

As shown in Figure 2, first secure the base plate onto the surface of the ATM or the object you wish to protect. There are two methods for securing the base plate: one is to use screws to fasten it onto the protected object's surface, and the other is to adhere it using strong adhesive.

Note: If you are using strong adhesive, make sure to clean the surface of the ATM before bonding. If you are using the detector for wall vibration monitoring, secure the base plate to the wall using metal expansion screws before mounting the detector onto it. Ensure that the detector is tightly installed against the wall; otherwise, it may affect its performance.

4.4 Calibration Method

4.4.1 After making the proper connections, connect the device to a 12V DC power supply. The green indicator light will flash (on for 0.3 seconds, off for 2 seconds), indicating that the device is in normal working condition.

4.4.2 Simulated Instantaneous Explosion Alarm Test: Use a hammer or a large screwdriver to deliver a heavy strike near the detector. The red light will flash continuously for 3 seconds, indicating that the striking energy has met the alarm intensity requirements, and the detector will trigger an alarm.

4.4.3 Knock Count Alarm Test: Use a metal hammer or other metal object to knock on the surface. Each effective knock will cause the green light to illuminate for 1 second. Once the cumulative number of knocks reaches a certain amount (factory setting is 5 knocks), the detector will trigger an alarm. During testing, the number of knocks can vary between 2 and 5 and can be adjusted using DIP switches 1 and 2. Depending on site requirements, you can fine-tune the knock sensitivity by adjusting the blue knob.

When DIP switch 3 is set to off, it is generally used for installation on ATMs. When DIP switch 3 is set to on, the knock sensitivity increases by 9db and is generally used for wall vibration detection.

4.4.4 Temperature Alarm Test: When continuously applying heat to the temperature sensing hole (as shown in Figure 1) using a high-power heat gun or other heat-generating equipment, the detector will trigger an alarm. During a temperature rise alarm, the red light will flash continuously for 3 seconds.

4.4.5 If you need to maintain a constant standby state with the alarm output closed, simply switch DIP switch 4 to the "on" position.

V. Reference Scope of Application

Material	Sensitivity	Impact Drill	Knock (5 times)	Instantaneous Explosion
Reinforced Concrete Plate	5 (Turned Clockwise to the End)	8 Meters 10 Meters	8 Meters 12 Meters	Alarm
Reinforced Concrete Plate	4	6 Meters 7 Meters	6 Meters 9 Meters	Alarm
Reinforced Concrete Plate	3	5 Meters 5 Meters	5 Meters 6 Meters	Alarm
Reinforced Concrete Plate	2	4 Meters 3 Meters	4 Meters 4 Meters	Alarm
Reinforced Concrete Plate	1 (Turned Counterclockwise to the End)	2 Meters 1 Meter	2 Meters 1 Meter	Alarm

Note: The data in the table is for design reference only and does not define the actual operational scope of the product. The effectiveness of the vibration detector depends on various factors such as vibration source intensity, differences in transmission mediums, installation discrepancies, and sensitivity levels. The vault's recommended design effective radius is 4 meters; therefore, the actual operational range should be based on on-site measurements.

For the concrete wall simulation, the test conditions require that DIP switch 3 is set to the ON position.

VI. Restricted Elements and Element Identification Table

Component Name	Hazardous and Toxic Substance Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Polybrominated Biphenyls (PBB)	Hexavalent Chromium (Cr(VI))	Polybrominated Diphenyl Ethers (PBDE)
Outer Shell Components	O	O	O	O	O	O
Main Circuit Board	X	O	O	O	O	O

This table is prepared in accordance with the SJ/T11364 standards.

O: Indicates that the concentration of this hazardous substance in all homogeneous materials of this component is below the limit requirements specified in GB/T26572.

X: Indicates that the concentration of this hazardous substance exceeds the limit requirements specified in GB/T26572 in at least one homogeneous material of this component.

VII. Random Accessories:

Instruction Manual: 1 copy
Fixing Screws: 3 pieces
Certificate of Conformity: 1 copy
Installation Backplate: 1 piece