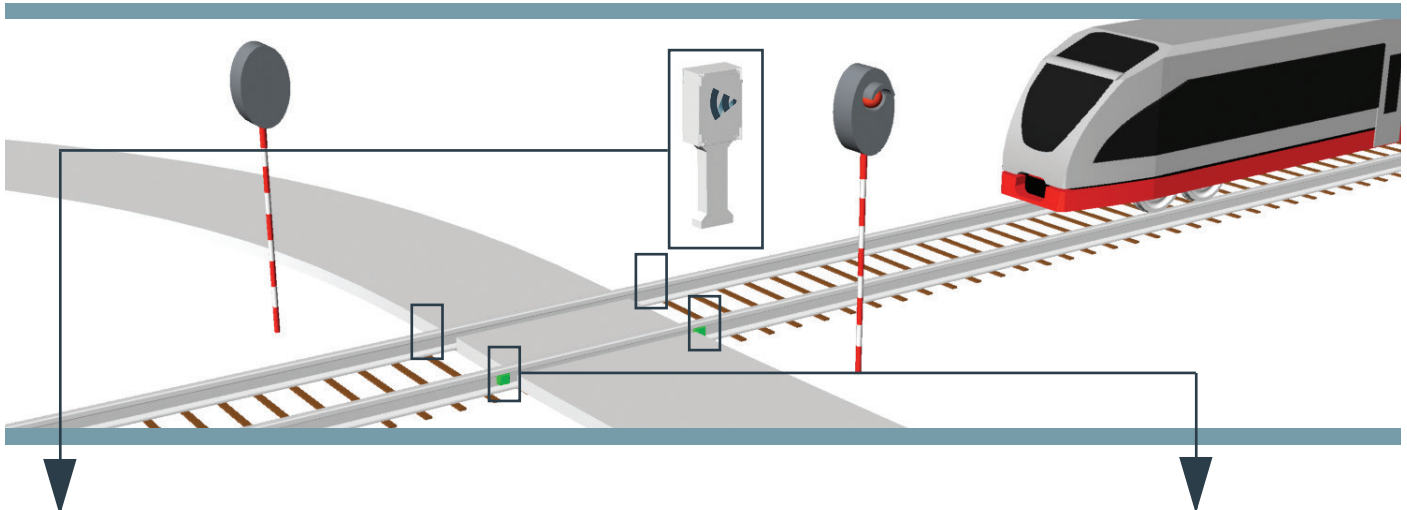


# SIL 2 LEVEL CROSSING WARNING SYSTEM

The Wavetrain LCWS is a CENELEC SIL 2 certified train detection system with low life cycle costs and excellent performance. All components are co-located at the crossing without need for long cable runs or regular maintenance.



SIL 4 acoustic Sensors mounted on the rails listen for the soundwaves generated by approaching trains. The digital data is analysed by a nearby Control Unit, which activates the customer's preferred warning devices at the appropriate time.

All components of the system are installed at the level crossing, normally within 15 to 20 meters. The system is independent of signalling infrastructure and operates autonomously.



## KEY BENEFITS

- ✓ SIL2 certified by Lloyd's Register
- ✓ Suitable for single and double track
- ✓ Low maintenance
- ✓ Reduced life cycle cost
- ✓ Sensors installed on track in 15 minutes
- ✓ Automatic reset after power loss
- ✓ Train detection Sensors and Control Unit co-located at level crossing
- ✓ Reduced warning time variance compared to axle counters and treadles
- ✓ MTBF 20 years
- ✓ Minimal cabling
- ✓ Reduces risk by up to 60% at level crossings
- ✓ Installation without service interruption
- ✓ Alternative power options

# SIL 2 LEVEL CROSSING WARNING SYSTEM

## WARNING TIME CONSISTENCY

The LCWS will activate the warnings when the triggering criteria are met, irrespective of train speed, type or load. At sites with both slow and fast trains the LCWS can give less variation in warning times than traditional systems provide. Better consistency of warning time provides level crossing users with a familiar waiting time and reduces human factors risks.

## RAMS PERFORMANCE

Input from one of the four Sensors is sufficient for the LCWS software to detect an approaching train and activate warnings. Two independent Control Units are running the LCWS software. The system is designed to fail to a safe state. Availability for double track is estimated to 99,9999980 %. Yearly inspection cycle keeps maintenance costs down.

## SAFETY CASE AND CERTIFICATION

The LCWS safety case is CENELEC SIL2 certified to EN50126, EN50128, EN50129 and IEC61508 by Lloyd's Register using evidence from extensive lab testing and field tests in UK, Norway, Finland, France, South Africa and Australia, covering the most demanding climates and more than 3 million train passes over the sensors. The sensors are CENELEC SIL4 certified. Type Approvals are pending in UK and Australia.



SPECIFICATIONS		CONTROL UNIT	SENSOR UNIT
Power	Power consumption	Normal operation 80W Battery recharge 180W	Driven by the Control Unit
	Input voltage	85-264VAC, 90-375VDC	
	Input frequency	47-63Hz	
	Power factor	EN61000-3-2, class A	
	Input protection	Circuit breaker 6A, 400VAC B curve	
	Isolation	3000VAC Input to Output, 1500 VAC Input to Ground, 500VAC Output to Ground	
	Battery backup	24 hours	
EMC	Standard compliance	EN50121-4 (2006) EN301 511/ TS 151 010-1 V11.3.0 (2014-03)	EN 50121-4(2006)
Environmental	Temperature, operational	-40 °C + 65 °C	-40 °C + 80°C
	Temperature, installation & maintenance	-25 °C + 65 °C	-25 °C + 65°C
	IP rating	IP56	IP67
Dimensions	Dimensions(L x W x H)	Standard enclosure: 65 x 35 x 155cm	166.5 x 39 x 36mm
	Weight	No single component weighs more than 20kg	0.6kg per Sensor
Communication	Mobile Communications	For maintenance messages	N/A
	External output	12V warning active low 12V warning active high 12V status	N/A