PERSEC TECHNOLOGIES

# SMART ELECTRIC FENCE INTRUSION DETECTION SYSTEM

## USER MANUAL

December 2025

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**Contents** **Page**

# 1 Purpose and Scope

This manual provides general guidance for the design, installation, configuration, commissioning, testing, and handover of the PSF Series Smart Electric Fence.

It is intended for:

- Security system designers and consultants
- Installation contractors and technicians
- Site security managers and operators

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

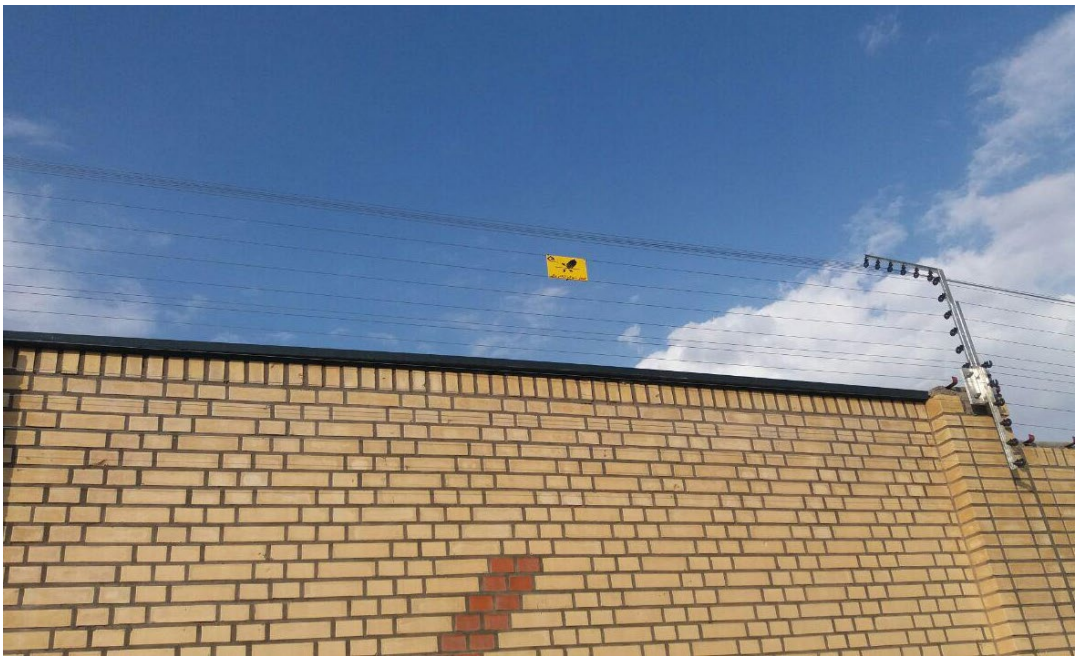
# 2 System Overview

The PSF Series is a perimeter protection system that combines a physical barrier with an electric deterrent.

Key characteristics:

- Non-lethal, pulsed high-voltage output (up to approx. 10 kV, low current)
- Clear psychological and physical deterrent to cutting and climbing
- Continuous monitoring of shock voltage, wire integrity, and earth condition
- Integration with CCTV, sirens, lighting, access control, and other I/O devices via dry contacts and TCP/IP/RS-485
- Zoning capability (from small sites up to large perimeters with many zones)

Typical applications include: industrial facilities, power substations, factories, warehouses, data centers, and other high-value outdoor sites.



# 3 Safety Information

Electric fences must always comply with local electrical and safety standards as well as occupational health regulations.

## 3.1 General Safety Rules

Do not modify the output stages, Earthing, or wiring in any way that increases risk. The PSF system is designed as a non-lethal deterrent.

Allow only trained and authorized personnel to install, commission, maintain, or service the PSF system.

Always disconnect power to the controller before performing mechanical or electrical work on the fence.

Install warning signs around the perimeter according to local codes (e.g., at gates and at regular intervals).

Do not install an electric fence where public access is possible without adequate signage, physical barriers, or controlled-access gates.

## 3.2 Environmental and Animal Safety

The PSF system uses short, intermittent pulses with low current, designed to deter but not injure humans or animals during normal operation.

Avoid installing energized wires directly accessible to livestock or vulnerable animals without confirming compliance with national standards for agricultural/electric fencing.

Maintain clear space and vegetation control around the fence to avoid leakage paths and unintended contact points.

# 4 Pre-Installation Site Survey and Planning

Before any installation work, perform the following:

Technical Site Survey

Visit the site and take precise, final measurements of the entire perimeter.

Record wall/fence type, height, thickness, and structural condition.

System Modelling and Layout

Prepare detailed implementation drawings:

PSF fence layout and zoning plan

Location of PSF posts (end, corner, intermediate)

Position of gates, corners, level changes, and obstacles

Coordinate PSF layout with:

Existing wall/fence structures and site topography

CCTV camera locations and fields of view

Other security systems and services (access control, lighting, etc.).

Coordination with Other Trades

Review potential clashes and interdependencies with:

Cable trays, ducts, and conduits

Power supply routes

Civil works and structural modifications

Agree on a project schedule considering:

Order of works for all contractors

Required manpower for PSF installation

Availability of all PSF equipment, posts, insulators, cable, and accessories.

# 5 System Design Guidelines

## 5.1 Zoning

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.

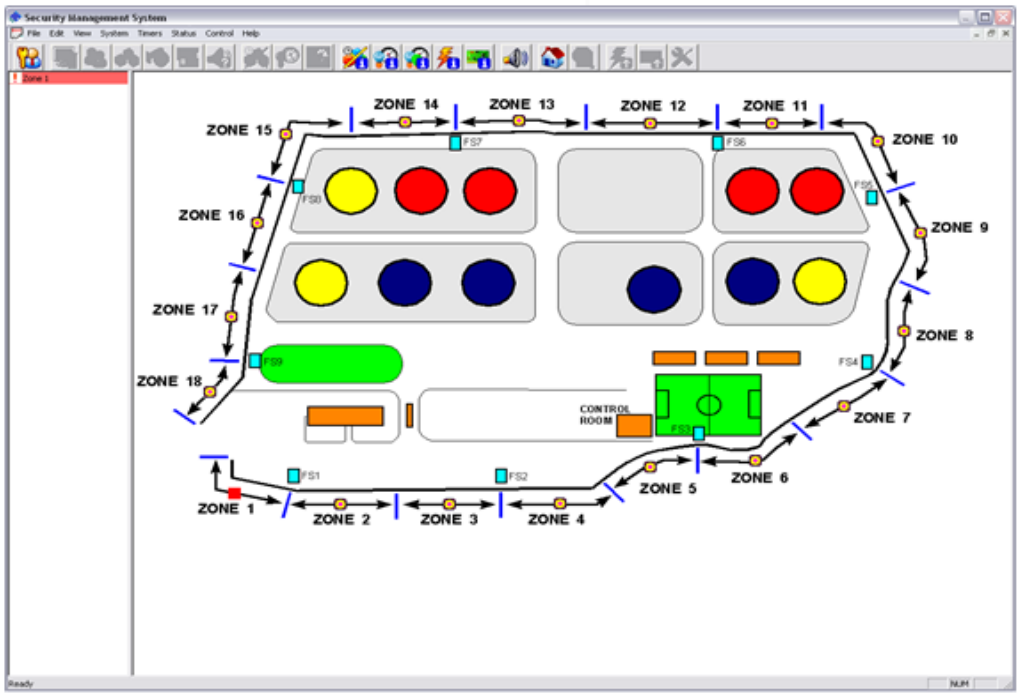
Separate critical areas (e.g., main entrances, sensitive spots) into independent zones where possible.

## 5.2 Fence Layout

Use existing fences, walls, or palisades as the base structure where possible.

Install PSF Intermediate Sections and Direction-Change Sections at the spacing recommended in your project design (commonly 2–3 m between intermediate posts).

Alternate high-voltage and earth wires as per design, ensuring proper clearance from metallic structures using appropriate insulators.



# 6 Installation Instructions

Important: Follow local electrical code and project-specific drawings. The steps below describe a general recommended sequence.

## 6.1 Mechanical Installation

Inspect the Base Fence

Check structural integrity, post spacing, and foundations.

Ensure the wall or fence can support PSF posts and tension loads.

Install End and Corner Sections

Fix brackets securely to the base fence or structural posts.

Install strain insulators and all required tensioning hardware.

Make sure corner and end posts are robust enough to withstand wire tension without excessive tilt.

Install Intermediate Posts and Insulators

Fit intermediate insulators on intermediate posts.

Mount PSF posts on top of walls/fences or directly into the ground according to design.

Level posts and ensure that tilt remains within allowed tolerance.

String Fence Wires

Route high-voltage and earth wires through insulators and hardware on each section.

Install all end insulators, hooks, tension hooks, and tensioners.

Set wire spacing according to design; avoid irregular distances between wires in any zone.

Set Wire Tension (Regulation)

Gradually tension each wire using the tensioners.

Do not overstress posts, brackets, or insulators.

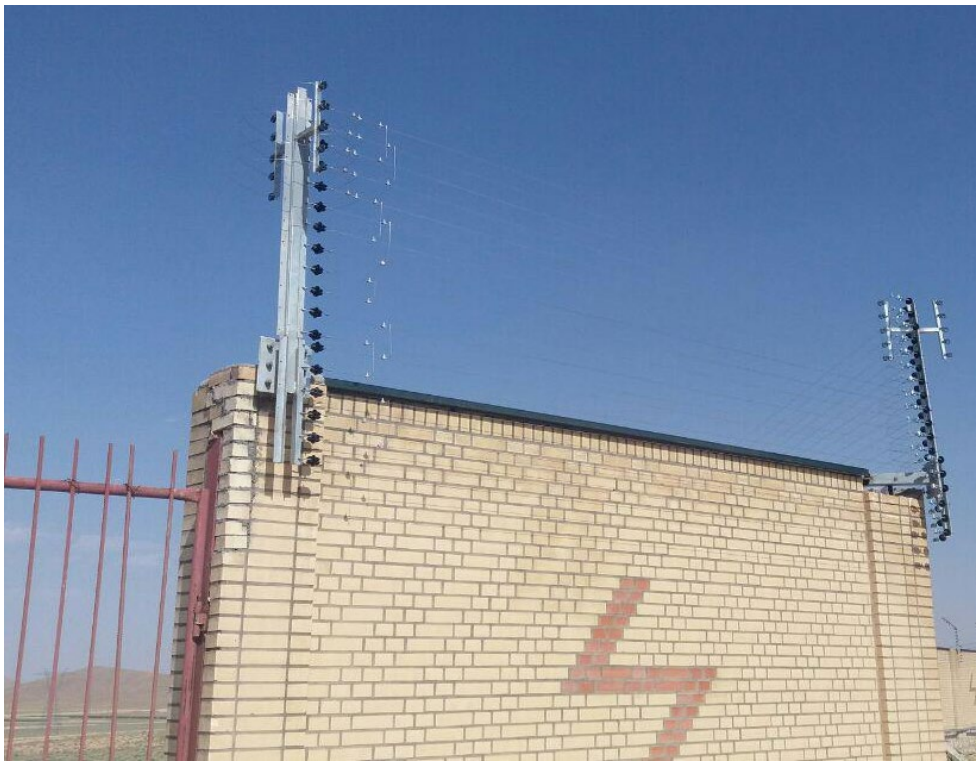
Check that all wires are straight and uniformly tensioned across each zone.

Install Earth Wires and Earth Rods

Install and connect earth wires as per design.

Connect the earth network to earth rods.

Verify earth resistance meets project specifications.



## 6.2 Electrical and Control Installation

Mount the PSF Controller(s) and Panels

Install controllers and PSF panels in approved, secure enclosures.

Ensure easy access for maintenance while preventing unauthorized access.

Connect High-Voltage Outputs

Connect HV outputs from each PSF controller to fence wires according to wiring diagrams and zone definition.

Verify polarity and separation between HV and earth wires.

Connect Earth Terminals

Connect all controller earth terminals to the earthing system.

Ensure robust and corrosion-resistant connections.

Route Zone Cables

Route insulated zone cables from panels to posts and wires.

Use suitable protective coverings (e.g., metal flexible conduits, UV-resistant conduits) along the entire path to prevent mechanical damage.

Route Power and Data Cables

Run power and data cables using proper containment (cable trays, ducts, manholes, etc.).

Maintain separation between power and communication lines as per standards.

Label all cables clearly at both ends.

Connect I/O and Communications

Connect alarm outputs to sirens, beacons, relays, and other devices as per project drawings.

Connect alarm inputs from other systems if required.

Connect communication ports (RS-485 / TCP/IP) to the PSF management server or network switch.

# 7 Commissioning and Energizing

## 7.1 Pre-Power Checks

Before energizing the PSF system:

Make sure all mechanical work on the fence is complete and tools/materials are removed from the fence.

Confirm that all PSF controllers and panels are installed correctly and securely.

Verify that all HV, earth, power, and data cables are connected according to drawings.

Check for visible damage to the wall, posts, insulators, and hardware.

Confirm correct zone allocation and wiring based on the zoning plan.

## 7.2 Initial Power-Up

Switch on power to the PSF controller(s).

Check basic status indicators: power, communication, and general alarm LEDs.

Confirm that no unexpected alarms are present at system start-up.

## 7.3 PSF Software – Initial Setup

Using the PSF Perimeter Security Management Software:

Log in with an authorized username and password.

Configure communication settings for each controller (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 PSF controllers 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.

## 7.4 Fence Parameters and Voltage Levels

In the "Change Electro-Fence Settings" (or equivalent) menu:

Set the Power Level (output voltage) appropriate for the site.

Configure Zone Alarm Voltage and Missing Pulse thresholds.

Enable earth voltage monitoring and set earth alarm thresholds.

For verification, change the power level stepwise (for example 30, 60, 100):

At each level, use the voltage display menu to confirm the approximate zone voltages (e.g., around 3000 V, 5500 V, and 9000 V with ±15% tolerance, as per design).

Enable all required zones and confirm that the voltage is present across the intended wires.

# 8 Detailed Functional Tests and System Verification

This section describes the inspection, test, and verification steps that must be completed before handover.

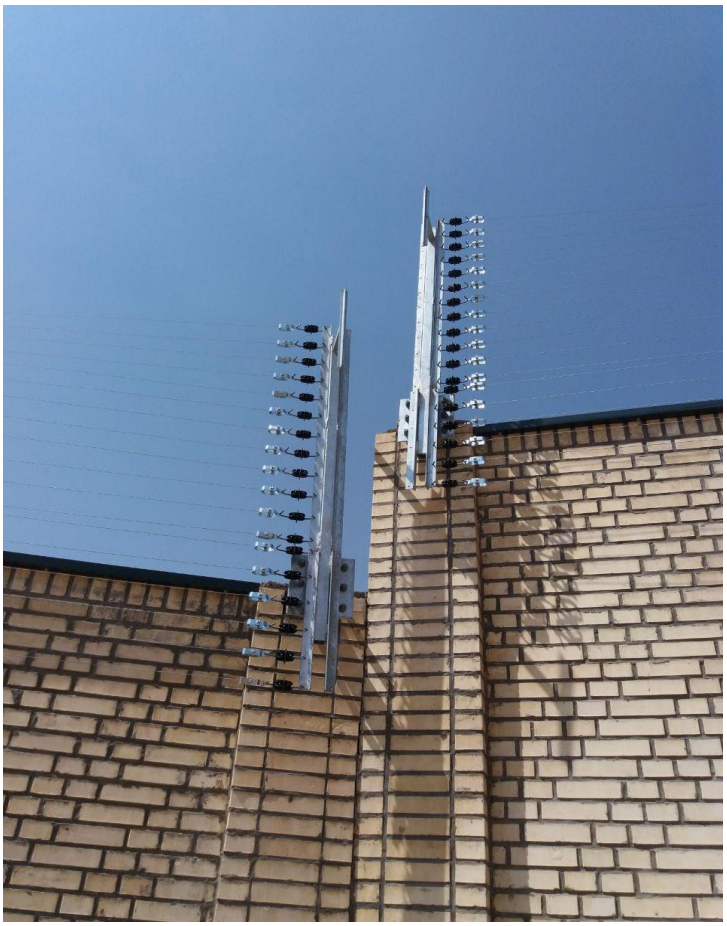
## 8.1 Mechanical and Visual Inspection

### Intermediate Posts

Inspect all intermediate posts for structural stability and proper mounting.

Confirm that the wall or base is not cracked or damaged.

Verify that post tilt does not exceed the allowed tolerance.



## End and Corner Posts

Check for excessive tilting due to wire tension.

Ensure that the wall or post foundation has not been damaged by tension forces.

Confirm that all tensioners, hooks, and line connection hardware are installed and correctly positioned.

Note: Correct voltage readings and proper alarm behavior during short-circuit tests indicate electrically sound connections; on-site focus is mainly on mechanical and visual inspection.

## Fence Wires

Verify that all steel wires are present and continuous in every zone.

Confirm that wire spacing is uniform and matches design, with no irregular gaps.

## Panels and Enclosures

Confirm that all PSF panels and enclosures are firmly mounted and sealed as required.

## Cabling Quality

Verify that insulated zone cables from panels to posts/wires are properly routed and protected (metal flexible conduits or equivalent).

Check that power and data cables are routed in standard-compliant ways using trays, ducts, or manholes and are properly labeled.

## 8.2 Software and Communication Checks

Confirm that all controllers and zones appear in their correct positions on the software map.

Open the door of a controller and verify that a tamper alarm is generated and correctly indicated on the map at the relevant zones.

Enter the settings menu of each processor from the software and confirm that communication to each panel is active and stable.

Use the voltage display menu to check the real-time voltage of each zone and confirm they are within the expected values for the current power level.

## 8.3 Alarm and Response Testing

In the Alarm Test menu, trigger manual alarm tests for each zone:

Verify that the zone icon for the tested zone flashes or changes color in the correct position on the map.

Check that alarm sounders in the control room are activated.

Where site sirens or beacons are installed, confirm they activate as configured.

If a CCTV system is integrated with the PSF system:

Test the programmed camera presets for each zone.

Confirm that, when an alarm is generated in a given zone, the corresponding PTZ camera preset is activated and the camera points to the optimal view for that zone.

Confirm that fixed cameras associated with each zone display the correct area continuously or upon alarm.

Review the software log file:

Confirm that all test alarms and parameter changes performed during the day are recorded accurately.

Check that timestamps and zone identifiers are correct.

# 9 Handover, Training, and Documentation

## 9.1 User and Operator Training

Train the client's security personnel and operators on:

Basic system concept and zoning

Use of the PSF 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.

## 9.2 Documentation and User Manual Delivery

Provide the System Operation and Training Manual for the PSF Smart Electric Fence.

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

## 9.3 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.

# 10 Maintenance and Service

## 10.1 Routine Maintenance

Perform regular inspections to keep system performance stable.

Weekly / Monthly (depending on site risk):

Visually inspect wires, insulators, posts, and hardware.

Remove vegetation in contact with or close to the wires.

Check for corrosion or broken components.

Quarterly / Semi-Annually:

Verify output voltage using a suitable fence tester.

Confirm earth resistance and integrity of earth connections.

Test alarm outputs (sirens, beacons, CCTV presets) using the software "Test Alarm" function.

Controller software logs for recurring false alarms and fine-tune thresholds as needed.

After severe weather or construction work nearby:

Inspect for fallen branches, damaged sections, or disturbed cables.

Confirm controller power status and communication links.

## 10.2 Periodic Technical Inspection

Carry out periodic system inspections every 2 to 4 months, depending on project requirements.

During each visit:

Review system performance and calibration.

Re-verify critical voltages and earth conditions.

Review event logs and reports.

Discuss any observations with the client's representatives and users.

## 10.3 Repair and Spare Parts

Commit to repair or replace any faulty PSF components within an agreed period.

Maintain a minimum set of spare parts at the project site (or nearby) in coordination with the client to minimize downtime.

# 11 Normal Operation

Operators monitor the perimeter using the PSF management software:

Zones are displayed on the site map.

Real-time alarm status and events are indicated clearly.

When an alarm occurs:

The operator identifies the zone on the map.

Associated CCTV views are displayed (if integrated).

The operator acknowledges the alarm and investigates.

After resolving the cause, the operator resets the zone.

The "Cancel the Siren" or equivalent function may be used to silence audible alarms while the zone remains active for detection.

# 12 Troubleshooting

Problem: No high-voltage output

Possible Causes: Controller off, blown fuse, loose wiring, poor earth

Recommended Actions: Check power supply, fuses, HV wiring, and earthing system.

Problem: Frequent voltage alarms

Possible Causes: Vegetation, damaged insulators, poor earth, unauthorized contact

Recommended Actions: Inspect fence line and earth system; clear vegetation and repair defects.

Problem: Repeated cut alarms

Possible Causes: Broken wire, loose connection, vandalism

Recommended Actions: Inspect and repair the affected zone; confirm that the alarm clears after reset.

Problem: Earth alarm active

Possible Causes: Positive wire touching earth, faulty insulator

Recommended Actions: Inspect for shorts between HV and earth; replace damaged components.

Problem: No communication with controller

Possible Causes: Network issue, incorrect IP/RS-485 settings, cable fault

Recommended Actions: Check network switch, settings, serial wiring, and PSF software configuration.

13. Technical Specifications (Example – adapt to actual PSF model)

Number of Zones: 2, 4, 6, … up to 50 (depending on model)

Maximum Output Voltage: up to approx. 10 kV

Energy per Pulse: approx. 2.5 J

Communication: RS-485 and TCP/IP

Alarm Outputs: Dry contacts (normally closed) + TCP/IP events