

Progressive Safety System TFL2024

Moving Off Information System (MOIS)

UNECE Regulation 159

The MOIS system must use radar or lidar sensors, Ai cameras are not UN159 Compliant

Blind Spot Information Systems (BSIS)

UNECE Regulation 151

THE SYSTEMS SHOWN IN THIS BROCHURE ARE UNECE-151 and 159 COMPLIANT



The BSIS & MOIS systems are designed to detect Vulnerable Road Users. The above illustration shows those at risk... highlighted in a yellow solid colour for your visual effect only. The vehicle operator in real life will get audible and visual warnings in the driver's cab area via the LED/Speaker Interface.

Moving Off Information System

PZ-159 Radar Sensor System (MOIS)

A Moving Off Information System (MOIS) is a system that detects and informs the driver of the presence of pedestrians and cyclists in the close-proximity forward blind-spot of the vehicle and, if deemed necessary based on manufacturer strategy, warns the driver of a potential collision. MOIS is a part of the Blind Spot Information System (BSIS) regulation that was adopted by the United Nations Economic Commission for Europe (UNECE) in 2020. The alert requirements for MOIS are specified in the UNECE Regulation No. 159 which covers the following aspects:

- The detection zone of MOIS, which is defined as a rectangular area in front of the vehicle with a width of 3.5 m and a length of 1.5m as stipulated by UNECE 159.

Guide To: UNECE R159 - Moving Off Information System (MOIS)

July 2023

UNECE R159, or Regulation No. 159 of the Economic Commission for Europe of the United Nations, is a regulation that specifies the requirements for the Moving Off Information System (MOIS) for power-driven vehicles. This regulation aims to reduce the number of collisions between vehicles and pedestrians and cyclists by ensuring that drivers are aware of the presence of these road users in the close-proximity forward blind-spot of the vehicle. UNECE R159 applies to all new passenger cars, vans, trucks, buses, and trailers that are manufactured after 7 July 2022. The regulation specifies the requirements for the MOIS system, including the type of sensors that must be used, the location of the sensors, and the information that must be displayed to the driver. It also specifies the test methods that must be used to verify that vehicles meet the requirements of the regulation.

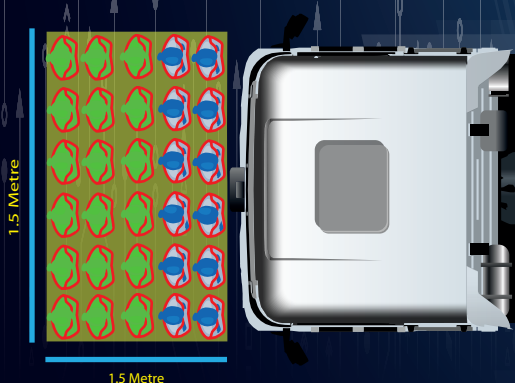
Here are some of the key requirements of UNECE R159:

The MOIS system must use radar or lidar sensors to detect pedestrians and cyclists in the close-proximity forward blind-spot of the vehicle. The MOIS system must display a warning to the driver if a pedestrian or cyclist is detected in the close-proximity forward blind-spot of the vehicle. The MOIS system must be able to distinguish between pedestrians and cyclists. UNECE R159 is an important regulation that helps to improve the safety of pedestrians and cyclists on the road. By requiring vehicles to meet certain standards, the regulation helps to ensure that these vehicles are equipped with a system that can warn drivers of the presence of pedestrians and cyclists in the close-proximity forward blind-spot of the vehicle.

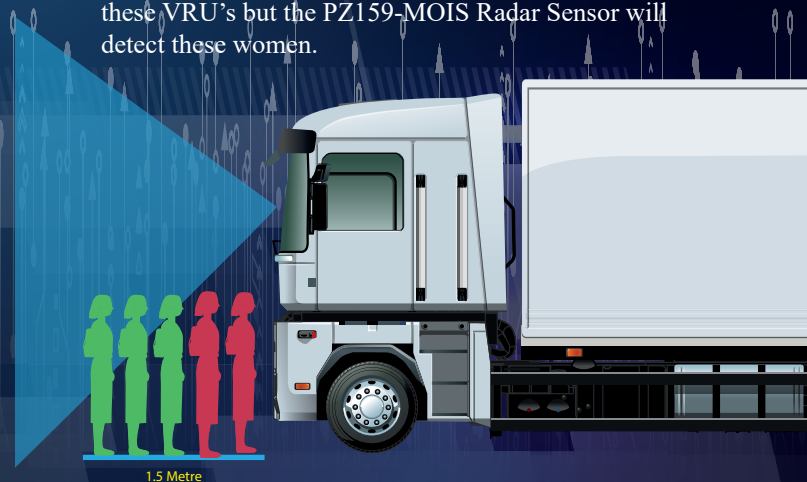
Here are some additional points about UNECE R159:

Vehicles that meet the requirements of UNECE R159 are marked with the UNECE R159 approval number. Vehicles that do not meet the requirements of UNECE R159 may not be sold or registered in some countries. The requirements of UNECE R159 are being continuously updated to reflect the latest research on pedestrian and cyclist safety.

MOIS Top View the two front rows are RED as spotting these VRU's from the Driver CAB would not be possible but would be picked up by the PZ159-MOIS Radar System.



MOIS Side View the two front rows are in RED as the height is based on small Italian women averaging 1.2 metres in height. Most HGV operators would miss these VRU's but the PZ159-MOIS Radar Sensor will detect these women.



Blind Spot Information System

PZ-151 Radar Side Sensor System (BSIS)

UNECE 151 is a regulation that establishes the requirements for Blind Spot Information Systems (BSIS) for the detection of bicycles in the lateral areas of motor vehicles. The primary features of UNECE 151 are:

The definition of the detection zone, which is a rectangular area on each side of the vehicle with a width of 1.5 m and a length of 4.5 m

The activation conditions of BSIS, which are based on the vehicle speed, the direction indicator status, and the steering wheel angle

The information signal of BSIS, which is a visual signal that indicates the presence of bicycles in the detection zone. The signal should be located in the driver's direct field of view and have a minimum luminous intensity of 200 cd/m

The test procedures and performance requirements of BSIS, which include static and dynamic tests with different bicycle targets and scenarios

UNECE 151 aims to improve the safety of cyclists by reducing the number and severity of collisions with motor vehicles in urban areas. According to UNECE, BSIS can prevent up to 36% of fatal accidents involving cyclists and heavy vehicles. UNECE 151 entered into force on 15 November 2020 and applies to new types of vehicles from 1 July 2022

- 1) Vehicle fitted with BSIS & MOIS Radar becoming active detecting pedestrian on the Zebra Crossing and MOPED activating Time To Collision Warning (TTC) on the BSIS
- 2) Cyclist being detected by the Blind Spot Information System radar making the operator aware of the presence of the cyclist
- 3) Activating Time To Collision (TTC) on the MOIS with approaching MOPED and the BSIS is detecting the pedestrian on the pavement as well.



Vulnerable Road User Products

MOIS - Radar (UNECE 159)

PZ-159 Radar Sensor System (MOIS)

Description

The moving off information system is designed to detect vulnerable road users whilst not being affected by street furniture or parked cars. The PZ159-MOIS is a front facing radar system that can have a variable detection area but has a ground spread of a minimum of 3.5 metre = 1.75mtr covering the left & 1.75mtr covering the right sides of the vehicle. The distant covered is 2mtr from the front of the vehicle before any detection is required (UNECE only call for 1.5mtr). This system is not only designed to detect VRU's but is designed give a collision impact warning alert 1.4 seconds before impact at 5Kmh. Giving the vehicle operator time to take evasive action

Driver/ Camera view from widow placement

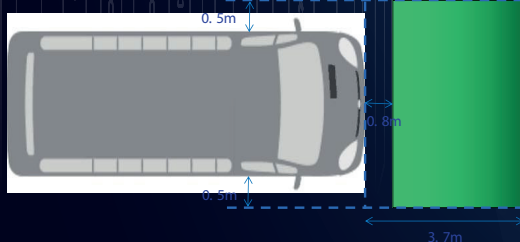
Driver /Camera placement can miss out VRU stood in front of the vehicle as illustrated



SDS-PZ159 Radar scans an area of 4metres x 2metres
Collision Impact warning of 1.4s = VRU travelling at < 5kmh
alert status detect active/ Non AQctive VRU



MOIS Static Function (vehicle speed $V_{\text{vehicle}} \leq 5 \text{ km/h}$)
When pedestrians or bicycles (VRU) appear within the green box in the diagram, a level one alarm is triggered, and the display shows an orange color. The display shows the Time-to-Collision (TTC) between VRU and the vehicle, but if $TTC \geq 3$ seconds, it will not be displayed

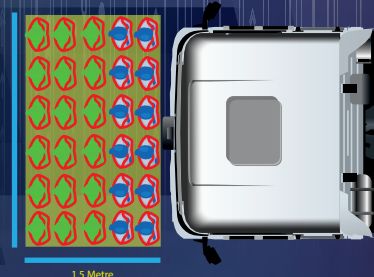


TTC < 3 s



TTC ≥ 3 s

Cab Window View



Vulnerable Road User Products

BSIS - Radar (UNECE 151)

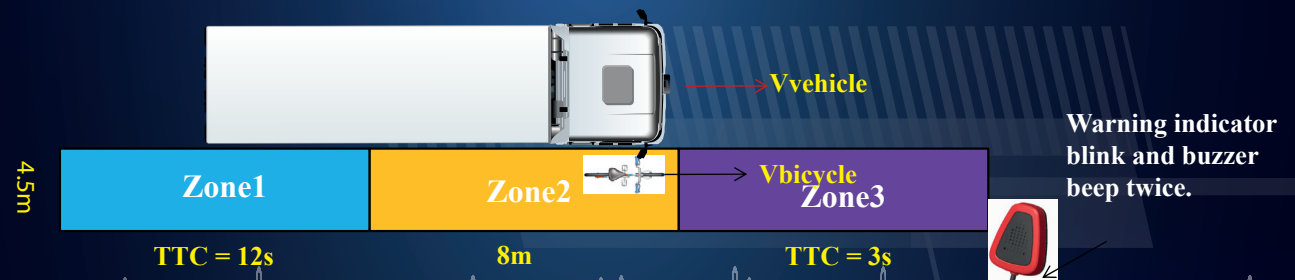
PZ-151 Radar Sensor System (BSIS)

Description

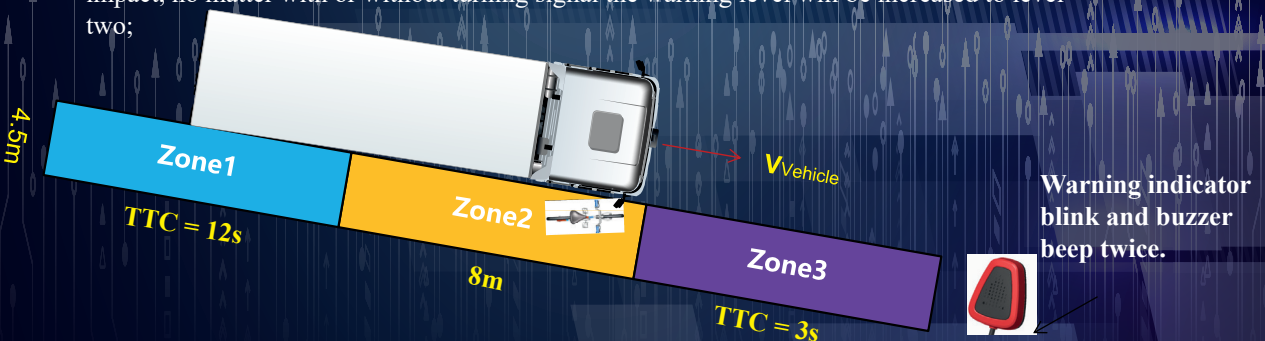
Turning manoeuvres involving collisions between trucks turning left/right and cyclists, typically occurring at lower driving speeds or standstill, usually have serious consequences for vulnerable road users (VRU). In the past, the safety of VRU was raised by an improvement of the truck driver's vision by increasing the number of mirrors by equipping trucks with side under-run protection. Now, SDS have developed a completely new solution to solve this issue by 77Ghz radar sensor, which effectively improve VRU safety.



When bicycle is close to the vehicle front wheel, the lateral distance $< 0.9m$, no matter with or without turning signal, the warning level will be increased to level two;



8.3.6 When vehicle is turning right, the bicycle moving trajectory and vehicle trajectory will impact, no matter with or without turning signal the warning level will be increased to level two;



PZ-159 MOIS Radar

Moving Off Information System

UNECE 159 Regulation Compliant System

PZ-159 Radar Sensor System (MOIS)

A moving off information system must, be fitted to the front of the vehicle to warn the driver of the presence of a vulnerable road user, in accordance with the technical specifications for the PSS. A vehicle that demonstrably complies with UNECE Regulation 159 will meet this requirement. The PZ-159 MOIS radar system is UNECE 159 compliant.

PZ-159 MOIS Display
Shown below in display
mode showing VRU is
1 metre away from the
front of the vehicle

PZ-159 MOIS RADAR shown below is active in Vulnerable Road User (VRU) mode will detect moving objects such as people bicycles and other VRU (UNECE 159), In Static Mode it will detect all obstacles in the specified area set as the Priority Zone (PZ) Distant 2 metres (2000) offering ultimate safety coverage using Time to collision algorithms to advance warning alert buzzer = TTC at 1.4s or 3s < 5kmh (TTC 1.4s = UN Regulation 159 minimum TTC)



System Specification

UNECE 159 Compliant
PZ Width: Area 3.5mtr Left To Right (UN159)
PZ Front: Area 2mtr front off vehicle out
(UN159, Minimum = 1.5mtr)
GPS: Global Positioning SataliteStandard
Scanning Area: Maximum Area Coverage 10mtr x 50mtr
TTC: Time to Collision UN159 1.4s<5kmh (Collision Alarm)
Self Learning: Area Scanning Calibration (Read Manual)
NDD: Night Dimming Display
Fault Diagnosis: Self Checking System
MODE C0: Static Mode (Not UN159)
MODE C1: VRU = to UN159
FID: Full Information Display
Variable Alerts: Colour Coded Display with Alarm
DID: Directional Information Displayed

System Error Checking Mode



PZ-151 BSIS Radar

Blind Spot Information System

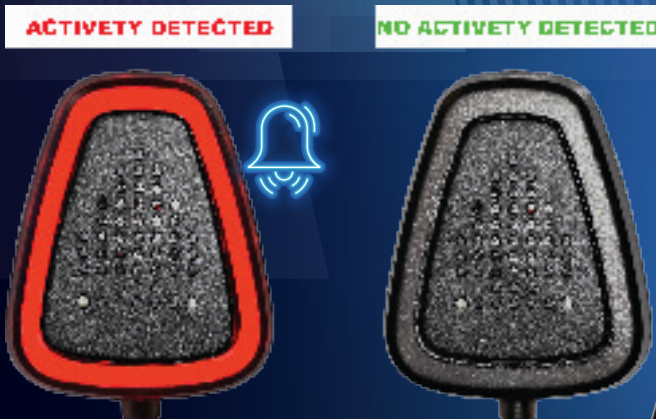
UNECE 151 Regulation Compliant System

Blind Spot Information System, can be fitted to the side of the vehicle to warn the driver of the presence of a vulnerable road user, in accordance with the technical specifications for the PSS. A vehicle that demonstrably complies with UNECE Regulation 151 will meet this requirement. The PZ-151 BSIS radar system is UNECE 151 compliant.

PZ-151 BSIS Buzzer LED Display acting in TTC mode with dynamic buzzer showing VRU close to Collision
TTC 1.4s < 5kmh stage 2 alert alarm setting

PZ-151 BSIS RADAR shown below is active Vulnerable Road User (VRU) will detect only moving objects such as people, bicycles and other VRU (UNECE 151). Priority Zone (PZ) Distant from the side 2 metres. (2000) offering ultimate priority zone coverage. The maximum area is 7.5 metre with 25.5metre in length. Plus a front Priority Zone of 5 metres.

Time to collision algorithms give advance warning LED alert and buzzer = TTC at 1.4s or 3s < 5kmh (TTC 1.4s = UN Regulation 159 minimum TTC)



System Specification

Max width: 7.5M from Vehicle
Max Length: 25.5M to rear and 5M to front
Alarms: 2 Warning Levels (2nd one TTC)
TTC: up to 20 sec on side detection in dynamic mode
TTC: for other modes and areas up to 7.5 sec
Calibration feature: Auto
Self Diagnosis: Fault Detection Feature
Mute Switch: Optional
Trigger Output: 500mA output, on Second Warning Level

Street Furniture

Street furniture is a term that refers to various objects and equipment that are installed along streets and roads for different purposes. Some examples of street furniture are benches, bollards, cycle-stands, litter bins, planters, shelters, signs, etc. Street furniture can enhance the appearance, functionality, and safety of public spaces. With the operating area extending to Two metres these systems have been designed to avoid parked cars, railings, bins, and signage.

