KFS SIL2: Signal Crossing Prevention System - (ATS - Automatic Train Stop)
Certified SIL2 by Certifer

Operating principles of the KFS SIL2 (ATS)

KFS SIL2 is an Automatic Train Stop (ATS), developed by ClearSy.

The KFS system operates from three elements:

- an onboard KFS sensor
- a KFSI beacon installed on the ground on the track
- an onboard KFS processing block or rack

The principle behind it is simple: the onboard KFS sensor detects an electro-magnetic (or magnetic) field, emitted by a KFSI beacon, installed on the ballast between the running rails via the intermediary of an external chassis, and relayed to the manoeuvre protection signal. The KFS sensor sends the information picked up at the KFS processing block, which is responsible for decoding it and passing on the information for the emergency braking or the driver’s alarm, which in turn triggers the halting of the tramway.
KFS Sensor

ANTI-SIGNAL CROSSING

The KFS sensor is an onboard device. Its main objective is to detect two types of fields: one is magnetic from an electric magnet or permanent magnet, the other is low frequency electromagnetic from an antenna, generated by the RPS, KPVA or KFS1 track antennas assembled on the track between the train rails. The KFS sensor sends the information it receives to the KFS block, which decodes it and transmits the information to the emergency brake system or the driver’s alarm.

KFS Sensor

KFS Sensor assembled on a train

KFS Bloc or Rack

The KFS block is an onboard.

Its main objective is to:

- Decode information from the magnetic onboard KFS sensor, which is generated by the RPS, KPVA or KFSI track antenna installed on the track between the train’s rails,
- And transmit the information to the emergency braking system (VACMA).

The KFS block receives two types of electrical signals from the magnetic sensor:

- One is transmitted from a detection stage of the constant magnetic field and produces binary information (R) in accordance with the existence or absence of a magnetic field generated by the ground track antenna (R = 0 (OV) if the field is present, R = 1 (10V) if it is absent).
- The second is the image of the sum of low frequency signals (F1:15.36 KHz, F3 :15.36 KHz, F3: 25.6 KHz) from the ground track antenna and received by an antenna set to the useful frequency band inside the magnetic sensor.
The decoding circuit can interpret the combination of signals transmitted in order to lower the corresponding outgoing relay for 160 ms. The following commands are therefore issued depending on whether the block decodes a magnetic field or not and detects the electromagnetic frequencies (F1: 15.36 KHz, F3: 25.6 KHz):

- Detection of a constant magnetic field and two F1 and F3 frequencies: *train passage*
- Detection of a single magnetic field; *train stoppage command*
- Detection of a magnetic field and F3: *vigilance command*
- All other cases: *train passage*

The KFS block can be mounted onto a European standard box or rack.

Specifications:

- 24V or 72V DC EN 50155 standard power
- EN 50121 standard electromagnetic compatibility
- Safety relay: NF F 62-002 standard
- Operates between -20°C and +85°C

KFS blocks guarantee full compatibility with BL.RC.SI blocks on the current equipment of the Parisian subway and RER systems.

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**KFSI Track Antenna**

**INTEGRATED SIGNAL CROSSING PREVENTION**

The analogical KFSI track antenna is an integrated autonomous device for electrical and thermal railway systems (train/urban subways/RER/tramway).

Its main function is to provide information on a crossing at a traffic signal (red light/green light). It is installed on a ballast between the tracks via the intermediary of an external chassis with anti-vibration resilience.

The electrical equipment attached to the traffic signal provides the track antenna with red light information (which is the same when there is no light) or green light information.

A permanent magnet creates a constant magnetic field. The presence of this magnetic field alone informs the onboard sensor and its treatment block that the track antenna, in other words the related traffic light (red light or no light), must not be crossed.
When the light is green, this magnetic field runs in parallel to the electro-magnetic emission of two F1 and F3 frequencies, informing the onboard sensor and its block of an authorization to pass.

Three track antennas are available:

- The KFS mp track antenna (anti-signal crossing prevention device for the Paris subway system) is a functional equivalent of the RPS permanent magnet track antenna used on the urban subway system in Paris.
- The KFS rp track antenna (anti-signal crossing prevention device for the Paris RER) is a functional equivalent of the RP electromagnet track antenna used on the RER system.
- The KFSI track antenna (integrated anti-signal crossing prevention device) is a functional equivalent of the RPS subway and RER track antennas, as well as their associated electronics.

Reference

- Corse :
  - Number of copies: 70
  - Year Implemented: 2006