XSafe®
BY EFACEC

# New Generation Automatic Level Crossing Protection Systems

The safety of people and goods is a major concern in any transportation system. The interaction between road and rail traffic at level crossings represents a critical point in terms of security, which involves the use of appropriate protection systems.

XSafe solution, Efacec latest version of its automatic level crossing protection systems, is based on highly reliable and fail safe equipments, thus assuring the highest safety standards.

In this new generation, the system controller is based on a safety programmable logical controller (PLC), replacing the traditional railway signaling relays. This solution, following the global trend of rail signaling systems by using solid state components, also allows a set of additional features, namely remote monitoring and integration with Efacec's Technical Supervision platforms, allowing faster intervention in case of anomaly.

This solution, fully developed in Portugal, meets the highest standards of safety certification, SIL 4. Its versatility allows different installation configurations found in railway networks and several innovative features such as intelligent infrastructure monitoring and fault prediction.

Efacec, the biggest Portuguese group in the fields of electrical and electronical equipments and solutions, has more than 500 automatic level crossing protection systems installed worldwide, and is continuously improving and updating its solutions, in such a demanding market.

**Efacec's solutions are able to assure the safety at level crossings in a wide range of application scenarios:**

- Main, secondary or low traffic lines;
- Single or double tracks;
- Open rack or station controlled;
- With or without barriers;
- Independent or integrated with rail signaling systems;
- Coordination with road traffic signaling systems.

**The flexibility of Efacec's architecture allows designing each system according to the specific conditions of each crossing. Different solutions can be used for:**

- Activation sensors;
- Release sensors;
- Road traffic signaling;
- Barrier configuration;
- Power supply, which can be based on solar systems for remote locations.

# Application Overview

## Key Components

The automatic level crossing protection systems, depending on its configuration, can be composed by:

- **Activation sensors**
  The system activation could be done locally from approaching train detectors, using several types of on-track sensors (treadles, loops, track circuits or axle counters), remotely from the signaling system or from the precedent level crossing;

- **Release sensors**
  The system release is done by the safe detection of the train leaving the protected zone, usually done by a conjugation of a track circuit and a treadle or by axle counters;

- **Physical obstacle**
  Usually implemented by fail safe half barriers, available with lengths from 2,5 to 6,5 meters, which are lowered automatically by gravity in case of a failure in the level crossing system;

- **Road signaling**
  In the standard solution, there are one semaphore at each side of the crossing, with 2 lights and a bell, plus advisory panels. Each solution is designed according to the road topology and the applicable requirements of each customer;

- **Controller**
  A SIL 4 PLC controller implements in a fail safe scheme all functional logic, assuring a continuous system monitoring and event recording;

- **Data recorder**
  All alarms and operational events of the controller and different components are stored in a removable memory module, allowing early detection of anomalies and trace of malfunctions. The data is transmitted for the infrastructure monitoring application and retrieve locally, with the appropriated security credentials.

The system can be powered from the public network, catenary or, if required, from other sources such as solar panels.

A rectifier generates the 24 Vdc required operating voltage and a battery set assures the required autonomy, usually 12 hours.

## Working Principles

The system is activated by the detection of an approaching train to the level crossing protected zone, which causes the road signals and bell to be activated.

The barriers start to lower, to guarantee the protection of pedestrians and vehicles.

A minimum interval is guaranteed between the activation and the train reaching the crossing area. The system stays activated until the train effectively leaves the protected area. Once the system safely detects the train has abandoned the crossing area, the barriers start to rise but the road signals are kept activated until the barriers reach its upper position.

## Supervision and Diagnostics

The system performs a continuous self monitoring and all events are time stamped and recorded in a non-volatile memory. If a failure that affects the safety is detected, the system automatically puts itself in a safe state (barriers in the lower position).

All alarms can be reported in real time to a remote supervision centre or also directly to the field maintenance crews.

These functionalities provide significant advantages to the customer, namely:

- Faster and more efficient fault diagnosis;
- Timely detection of potential faults that may cause system unavailability;
- Reduction of maintenance costs and unavailability of the system.


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