

# RAILWAY SAFETY

ametsis



Derailment detector  
**SICODE**

Bearing temperature detector  
**DTR**



## SICODE (Derailment Detector UIC 541-08)

**The purpose of the SICODE derailment detector is to stop the train by activating automatic application of the brakes when its triggering threshold has been reached following a wagon derailment.**

Our pneumatic derailment detector monitors vertical accelerations at wagon-body level and, when its triggering threshold is reached, opens a large aperture to exhaust the main brake pipe (BP) to atmosphere.

Accelerations occurring in normal service do not trigger the derailment detector. In the event of a derailment, the vertical acceleration occurring exceeds the triggering threshold of the detector. This applies irrespective of the load conditions and speed of the wagon.

### The main strengths and advantages:

- The SICODE is a derailment detector certified according to the UIC CODE 541-08, 4th edition by CETREN (Independent Certification Body at the Spanish Rail Sector).
- The SICODE is a high reliability pneumatic derailment detector which doesn't need power supply, batteries, electronic, software, microprocessors and complex telecommunications.
- The SICODE can be connected to the brake cylinder pipe. In this case the detector will apply emergency brake to the train except in the derailed vehicle which brake cylinder will be automatically released in order to avoid the serious consequences of keeping stopped the derailed vehicle (bounces, blade-wheels, violent collisions and sparks, etc.).
- Its implementation on board and its maintenance during the operation are simple and easy to do, so no highly skilled workers are needed. If it is additionally considered that the cost for investments for maintenance and the cost for operation maintenance are very competitive, an optimum LCC is obtained.

### Installation and Integration:

- Two (2) derailment detectors SICODE are necessary per wagon. They should be fitted to both ends of the vehicle.
- Integration on board (see pictures 1, 2 & 3):
  - Mechanically: The connector plate (accessory) is rigidly fixed to the main chassis of the body and the detector is easily fixed to the plate. This minimizes its assembly and disassembly time.
  - Pneumatically: The BP is plugged directly to the connector plate. An isolating cock is integrated on the plate.



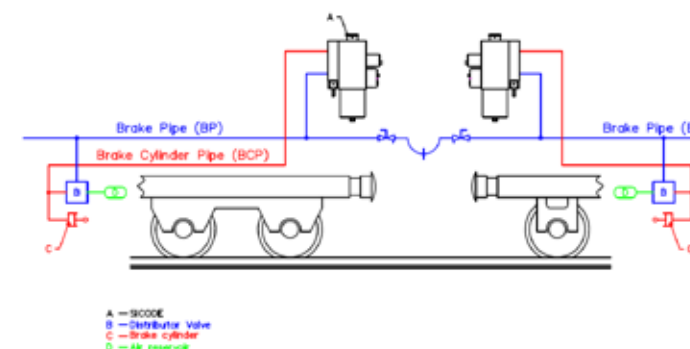
Picture 1 – Wagon with SICODE.



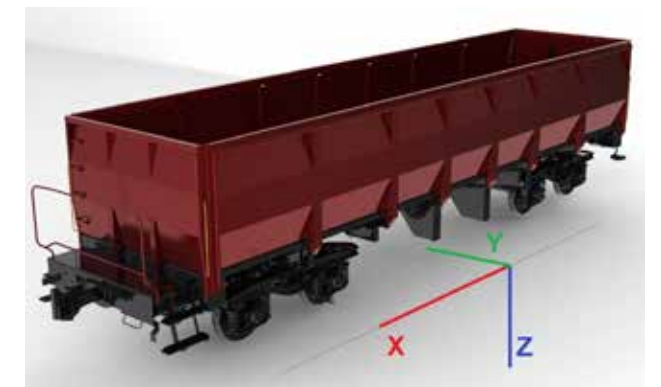
Picture 2 – SICODE Integration.

### Configuration:

- The SICODE is calibrated according to UIC 541-08: The range of vertical accelerations are (Z axle – see picture 3):
  - From 0 to 6.5 g the detector remains in stand-by mode.
  - If the Z acceleration is higher than 11.5 g the detector triggers.
  - Between 6.5 and 11.5 g there is a change of status in which the detector might trigger.
- The SICODE is not sensitive to accelerations in the X and Y axes. (Horizontal shocks of up to 30 g do not trigger the detector).



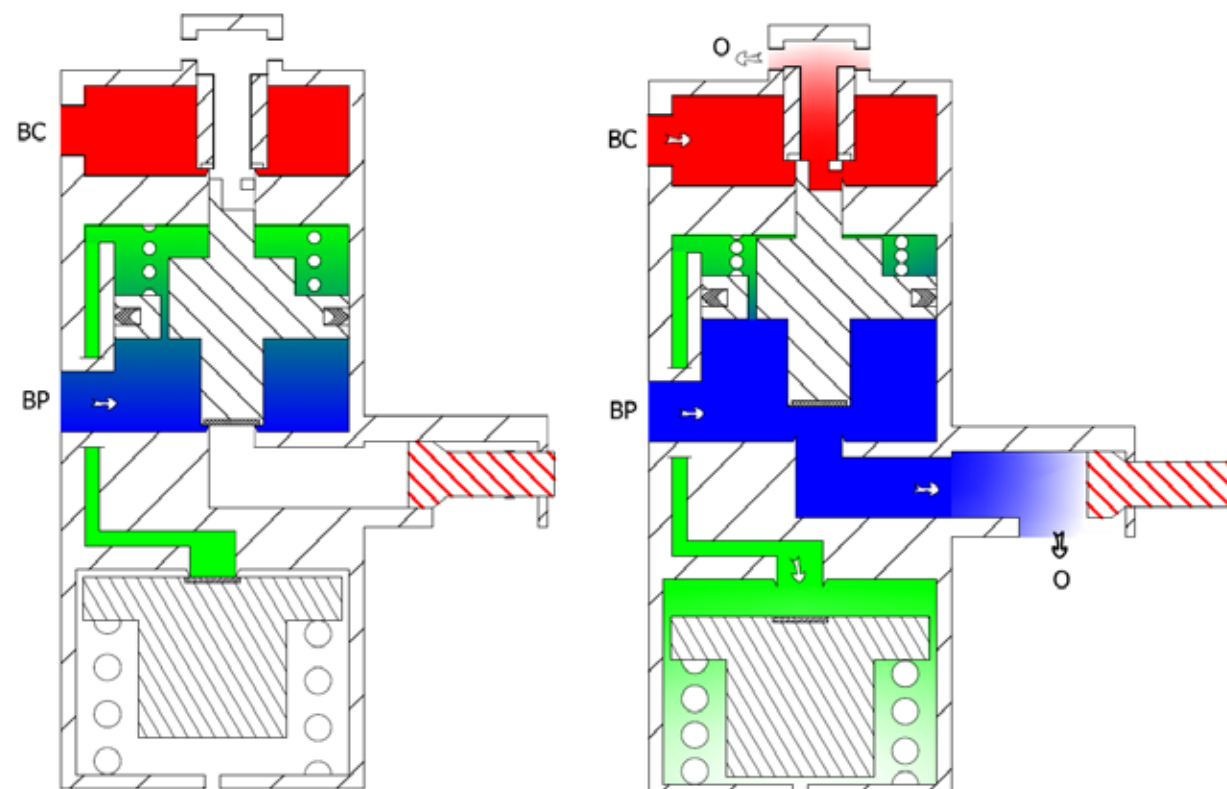
Picture 3 – SICODE Integration



Picture 4 - Cartesian coordinate system

## SICODE (Derailment Detector UIC 541-08)

- The SICODE operates in the frequency range of 0 – 100 Hz.
  - The SICODE operates in the following environmental conditions:
    - Temperature range: from -40 °C to +70 °C.
    - Humidity rate: up to 100%
    - Suitable for operation in desert and salt environments (see level).
  - The SICODE operates at the BP pressure (between 0 and 5 bar).
  - The SICODE indicates the triggered visually by a red indicator that rises from its body
  - The SICODE can be isolated by means of the isolation cock including in its connector plate.
- Automatic rearmament of the detector according to the UIC 541-08 as soon as the pressure of the brake pipe has got down below 0.5bar after the triggering of an emergency brake.
- Most of the SICODE is made in anodized aluminium that ensures protection against corrosion during its life.



Stand-by position

Emergency position

## SICODE EP

**The purpose of the SICODE-EP derailment detector is to stop the train by activating automatic application of the brakes or to send a signal to the train driver when its triggering threshold has been reached following a coach derailment.**

Our electro-pneumatic derailment detector monitors vertical accelerations at coach-body level and, when its triggering threshold is reached, opens and closes instantly a small aperture that exhausts briefly the main reservoir pipe to atmosphere and whose energy is finally used for the opening of the emergency loop or for changing the status of another electric signal (If the train is equipped with a train control-command and diagnosis system, the detector can transmit an advance warning and derailment signal to the driver).

Accelerations occurring in normal service do not trigger the derailment detector. In the event of a derailment, the vertical acceleration occurring exceeds the triggering threshold of the detector. This applies irrespective of the load conditions and speed of the coach.

### The main strengths and advantages:

- The SICODE-EP is a high reliability electro-pneumatic derailment detector which doesn't need power supply, batteries, electronic, software, microprocessors and complex telecommunications, consequently there is no electro-magnetic incompatibility.
- The SICODE-EP can be used in both types of vehicles: using direct brake (with main reservoir pipe) or using automatic brake (with brake pipe: In this case its behaviour will be the same of a SICODE but now electric signals will be provided for its change of status).
- The SICODE-EP can be connected to the brake cylinder pipe. In this case the detector will apply emergency brake to the train except in the derailed vehicle which brake cylinder will be automatically released in order to avoid the serious consequences of keeping stopped the derailed vehicle (bounces, blade-wheels, violent collisions and sparks, etc.).
- Its implementation on board and its maintenance during the operation are simple and easy to do, so no highly skilled workers are needed. If it is additionally considered that the cost for investments for maintenance and the cost for operation maintenance are very competitive, an optimum LCC is obtained.

### Main Technical Features:

- Two (2) derailment detectors SICODE-EP are necessary per coach. They should be fitted to both ends of the vehicle.



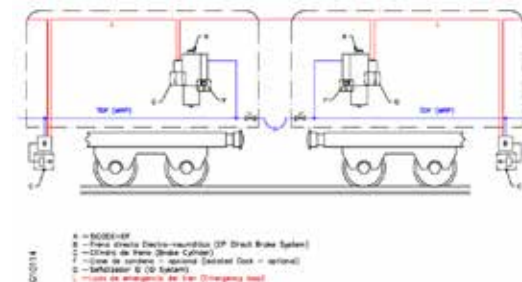
## SICODE EP

### Integration on board (see pictures 1, 2 & 3):

- Mechanically: The connector plate (accessory) is rigidly fixed to the main chassis of the body and the detector is easily fixed to the plate. This minimizes its assembly and disassembly time.
- Pneumatically: The MRP is plugged directly to the connector plate. An isolating cock is integrated on the plate.
- Electrically: The detector is connected to the Emergency Loop by its Harting connector. (Additional electric signals can be configured).



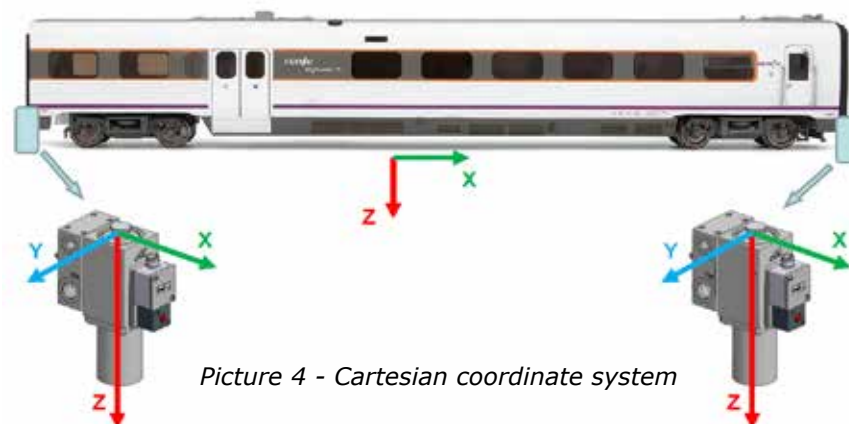
Picture 1& 2 – SICODE-EP



Picture 3 – SICODE-EP Integration

### Configuration:

- The maximum vertical acceleration which will apply the emergency brake can be configured from 0,5 to 20G (Z axle – see picture 4):
- The acceleration ranges of the standard model are based on an EN 14363 analysis; nevertheless they can be configured according to the customer requirements in function of the specific vehicle dynamic and/or the operation conditions.
- The SICODE-EP is not sensitive to accelerations in the X and Y axes. (Horizontal shocks of up to 30 g do not trigger the detector).



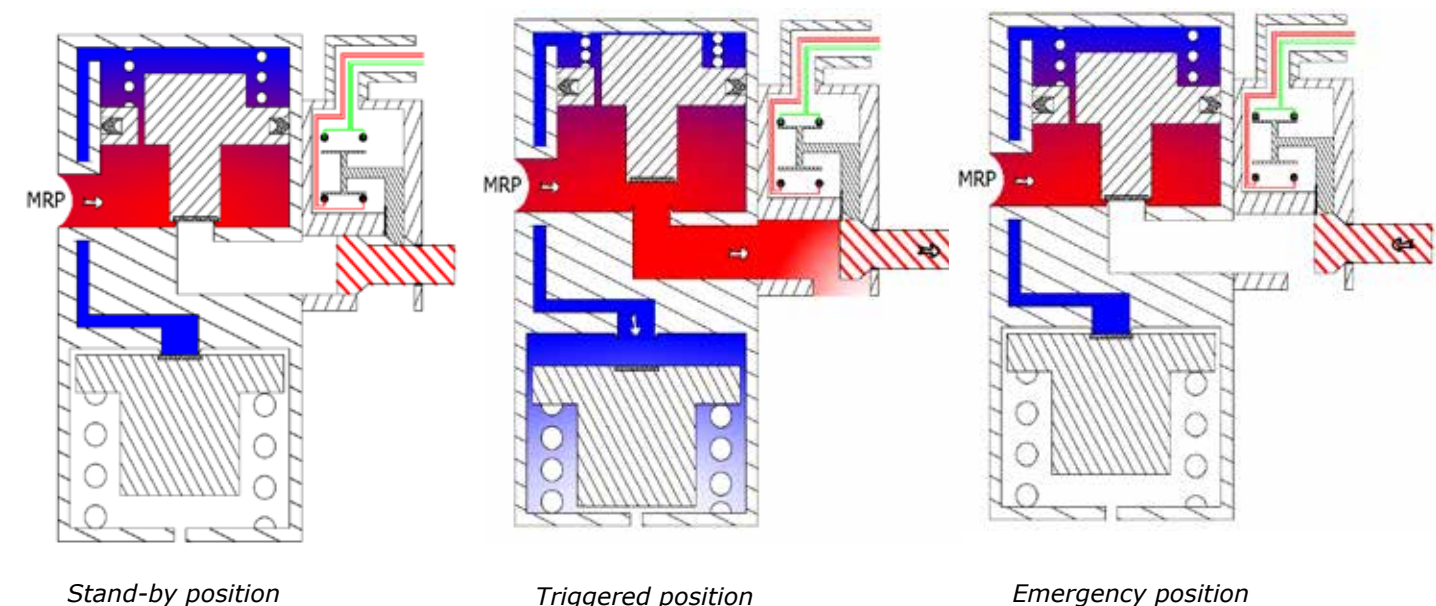
Picture 4 - Cartesian coordinate system

- The SICODE-EP operates in the frequency range of 0 – 100 Hz.
- The SICODE-EP operates in the following environmental conditions:
  - Temperature range: from -40 °C to +70 °C.
  - Humidity rate: up to 100%
  - Suitable for operation in desert and salt environments (see level).
- The SICODE-EP operates at the MRP pressure (between 1 and 11 bar).
- The SICODE-EP indicates the triggered status in two ways:
  - By the change of the provided electric signals.
  - Visually by a red indicator that rises from its body
- The SICODE-EP can be isolated by means of the isolation cock including in its connector plate.

The loss of pressure is insignificant not only at the train level but locally at the MRP connection zone.

Most of the SICODE-EP is made in anodized aluminium that ensures protection against corrosion during its life.

The technical references in which the development of the SICODE-EP is based are: EN 14363 and UIC 541-08.



## DTR – Axle Bearing Temperature Detector

**The function of the axle bearing temperature detector (DTR) is exhausting the piloting air pressure of the derailment detector SICODE if an overheating of the bearing occurs. Once the piloting air is exhausted the SICODE applies automatically emergency brake to the train.**

Unlike existing temperature detector systems, the DTR does not require electricity, wires, batteries, electronic, computers or telecommunications for its operation. Nowadays, for example, there are bearings which have built-in thermocouple for temperature control, but may not be used in installations without electric wiring, which happens in the majority of the wagons.

Likewise there are infrastructure installations for axles detection, for example: infrared detectors which only provide a punctual or discrete measure of the status (the DTR do it continuously) and does not happen in many installations and/or countries.

Even when there are infrastructure installations for the detection of hot axles, in many cases they are not effective, due as to weather conditions, well as an excess of dirt on the infrared, for example; making that in many cases the DTR is the best option, both as detection level and as installation level.

### The main strengths and advantages:

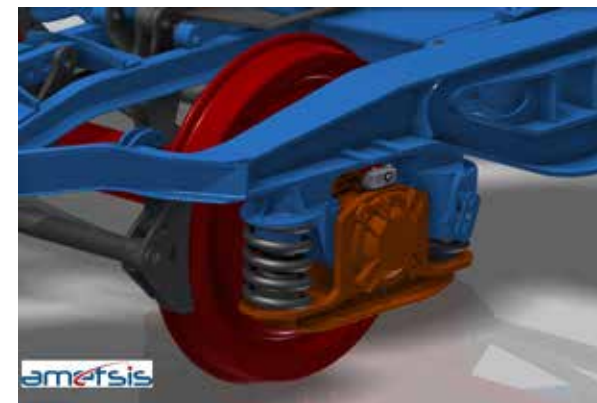
- The DTR is a pneumatic detector which does not need electricity, batteries, wires, electronic components, computers or complex telecommunications systems. Consequently there is no electro-magnetic incompatibility.
- The DTR accuracy is  $\pm 3^{\circ}\text{C}$  of the preset temperature.
- Improved safety due to early warning of potential failures.
- Its implementation on board and its maintenance during the operation are simple and easy to do, so no highly skilled workers are needed. If it is additionally considered that the cost for investments for maintenance and the cost for operation maintenance are very competitive, an optimum LCC is obtained.
- Major cost savings possible due to ability to extend maintenance intervals as bearings are monitored for early signs of impending failure.

### Main Technical Features

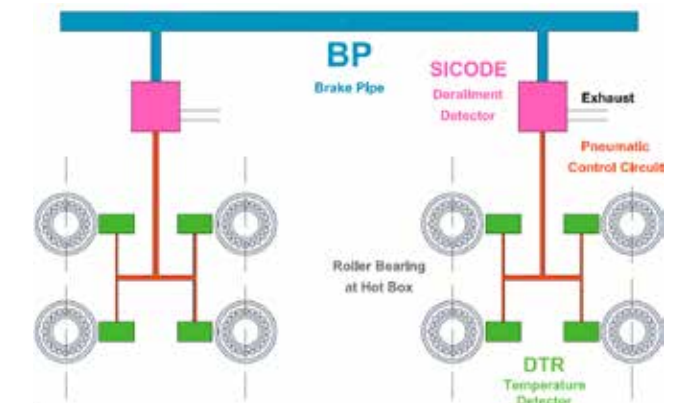
- Four (4) axle bearing temperature detectors DTR are necessary per bogie. They should be fitted to the axle box (housing of bearing).
- One (1) derailment detector SICODE is necessary to control four (4) DTR in a bogie.

### Integration on board:

- Mechanically: The DTR is rigidly fixed to the chassis of the bearing by two screws (axle box / journal box). The detector is easily fixed and this minimizes its assembly and disassembly time.
- Pneumatically: The Control Pressure Pipe, which is generated by the SICODE, is plugged directly to the DTR body by a hose.



Picture 1 – DTR



Picture 3 – DTR Integration

### Configuration:

- Once the trigger temperature has been set in the factory according to the final user necessities, the accuracy will be  $\pm 3^{\circ}\text{C}$ .
- The DTR operates in the following environmental conditions:
  - Temperature range: from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .
  - Humidity rate: up to 100%
  - Suitable for operation in desert and salt environments (see level).
- The DTR operates at the BP pressure (between 0 and 6 bar).
- The DTR indicates the triggered status visually by a red indicator that rises from its body.
- The availability of the DTR can be checked by its test button.
- The DTR can be isolated by means of an isolation cock.
- Most of the DTR is made in anodized aluminium that ensures protection against corrosion during its life.



Picture 2 – DTR Integration



## BRAKE SYSTEMS ADAPTED TO THE TRAIN

### Brake control



Brake manifolds



Universal brake distributor



Relay valve



Driver hand controller



Valve applying brake in function of the load.



Anti-skid valve



Driver emergency valve



Triple valve



Anti-Overcharge valve



Special magnet valve

### Air supply & treatment



Rotary compressors



Twin camber air dryer

## BRAKE SYSTEMS ADAPTED TO THE TRAIN

### Bogie Equipment



Brake cylinders (W/WO parking brake)



Hidro-pneumatic brake cylinders (W/WO parking brake)



Tread brake units (W/WO parking brake)



Wheel cleaning cylinders

### Pneumatic suspension control



Levelling valve



Mean pressure valve



Overflow valve

### Auxiliary components



Auxiliary compressor



Horns



Alarm devices for passengers



Sand ejector



Special valves



Emergency valves



It's Time to Increase  
the Performance &  
Profitability of the  
Train Braking  
System

C/ Ciudad de Frias 16  
28021 Madrid · Spain  
Tel: +34 917 109 730  
info@ametsis.com

[www.ametsis.com](http://www.ametsis.com)

**ametsis**

**A New Day. A New Era. Ametsis**