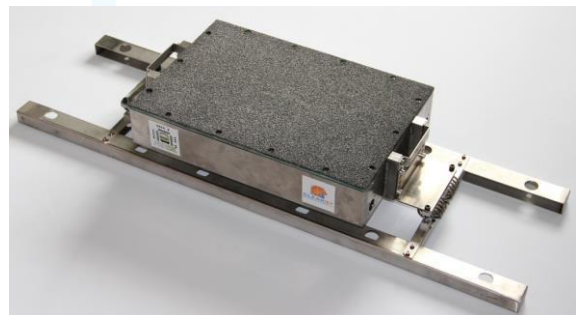


KFS – KFS V AUTOMATIC TRAIN STOP / SPEED CONTROL

KFS – SIL2 certified Automatic Train Stop

*EN50121 - EN50155 – EN50126 –
EN50128 – EN50129 Compliance
Triggers emergency braking if the
train crosses a closed signal*

Speed control (by section) option



KFS - KFSV

SYSTEM DESCRIPTION

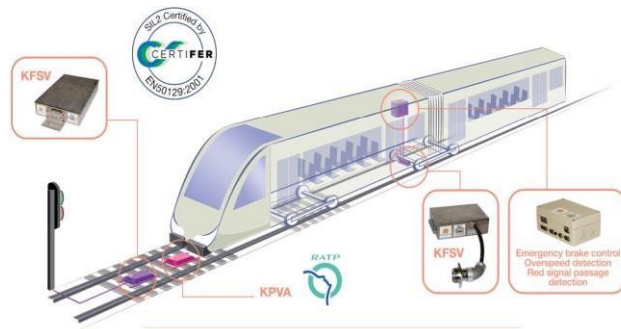
KFS SIL2 allows to detect that the train crosses a restrictive signal and automatically controls the emergency brake. The system, composed of on-track beacon and on-board sensor and control unit, is very simple to install and avoids installing CBTC. Embedded KFS sensors are similar to French RPS sensors and are compatible with RPS system (RATP patent).

An optional speed control function (KFS V) can be added with. It allows to limit the train speed on dedicated section (between 2 ground beacons).

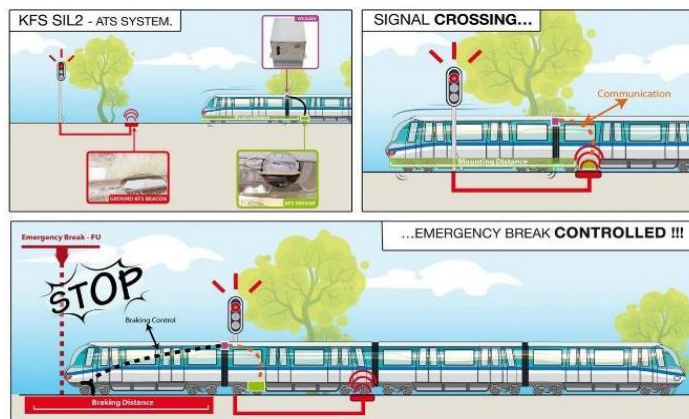
SYSTEM ARCHITECTURE

The KFS system architecture includes:

- **On-track beacon**, connected to the signaling system, it sends the signal state in intrinsic safety
- **On-board sensor**, detects presence of the beacon and the direction of the train. It sends the data received from the beacon to the control unit (signal state).
- **Control unit**, analyses signal state and activates emergency braking if restrictive signal is crossed (safety software execution).



KFSV : SIL2 AUTOMATIC TRAIN STOP (DAAT/ATS). KPVA : CONTROL SYSTEM OF TRAIN OVERSPEED



CARACTERISTIQUES TECHNIQUES

- **On board equipment supplied with DC from 24V to 110V**
- **On track beacons supplied with 100-230VAC**
- **No mapping or localization required (even for speed control)**
- **Safety beacons use permanent magnetic field**
- **Speed control option done by communication of speed limits to the controller on board**
- **System highly available with maintenance log**
- **Driver interfaces (maintenance and command)**
- **Emergency brake is applied if the train overruns a restrictive signal**
- **Service brake can be applied in case of internal errors or default**
- **EN50155, EN50129, EN50128, compliant**

INTEGRATION AND REFERENCES

Based on continuous magnetic field to ensure safety detection of the beacon, the KFS system detect the direction of the train. Low frequency electromagnetic fields (between 10 and 30 KHz) are used to send the state of the next signal.

The system can be adapted to reach SIL3 level if it is required.

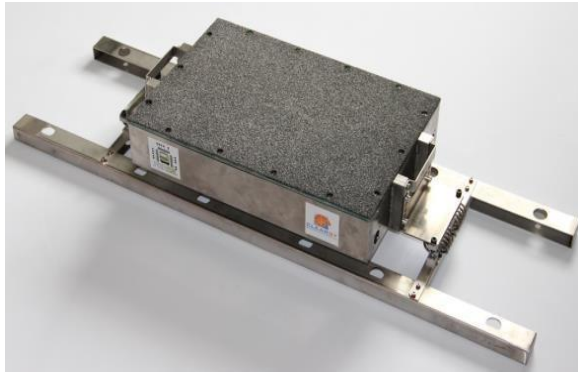
“Service brake” is implemented on the KFS to be compliant with EN 13452-1 and to limit hard brake to necessary situations.

INTEGRATION

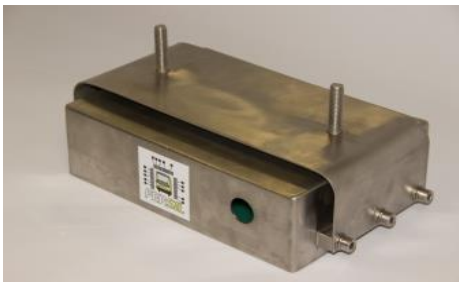
The KFS beacons are connected to the signaling system by two safety connections. It has to be installed far enough from the protected zone to ensure train stops before the following protected area. For speed control section, beacons have to be configured or have to receive the speed limit. On-board equipment install specification can be adapted to the train configuration and track constraints. Boxes and brackets are made of stainless steel for better shock resistance.

REFERENCES

KFS system is already installed in Valenciennes, Nice and Lyon Tramway. KFS is also in revenue service in metro environment in France and Azerbaijan.



■ KFS component overview



■ SIL2 certificate



Certificat (Certificate)

Attribué à (issued to)
CLEARSY
 320 Avenue Archimède – Les Pléiades III – Bât A
 13857 AIX EN PROVENCE CEDEX 3

Bureau Veritas Certification certifie que la conception du produit de la société susmentionnée (Bureau Veritas Certification certifies that the design of the product of the above mentioned company)

DAAT – KFS (Dispositif d'Arrêt Automatique des Trains)
(ATS – KFS (Automatic Train Stop))

a été évaluée et jugée conforme aux exigences applicables de la (des) norme(s) suivante(s) (has been assessed and fulfils the applicable requirements of the following standards) :

CENELEC EN 50128:2011 et 50129:2003

en correspondance avec le niveau SIL2 (in accordance with SIL 2) et suivant les descriptions, configuration et limitations définies en annexe du présent certificat (and following to descriptions, configuration and limitations defined in the appendix of this present certificate)

Ce certificat ne s'applique qu'à la conception du produit défini ci-dessus et au dossier descriptif correspondant. (That certificate only applies to the design of the product as referred above and to the corresponding technical baseline).

L'annexe au présent certificat est une partie intégrante du certificat. (The appendix is an integral part of the present certificate).

Ce certificat a été établi sur la base des rapports d'évaluation suivants : (The certificate has been established based on the following assessment report):

- Rapport d'évaluation (Assessment report): **722-7067388-19-R-030-2**

Date d'émission (Date of issue): 10/07/2019
 N° de certificat (N° of certificate): **7284445A**





Jacques MATILLON
 Président
 p/o Eric ROUAIX
 Responsable de la certification
 CENELEC 50126, 50128, 50129

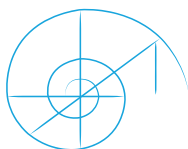

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