PERSEC
TECHNOLOGIES

SMART MICROPHONIC CABLE INTRUSION DETECTION SYSTEM

USER MANUAL

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Contents

1 Purpose and Scope

This manual provides general guidance for the design, installation, configuration, commissioning, testing, operation, and maintenance of PSM Series Microphonic Cable Perimeter Intrusion Detection System. It is intended for security consultants, installation contractors, commissioning engineers, and site security operators.

The information in this guide is generic to the PSM family and must be adapted to each project's drawings, risk level, and local regulations.

2 System Overview

The PSM Series is a perimeter intrusion detection solution that uses vibration-sensitive sensor cables mounted on fences, walls, or buried configurations. The system detects mechanical disturbances such as cutting, climbing, lifting, or digging and converts them into electrical signals analyzed by the processor.

3 Safety Information

The system is a passive detection system and does not emit hazardous energy.

All installation and maintenance work must comply with local electrical, safety, and occupational regulations. Only trained and authorized personnel may install or service the system.

3.1 General Safety Rules

Do not modify the output stages, Earthing, or wiring in any way that increases risk. Allow only trained and authorized personnel to install, commission, maintain, or service the PSF system.

Always disconnect power before performing mechanical or electrical work.

3.2 Environmental and Animal Safety

The microphonic cable perimeter intrusion detection system is a passive sensing system and does not emit electrical energy, radiation, or mechanical force into the protected area.

4 Pre-Installation Site Survey and Planning

Conduct a full site survey to evaluate the fence type, wall structure, and overall mechanical condition of the perimeter.

Assess soil conditions for buried applications, including soil type, compaction, and drainage.

Identify environmental noise and vibration sources such as roads, railways, heavy machinery, wind exposure, and nearby industrial activity.

Evaluate potential sources of vibration interference that may affect detection performance.

Define detection zones based on perimeter layout, risk level, and response requirements.

Prepare detailed zoning layouts and system drawings.

Plan sensor cable routing, lead-in cable paths, and protection methods.

Identify and define integration points with CCTV systems, alarm panels, access control, and other security systems.

5 System Design Guidelines

Divide the perimeter into logical detection zones based on site risk level, operational response requirements, and available processor channel capacity.

Limit the length of each detection zone to ensure accurate alarm localization and effective incident response.

Separate high-risk or critical areas (such as gates, entrances, and sensitive sections) into independent zones where possible.

Consider environmental noise and vibration sources during system design, including nearby roads, railways, heavy machinery, and wind-exposed sections.

Adjust zone boundaries and system sensitivity to minimize nuisance alarms while maintaining reliable intrusion detection performance.

5.1 Zoning and Layout

Divide the perimeter into logical zones based on risk level, camera coverage, and access points (vehicle and pedestrian gates).

Keep each zone sufficiently short to allow accurate localization and response to alarms.

Separate critical areas (e.g., main entrances, sensitive spots) into independent zones where possible.

6 Installation Instructions

Install the microphonic sensor cable securely along the fence mesh, wall surface, or within designated burial trenches.

Maintain consistent fixing intervals and tension where applicable.

Route lead-in cables in protective conduits and clearly label all zones.

6.1 Mechanical Installation

Inspect the base fence, wall, or structure to ensure it is mechanically sound, rigid, and free of loose elements.

Verify that the fence mesh, wall surface, or mounting structure can reliably transmit vibrations to the sensor cable.

Install the microphonic sensor cable along the fence mesh, fence fabric, wall surface, or designated mounting points as per project drawings.

Fix the sensor cable using approved clips, ties, or brackets at uniform intervals to prevent free movement.

Avoid over-tightening cable fasteners, which may dampen vibration transmission or damage the sensor cable.

Maintain consistent cable routing height and pattern along each zone to ensure uniform sensitivity.

Provide additional mechanical protection at corners, gates, and transition points to prevent abrasion or mechanical stress.

Ensure smooth bends and minimum bend radius are respected at all direction changes.

For buried installations:

- ❖ Excavate trenches according to specified depth and width.
- ❖ Lay the sensor cable on a stable base and backfill with approved material.
- ❖ Compact backfill evenly to maintain consistent vibration coupling.

Clearly mark zone boundaries at mechanical termination points.

6.2   Electrical and Control Installation

Mount the microphonic processor(s) and interface modules in secure, weather-protected enclosures.

Ensure equipment is accessible for maintenance but protected against unauthorized access.

Connect sensor cable zone terminations to the processor channels according to wiring diagrams.

Route lead-in cables in protective conduits to prevent mechanical damage and environmental exposure.

Maintain separation between sensor cables, power cables, and high-interference sources where applicable.

Connect power supplies in accordance with electrical codes and manufacturer requirements.

Connect alarm relay outputs and communication interfaces (dry contacts, RS-485, TCP/IP) to the monitoring system.

Label all sensor zones, lead-in cables, and processor terminals clearly at both ends.

Verify grounding and bonding of enclosures in accordance with site electrical standards (grounding is for equipment protection, not sensing).

7   Commissioning and Energizing

Connect all sensor cable zone terminations to the processor in accordance with the wiring diagrams.

Verify correct zone assignment and channel mapping before powering up the system.

Apply power to the processor and confirm normal startup and communication status.

Calibrate sensitivity levels for each zone based on fence type, mounting method, and environmental conditions.

Configure filter parameters to suppress background noise while preserving intrusion signal characteristics.

Set alarm thresholds individually for each zone to balance detection reliability and nuisance alarm reduction.

Perform controlled intrusion simulations (e.g., cutting, climbing, lifting, or digging, as applicable) on each zone.

Verify that alarms are generated correctly, accurately localized, and reported to the monitoring system.

Adjust sensitivity and threshold settings as required to achieve stable performance under normal environmental conditions.

8   PSM Software Setup

Using the PSM Perimeter Security Management Software:
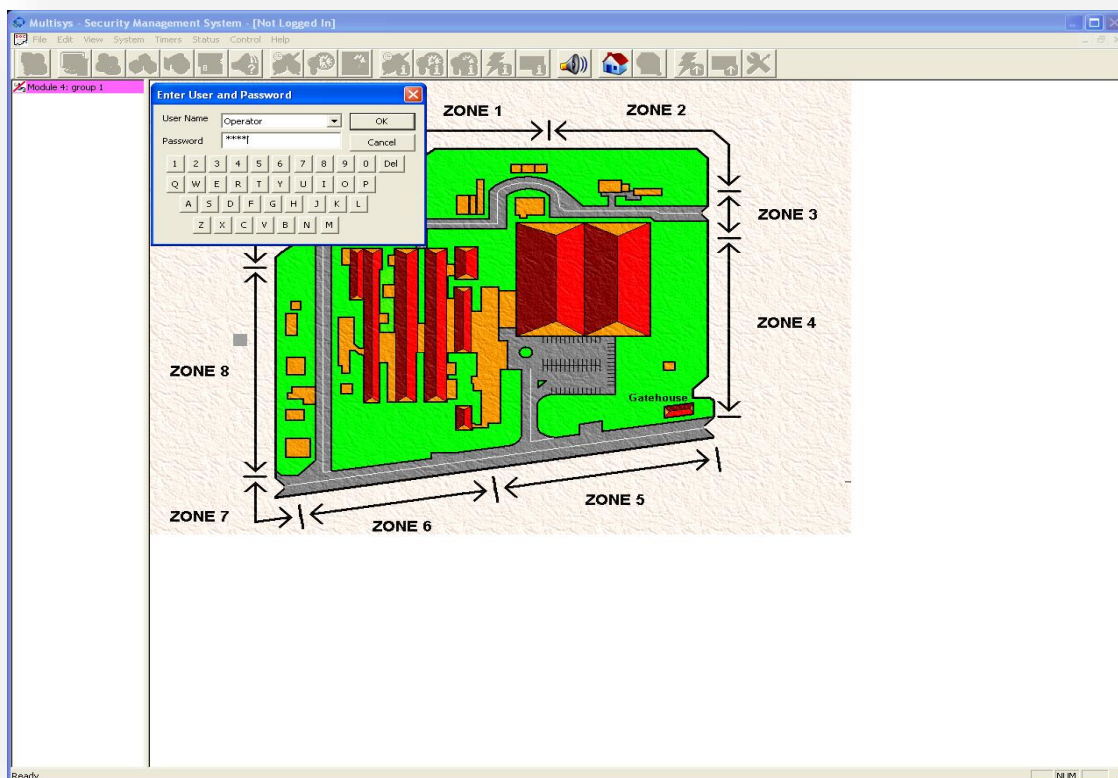
Log in with an authorized username and password.

Configure communication settings for each analyzer (IP address or RS-485 parameters).

Create or import site maps and define zones on the graphical interface, matching the physical zoning.

Place and label PSM analyzers and zones in their correct positions on the map.

Add CCTV camera positions and link them to relevant zones where applicable.

Configure users, roles, and permissions based on operator responsibilities.

9   Detailed Functional Tests and System Verification

Verify the mechanical integrity of the sensor cable installation, including fixation points, routing, and protection at corners, gates, and transitions.

Confirm stable communication between the processor and the management software.

Verify correct zone configuration and mapping within the management software, ensuring alignment with the physical installation.

Test alarm generation for each zone and confirm accurate indication on the software interface.
Test relay outputs and dry contacts connected to external devices.

Verify proper integration and response of connected systems, including CCTV camera presets, sirens, beacons, and monitoring platforms.

Review system event logs to confirm correct time stamps, zone identification, and alarm reporting.

10   Mechanical and Visual Inspection

Inspect the entire sensor cable route to confirm correct installation along the fence, wall, or buried path.

Verify that the sensor cable is securely fixed at all specified intervals and does not hang freely or move under normal wind conditions.

Check that fixation clips, ties, brackets, or adhesives are intact, correctly spaced, and free from corrosion or damage.

Confirm that the sensor cable follows the designed routing pattern and installation height consistently within each zone.

Inspect corners, direction changes, and termination points for excessive bending, abrasion, or mechanical stress.

Verify that minimum bend radius requirements are respected at all cable turns.

Inspect gate sections to confirm correct flexible mounting, slack allowance, and protection against repeated mechanical movement.

Check that transition points between zones are clearly defined and mechanically separated.
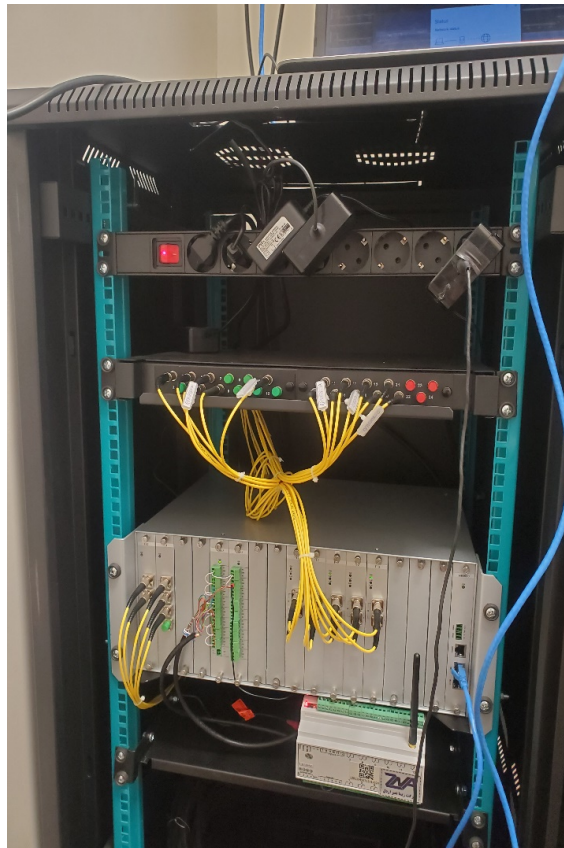
For buried installations:

- ❖ Confirm trench backfill is compacted and stable with no visible subsidence.
- ❖ Check for signs of erosion, water accumulation, or disturbance by animals.

Verify that lead-in cables are protected inside conduits and are not exposed to crushing, cutting, or UV damage.

Inspect processor enclosures and junction boxes to confirm they are securely mounted, properly sealed, and free from physical damage.

Ensure all zone labels and identification markers are present, legible, and match system documentation.

11   Alarm and Response Testing

Perform alarm tests on each detection zone using controlled intrusion simulations appropriate to the installation type (e.g., fence climbing, cutting, lifting, or ground disturbance for buried systems).

Verify that alarms are generated promptly and reliably for each simulated intrusion.

Confirm that the correct zone is indicated on the management software map or interface.

Check that visual and audible indications (icons, colors, sounds) operate as configured in the monitoring system.

Verify activation of alarm relay outputs connected to external devices.

Test site sirens, beacons, or other warning devices for correct operation and timing.

If integrated with CCTV systems:

❖ Verify that the correct camera view or PTZ preset is automatically displayed for each alarmed zone.
❖ Confirm that recorded video is correctly associated with the alarm event.

Verify alarm acknowledgment, reset, and restore functions through the operator interface.

Test alarm behavior during normal environmental conditions (wind, light rain, background activity) to confirm nuisance alarms are minimized.

Review system event logs to confirm accurate recording of alarms, responses, timestamps, and zone identifiers.

12   Handover, Training, and Documentation

12.1 User and Operator Training

Train the client's security personnel and operators on:

Basic system concept and zoning

Use of the PSM management software (monitoring, alarm handling, reports)

Normal procedures for acknowledging, verifying, and resetting alarms

Use of "Cancel the Siren" or similar functions without disabling detection

Conduct a joint test with the security team:

Simulate alarm conditions in selected zones.

Allow operators to follow the full procedure: identification, CCTV verification, acknowledgment, and reset.

Verify that training has been understood by practical demonstration.

12.2 Documentation and User Manual Delivery

Provide the System Operation and Training Manual for the PSM Smart Microphonic Sensor Cable.

Explain how to use the manual, including:

Accessing zone and event reports

Checking system status and logs

Recording maintenance and test activities

Hand over all project documentation:

As-built drawings and zoning plans

Cable schedules and connection diagrams

Controller and panel configurations

Test and commissioning reports

12.3 Final Acceptance

Agree on acceptance criteria with the client.

Confirm that all agreed tests have been completed and passed.

Obtain formal sign-off from the client's representative for system handover and start of operational use.

13 Maintenance and Service

13.1 Routine Maintenance

Perform a visual inspection of microphonic sensor cables along the entire perimeter to ensure they are securely fastened and free from cuts, abrasions, or signs of tampering.

Verify that mounting hardware, clamps, and brackets remain tight and properly aligned with the fence or structure.

Inspect junction boxes, splice points, and terminations for moisture ingress, corrosion, or loose connections.

Check processor enclosures for proper sealing, ventilation, and absence of dust or insects.

Confirm that grounding and earthing connections are intact and comply with local electrical standards.

Clean equipment surfaces as required and remove vegetation or debris that may contact the sensor cable and cause nuisance alarms.

13.2 Preventive Maintenance

Review system logs and alarm history to identify recurring nuisance alarms or abnormal activity patterns.

Re-verify zone configuration and ensure zone lengths have not been altered due to physical changes in the perimeter.

Confirm power supply voltage levels and battery backup condition, if applicable.

Inspect communication links between the processor and monitoring system (relay outputs, network connections, or serial interfaces).

13.3 Functional Testing

Conduct periodic walk tests on each detection zone to confirm correct alarm generation and accurate zone identification.

Simulate controlled intrusion events (e.g., fence climbing, cutting, or lifting) in accordance with system design criteria.

Verify that alarm signals are correctly transmitted to the monitoring software, control room, or external security systems.

Confirm proper operation of tamper alarms, power failure alarms, and communication fault indications.

13.4 Sensitivity and Calibration Check

Verify that sensitivity, filtering, and alarm thresholds remain appropriate for current environmental conditions.

Adjust parameters as necessary to maintain high detection probability while minimizing nuisance alarms caused by wind, rain, or nearby activity.

Document any changes made to system settings and maintain updated configuration records.

13.5 Testing Frequency

Perform routine visual inspections monthly or as required by site risk level.

Conduct full functional and intrusion simulation tests at least quarterly, or after any repair, fence modification, or environmental change.

Carry out comprehensive system testing annually as part of preventive maintenance.

13.6 Documentation and Reporting

Record all maintenance activities, test results, alarms, and parameter adjustments in a maintenance log.

Report any faults, degraded performance, or repeated nuisance alarms to the system administrator for corrective action.

Maintain updated as-built drawings and zone layouts reflecting any physical or configuration changes.

14 Normal Operation

Operators monitor zone status via the management software.

Upon alarm, the affected zone is highlighted and associated CCTV views are displayed if integrated.

After verification, alarms are acknowledged and reset through standard operating procedures.

15 Troubleshooting

Common issues include false alarms due to environmental noise, loss of communication, or damaged cables.

Corrective actions include sensitivity adjustment, inspection of physical installation, and verification of power and communication links.