



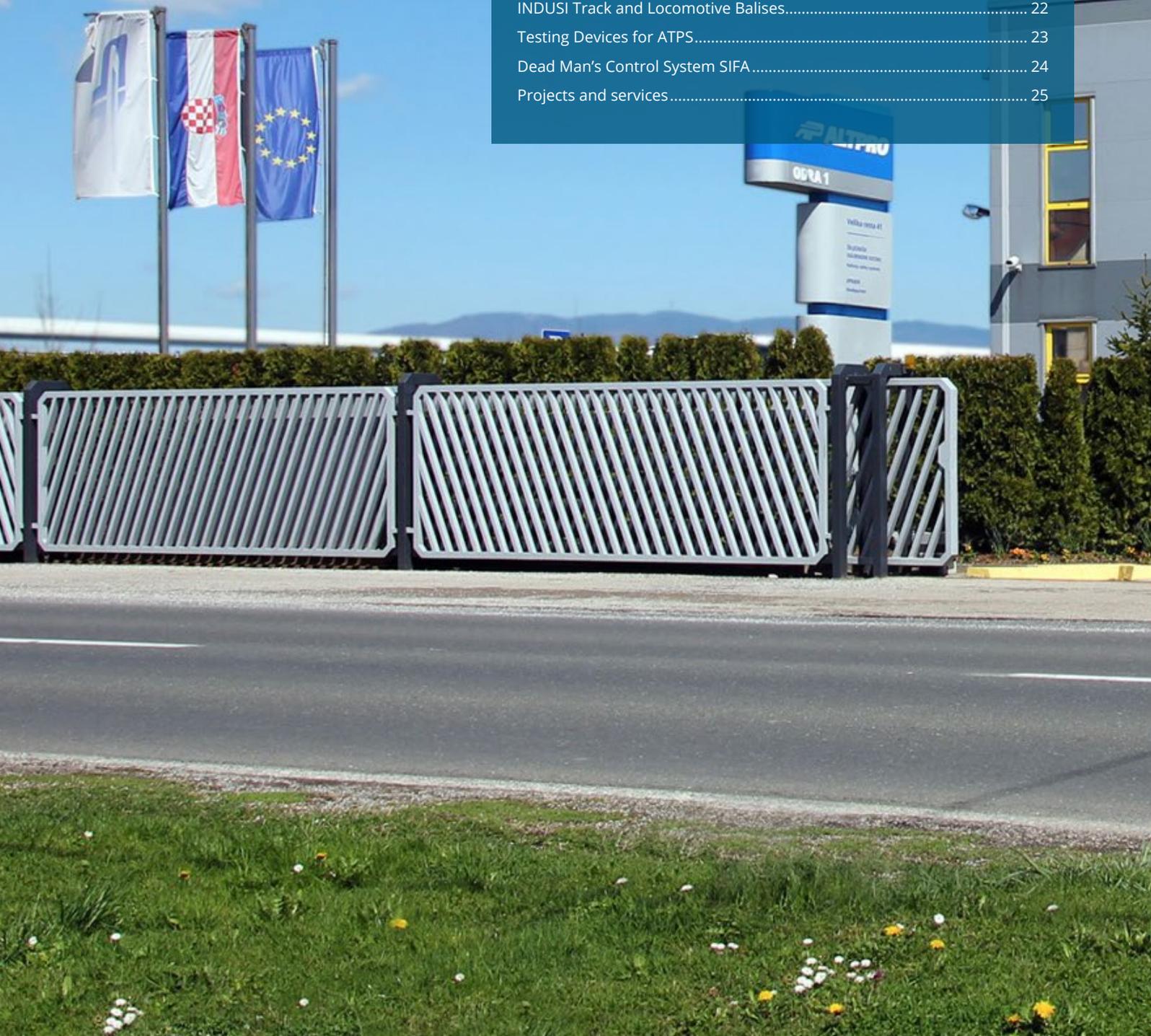
Origin of your safety.



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## ABOUT US

ALTPRO is a specialized signalling company active in research, development and production of safety critical signalling systems used on railway infrastructure and in railway vehicles. The Company offers train detection systems fit for regular railway, monorail, tram, metro and APM applications, level crossing protection systems and INDUSI based automatic train protection (ATP – i60 and PZB90). Over 25 years of experience in research, development and production in railway sector have made ALTPRO one of the key factors in the global market with solutions in more than 50 countries on 6 continents. Strong and flexible network of partners throughout the world enables optimal customer support and project execution. As a flexible and customer oriented company ALTPRO is able to take on customer specific, small scale projects as well as act as a system integrator in big (re)construction projects.

Since quality and innovation are ALTPRO's ways to stay competitive on the market, the Company is certifying its products in independent international certification institutions for the highest safety integrity levels (SIL 4). Currently, more than 200 experts in 5 locations in Croatia and the region work in line with ALTPRO's vision of innovative, integrated and sustainable approach to railways all over the world to bring the safety of railway transport to a higher level.

# COMPANY HISTORY

Since its founding date in 1994, **ALTR** has come a long way. From a small enterprise which fought for its place on the market, through a period of intensive development and finally till one of the global factors in the area of railway signalling and safety systems for railway vehicles.

In the beginning of its development, **ALTPRO** consisted of a group of enthusiasts led by today's director Zvonimir Viduka who were active in the field of industrial electronics. By collecting knowledge and experience, fueled by sheer will and love towards electronics, it soon became clear what **ALTPRO** wanted to be in the future – globally recognized company in the field of railways. **ALTPRO** continued its fast growth, growing from a few employees to a several dozen in a time period when companies in Croatia didn't have great conditions for development. By adapting to the Croatian, regional and eventually global market, ALTPRO reaches a point of stability which is not depending on outside factors. By passing that crucial development period of every company, in 2011. **ALTPRO** moves to a new research and innovation centre ODRA 1.

In its newest history which begins by moving to ODRA 1, **ALTPRO** multiplies in terms of new researched, developed and produced products and in the number of employees and revenue. Today's crown of **ALTPRO's** development is the recent expansion to the new research and innovation centre ODRA 2. The investment in the new centre, the kind of R&D investment which is very rare in the region, marked the beginning of a new era in which **ALTPRO** decisively advances towards its goal – to be one of the world leaders in the area of signalling technology and safety systems for railway vehicles.



1994. ALTPRO was founded



2003. Start of ATP RAS8385 IS production

2004. UNIFE member



2007. BO23 axle counter system development

2008. Official member of UNIFE signalling working group

2010. Products shipped on 6 continents

2011. Sole Croatian representative in CENELEC (SC9)

2012. Establishment of Research and innovation center ODRA 1

2013. Development of level crossing protection system RLC23



2018. Establishment of Research and innovation center ODRA 2

## FACILITIES & PERSONEL



Research and innovation center ODRA 1 was opened in 2012. It is the management building and it serves as an R&D center for ALTPRO signalling products. Along with the laboratories, ODRA 1 features ALTPRO own testing site where products are being tested in real life conditions.



Testing site in ODRA 1 serves as a polygon for testing the products from both ALTPRO production programmes – signalling and safety products for railway vehicles. Testing site gives engineers the opportunity to get feedback about the products behaviour to direct the R&D activities.



Research and innovation center ODRA 2 was opened in 2018. It is the R&D and production facility for ALTPRO safety products for railway vehicles. The building of the facility was financed by the European Union funds.



Mechatronics center Vrbovec was opened in 2007. It serves as a factory for mechanical parts ALTPRO needs. It includes mounting brackets, casings, and similar hardware. By investing in such a facility ALTPRO has the possibility to be in complete control of all production stages of its products.



The employees of ALTPRO are the core of the Company. They are highly motivated professionals and are well aware of their potential - this attitude makes ALTPRO what it is today. ALTPRO is present on 6 continents and the whole team - including agents, distributors and partners - contributes to the competitiveness of Alpro in the field of innovative, high tech safety solutions.

# PROJECTS AND INSTALLATIONS WORLDWIDE



Turkey



South Africa



Japan

Due to its large product portfolio, **ALTPRO** is able to deliver a wide range of solutions for signalling and rolling stock safety systems. **ALTPRO** is globally present in more than 50 countries thus proving the quality, reliability and interoperability of its products. **ALTPRO** delivers configurable standard solutions, as well as custom made, solutions for the most demanding applications or end-users. Due to modularity of products, highest safety certificates and extensive education of customers, **ALTPRO** systems are easy to use, maintain and operate by the customers themselves. Having the experience of installations on six continents, **ALTPRO** has the ability to meet any challenge.



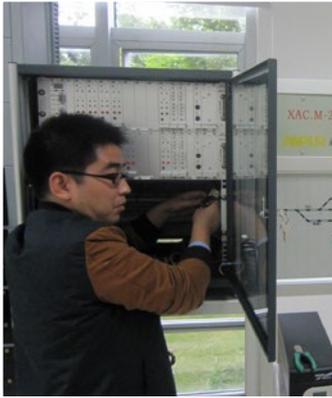
Canada



Thailand



Brasil



China



Indonesia



Austria



Delivered equipment

# QUALITY



One of the main advantages of ALTPRO products are quality and safety certificates. Testing and safety assessments are integral part of R&D our process. All of these activities are conducted in accredited laboratories and independent assessment bodies type A.



## Certificates:

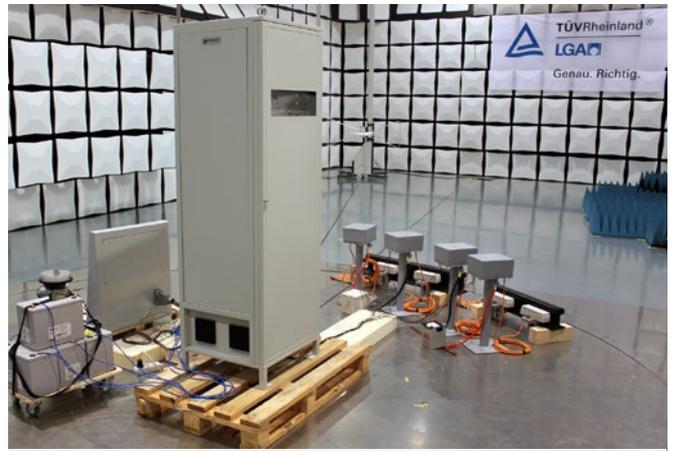
- ISO 9001 for management system and production
- ISO 14001 for environmental management

## SIL4 certificate (EN50126, EN50128, EN50129):

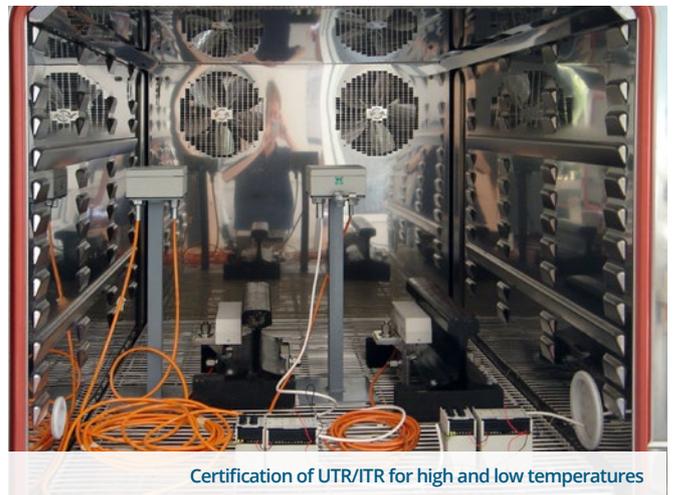
- Level crossing protection system RLC23
- Axle counter BO23
- Axle counter BO23-MTA
- Axle counter BO23-A
- Train detection system TDR14

## Environmental conditions (temperature, damp, pressure, vibrations, shock; EN50125) and electromagnetic compatibility (EMC; EN50121) certificates

- Level crossing protection system RLC23
- Axle counter BO23
- Axle counter BO23-MTA
- Axle counter BO23-A
- Train detection system TDR14
- Train detector UTR245/ITR245
- Rail wheel sensors ZK24 series
- ATPS system RAS8385
- Track balise PM 500 i PM1020
- Locomotive balise LLC0512
- Barrier drive PB13
- Road LED signal CS



Certification of RLC23 for EMC



Certification of UTR/ITR for high and low temperatures

# BUSINESS AND SOCIAL ACTIVITIES

**ALTPRO** is the member of multiple business and industry associations and actively supports their work. **ALTPRO** continuously participates on expert and scientific conferences and seminars worldwide, and attends railway and innovation trade fairs in

Europe, Asia and North America. Company activities in science, business and local community is recognized on multiple levels and confirmed through expert, national and independent awards.



HRVATSKA GOSPODARSKA KOMORA  
CROATIAN CHAMBER OF ECONOMY



Američka gospodarska komora u Hrvatskoj  
American Chamber of Commerce in Croatia



Deutsch-Kroatische  
Industrie- und Handelskammer  
Njemačko-hrvatska industrijska  
i trgovinska komora



American Railway Engineering and  
Maintenance-of-Way Association



hrvatski **izvoznici**



Fair Innotrans 2018, Berlin, Germany



"Zlatna kuna" for the Best Innovation in 2002 and 2018, the Best SME in Croatia in 2010



Awards and recognitions

# PRODUCT PORTFOLIO

## Signalling systems for railway infrastructure

Signalling systems for railway infrastructure are basis for safe, fast and simple operation of railway traffic and transport. Altpro signalling systems are based on inductive wheel sensing technology. Wheel sensors are entry points for devices and systems which cover wide range of possible applications starting from train detection, section management and axle counting up to

complete level crossing protection systems, including driver's indication systems, road signals, barrier drives and remote control systems. All ALTPRO signalling systems are certified for safety integrity level (SIL) 4 in independent assessment bodies type A (according to the EN 17020) and tested on EMC and harsh environmental conditions in accredited laboratories.

### AXLE COUNTING



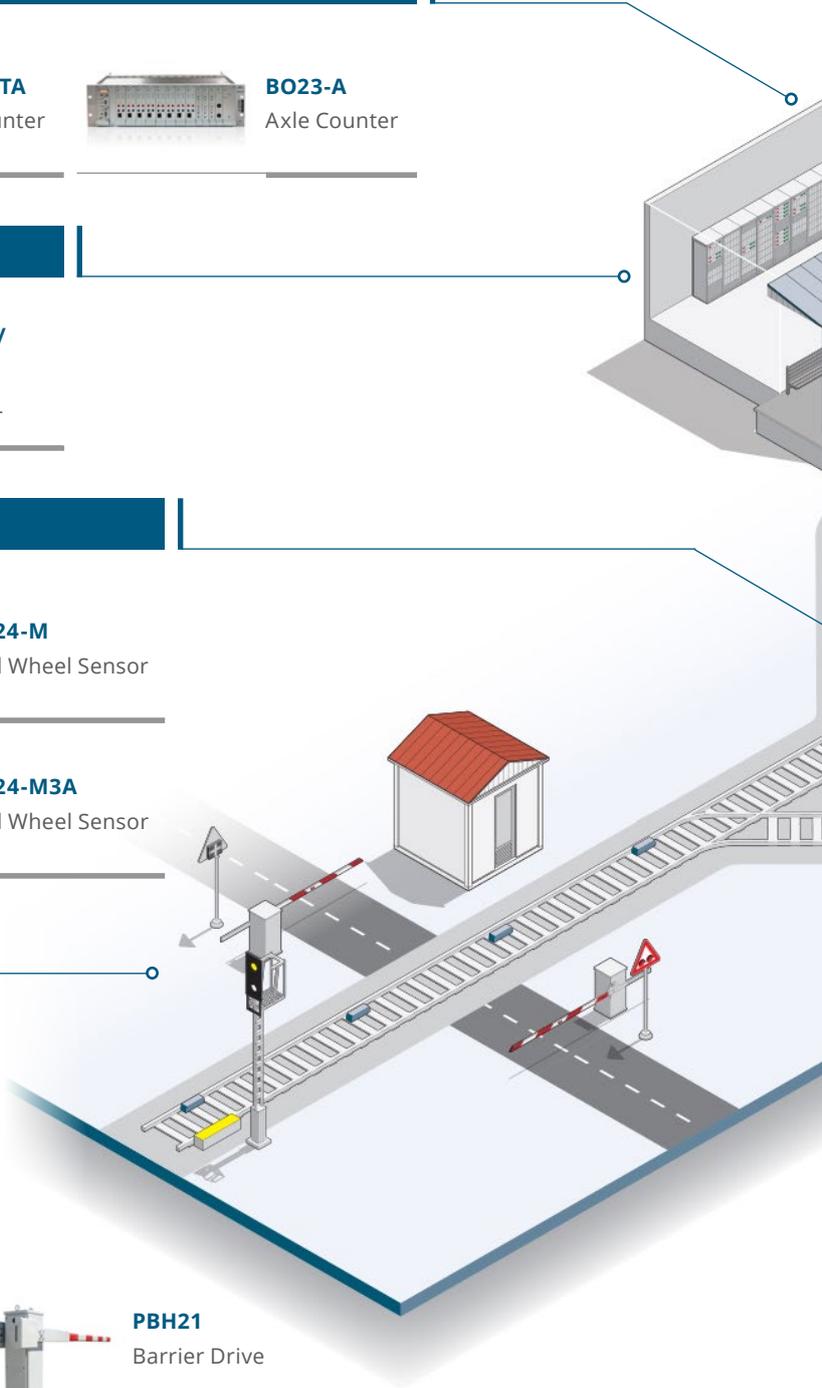
### TRAIN DETECTION SYSTEMS



### WHEEL DETECTION



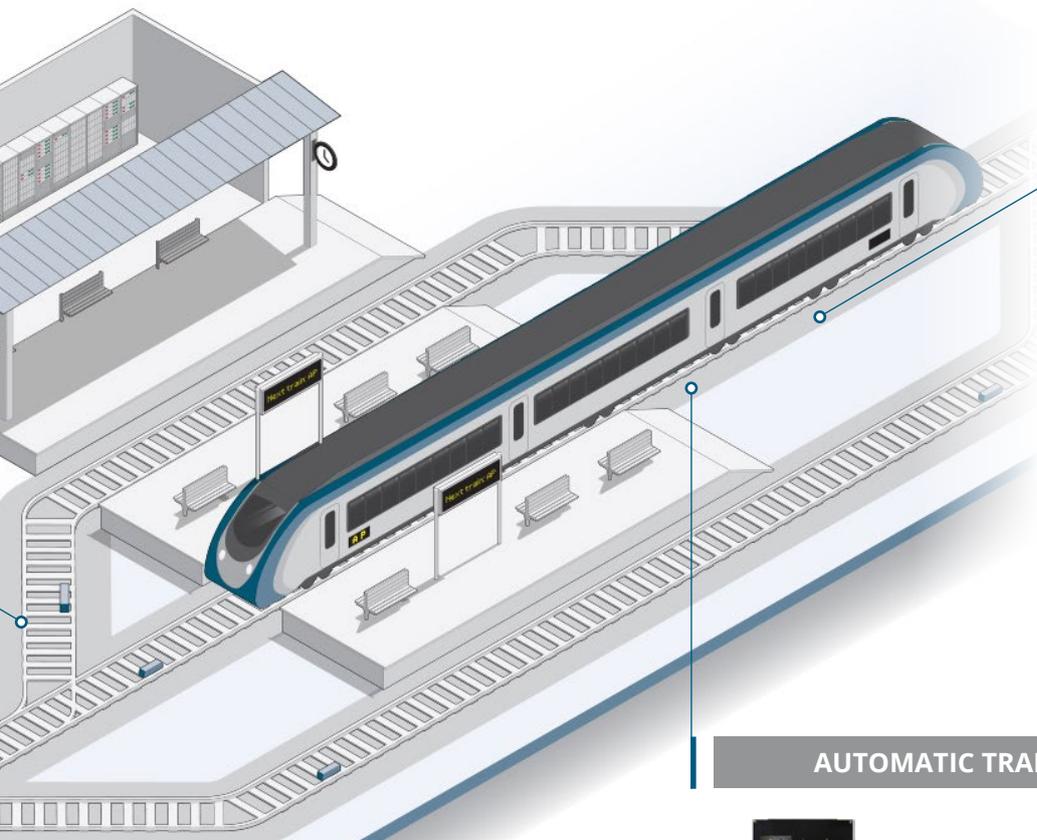
### LEVEL CROSSING PROTECTION SYSTEM



## Safety systems for rolling stock

Safety systems for rolling stock provide additional level of protection for passengers and cargo in railway vehicles, as well as other participants in traffic. Safety systems are designed around the principle of checking the driver's alertness and initiating automatic activities in case the driver's reaction is missing. ATP system, INDUSI based, alerts the driver or automatically brakes

the vehicle, depending on the information about vehicle speed, collected during the passage by the signals on railway tracks. Dead man's system (SIFA) controls the drivers alertness through constant periodical tasks which the driver has to perform, and if the driver fails to do so, warns the driver and in the end automatically stops the vehicle.



### DEAD MAN'S CONTROL SYSTEM (SIFA)



**ZS**  
Three-Tone  
Sound Indicator



**UP1-D, UP1**  
Foot Switch



**UDB1**  
Dead Man's  
Control Unit

### AUTOMATIC TRAIN PROTECTION SYSTEM



**RAS8385**  
ATP Central Unit  
INDUSI I60



**RAS90**  
ATP Central Unit  
INDUSI PZB90



**PM 500,  
PM1020**  
Track Balise



**LLC0512**  
Locomotive  
Balise

### TESTING DEVICES FOR ATPS



**ASI**  
Testing Device  
for ATP RAS8385

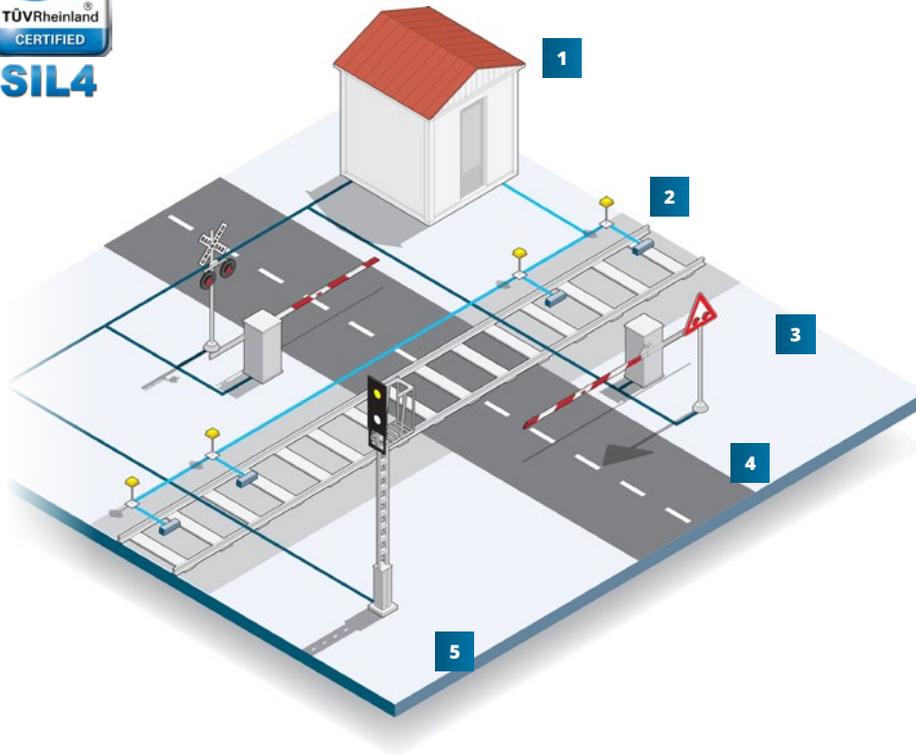


**LMI18**  
Testing Device  
for Locomotive  
Balise



**PMI3**  
Testing Device  
for INDUSI Track  
Balise

# LEVEL CROSSING PROTECTION SYSTEM TYPE RLC23



**RLC23 Level Crossing Protection** system is a 2 out of 2 SIL4 certified system. ALTPRO is producing all system components (central device, train detection, barriers and signals) which enables the Customer maximum flexibility. RLC23 is a highly configurable system and can be easily adapted to any requirement set by the Customer.

## Functionality

RLC23 system provides light, sound and/or physical protection to a level crossing site. Its high configurability possibilities are provided through unique PC application - time parameters, number of outdoor units controlled, different info to be received by the interlocking/AP... RLC23 central device can be adapted to virtually any LED or driver's signal available on the market. Range of other system functionalities enables RLC23 to meet various requirements.

## Safety

The system is designed and certified according to standards EN 50126, EN 50128 and EN 50129 for the highest safety integrity level SIL4 as well as EN 50125-3 for harsh environmental conditions and EN 50121-4 for EMC. The system is completely assessed and certified by TUV Rheinland.

## Maintenance

System maintenance is reduced to standard reviews by the railway personnel and there are any specific demands. Small number of different modules makes spare parts stock much easier to maintain and manage. Hot swap technology enables exchanging of the modules while still in operation. Expandable internal memory offers useful information which makes maintenance easy and quick.

## Analytics

Wide range of diagnostic data which can be transmitted remotely to the smart phone, tablet or any other device. Automatic text messages can be sent to the mobile phone in case of any disturbance or irregularity in system operation. Event registration can be read locally (UB) or remotely (GSM/3G).

## Connectivity

Easy and simple connection to relay, semi electronic and electronic interlockings. Wi-fi connection to smartphone/tablet in order to gain system status information.

## Application

- On open track
- Within station area
- Single and multiple track lines
- With/without driver's signals, remote control

## System information output

- Extensive diagnostic information about each system component (Road signals, driver's signals, axle counters, central cabinet, barriers)
- Each information axle counter provides

## System benefits

- Data registration system with stored data in inerasable memory (SD card); the possibility to save data from numerous RLC23 systems on to the user's server
- Exceptional configurability and adaptability
- One central device can drive up to 16 barriers and road signals
- ALTPRO can offer turn-key project with all ALTPRO made components of the system

## Technical data for indoor equipment: Central Device RLC23

- Vital electronics and processors are galvanically isolated from main power supply and from outdoor equipment.
- Eurocard 19" case with PCB modules; modules are configured according to the application and the number of counting points and sections, road and driver's indication signals and (half) barriers.

|                        |  |
|------------------------|--|
| Supply voltage         | One or two battery sets 24 V, battery supply from 230 VAC, 3 x 400 VAC, 3 x 750 VAC... |
| Operating temperature  | - 30°C - +70°C   |
| Dimensions (w x l x h) | 572 x 512 x 1826 mm  |



Level Crossing Protection System RLC23



Level Crossing Protection System RLC23

Central Device RLC23

## Technical data for outdoor equipment: VUR and ZK24-2 sensor

- Outdoor equipment consists of: wheel sensor ZK24-2, outdoor unit VUR, road signals, road barriers, driver's indication signals.
- Mechanical protection of the sensor with shields.
- 3-stage protection against lightning, overvoltage and traction current.

|                              |                       |
|------------------------------|-----------------------|
| Supply voltage               | 40 - 120 VDC (96 VDC) |
| Operating temperature ZK24-2 | - 40°C - +80°C        |
| Operating conditions         | Up to 100% humidity   |
| Wheel detection              | According to UIC510-2 |

### Order codes

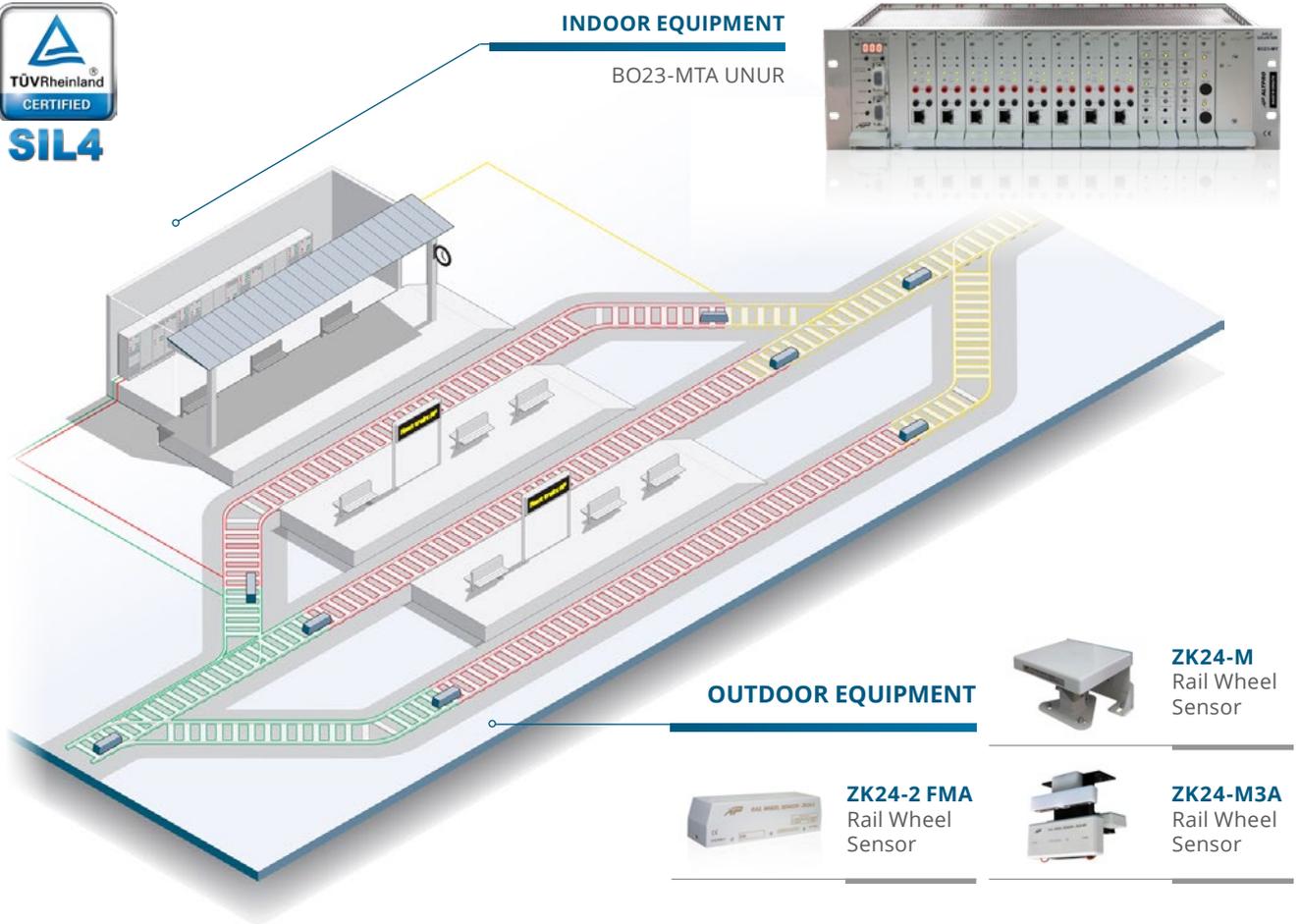
Level Crossing Cabinet RLC23:  
AP215766

Barrier Drive PB13:  
AP215738

LED Road Signal  
AP215789

LED Driver's Indication Signal:  
AP215787

# AXLE COUNTER BO23-MTA



**BO23-MTA** is a multi-section based axle counter system used for train detection in a wide range of applications. The flexibility of the system makes it ideal for specific applications like rubber-tired metro, regular metro, APM, monorail, outer side of rail tram detection or similar, always maintaining the highest level of performance.

## Functionality

The system is highly adaptable according to specific customer requirements. „M“ sensor series is specifically designed to be able to detect different unconventional types of trains. By processing raw analog signals from wheel sensors, the system retrieves overview of specific application environment. BO23-MTA system shows exceptional results in railwheel distinguishing from other metal objects and adaptation to environmental influences like temperature change, EMI, over-voltage, traction currents, different rail and wheel/train profiles, worn-out flanges and rails. Furthermore, implemented self adjustment to aging of system components and preventive maintenance features increase the availability of the system.

## RAMs

High availability levels are achieved using advanced system intelligent processes for self-adjustment and project specific

adjustments in order to have best operation in each particular application. BO23-MTA is certified according to the relevant CENELEC standards (EN50238, EN50126, EN50128, EN50129, EN50121-4, EN50125-3) and latest EU legislation satisfying safety integrity level SIL4.

## Maintenance

There is no need for complex maintenance works. System maintenance includes periodical reviews of installed indoor and outdoor equipment. Reviews consist of simple and fast checks of sensor and evaluator using tools which are easy to operate. There are no active components beside the track, only over-voltage protection.

## Connectivity

Possibility of interfacing with relay and electronic signalling systems. Output information is sent by safety relays. Safety direction outputs are also available. If SEC module (remote communications module) is used, Ethernet RJ45 connection of the SEC module is available for connection to a certain network.

## Analytics

System analytics is designed to be user friendly and may be done by the Customer independently using software for diagnostics. Diagnostics can be accessed locally or remotely.



BO23-MTA system in monorail application



Mounting BO23-MTA system for APM application

### BO23-MTA system application

- Track vacancy detection for wide range of applications (conventional railway, tramway, metro, rubber tyred metro, APM, monorail...)
- Train detection – electronic treadle functionality (activation/deactivation of different measuring system, train announcement...)
- Level crossing protection
- Speed measurement

### System benefits

- Low life cycle costs
- Minimal equipment quantities (no trackside electronics)

- Additional train detection treadle function
- Safety direction output

### System information output

- Section occupancy
- Wheel detection signals
- Wheel/train direction signals
- Operational data: section occupancy, number of axles, train direction, reset status etc. with time stamp
- Diagnostic data: configuration, power supply status, disturbance in detection, error in detection, counting point status (signal out of range, interruption or short circuit, permanent activation, disturbance, preventive maintenance information)

### Technical data for outdoor equipment for ZGK (over-voltage protection) and wheel sensor

- Sensor mounting bracket for all rail types – version with clamp (no need for rail drilling) and version for drilled rails.
- LED-indication of a sensor current state.
- Traction current immunity, lightning overvoltage protection.

|  |                                     |
|--|-------------------------------------|
| Supply voltage                             | 35 VDC (± 8%)                       |
| Operating temperature range for ZK24-2-FMA | - 40°C - +80°C                      |
| Operating conditions                       | Up to 100 % humidity                |
| Wheel detection (ZK24-2-FMA)               | According to TSI (ERA/ERTMS/033281) |
| ZK24-2-FMA operating frequencies           | H: 330 kHz, L: 300 kHz              |
| Water and dust protection                  | IP68 for sensor<br>IP65 for ZGK     |

### Technical data for indoor equipment BO23-MTA UNUR

- Vital electronic circuitry galvanically isolated from power supply and from outdoor equipment.
- Eurocard 19" case with PCB modules; modules are plugged in according to the application and the number of counting points and sections.

|                                      |                                      |
|--------------------------------------|--------------------------------------|
| Supply voltage                       | 18V – 80 VDC                         |
| Operating temperature range BO23-MTA | - 30°C - +70°C                       |
| Dimensions                           | 240 × 483 × 133 mm<br>(19 inch rack) |

#### Order codes

Indoor Equipment BO23-MTA  
AP215331.66

Rail Wheel Sensor ZK24-M  
AP215563

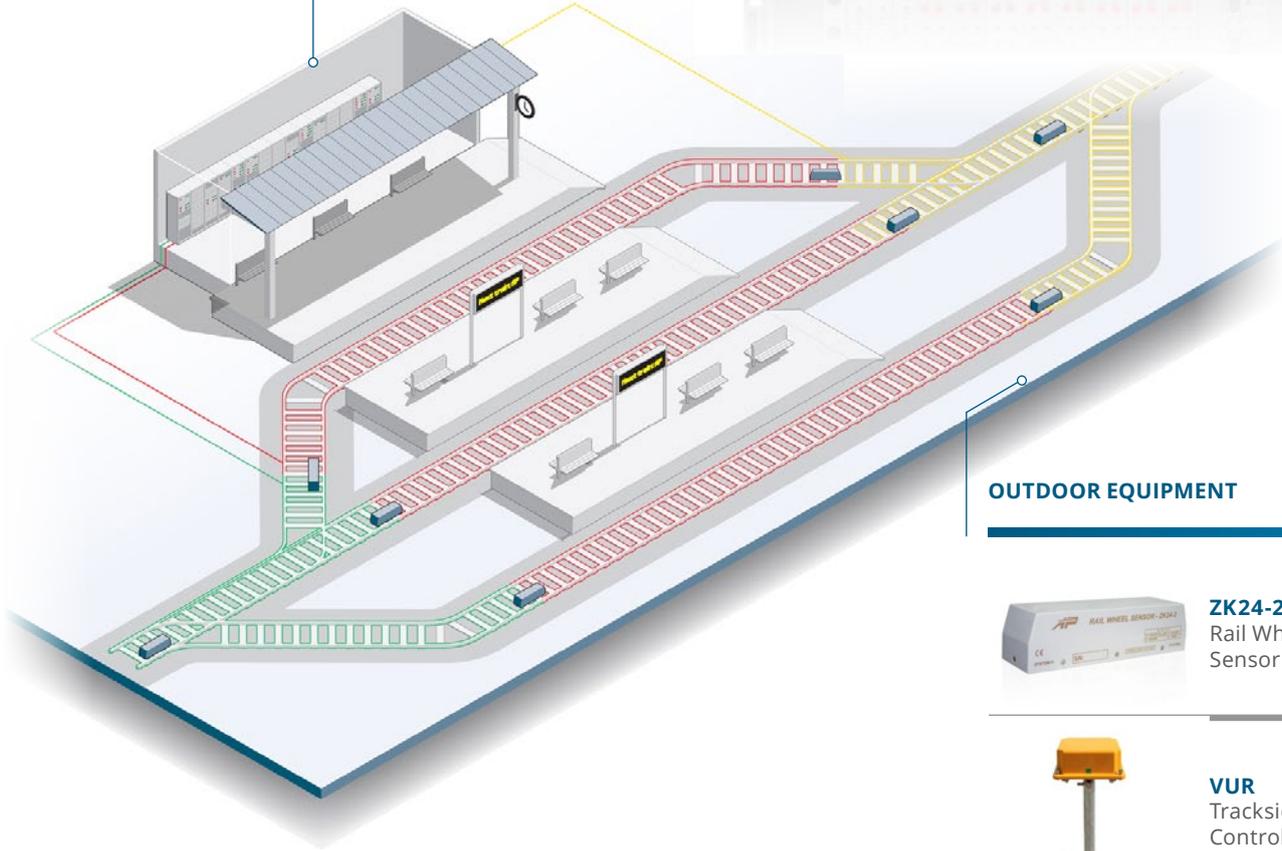
Rail Wheel Sensor ZK24-2 FMA  
AP215595.66

Rail Wheel Sensor ZK24-M3A  
AP215568.A

# AXLE COUNTER BO23



**INDOOR EQUIPMENT**  
BO23 UNUR



**OUTDOOR EQUIPMENT**



**ZK24-2**  
Rail Wheel Sensor



**VUR**  
Trackside Control Unit

**BO23 Axle Counter** is a multisection based axle counter system used in train detection applications. It consists of BO23 evaluator, trackside control unit VUR and wheel sensor ZK24-2. BO23 axle counter is a well established and proven solution on multiple global markets, operating under various conditions and in a variety of applications.

## Functionality

BO23 uses wheel detection technology. One indoor unit controls up to 8 counting points configured up to 6 sections (selection of 9 predefined configurations). The system proved its performance in railway, tram and metro applications. Axle counting can be performed at train speeds up to 350 km/h.

## Safety

The system is developed and certified according to standards EN 50126, EN 50128 and EN 50129 for the highest safety integrity level SIL4, as well as EN 50125-3 for harsh environmental conditions and EN 50121-4 for EMC. BO23 is assessed and certified by TÜV Rheinland. The system also has interoperability certificate

for compliance with all kinds of wheels according to TSI (ERA/ERTMS/033281).

## Maintenance

There is no need for complex maintenance works. System maintenance includes periodical reviews of installed indoor and outdoor equipment. Reviews consist of simple and fast checks of sensor and evaluator using tools which are easy to operate.

## Connectivity

Possibility of interfacing with relay and electronic signalling systems. Output information (section clear/occupied) is sent by safety relays. If SEC module (remote communications module - optional) is used, Ethernet RJ45 connection of the SEC module is available for connection to a certain network.

## Analytics

System analytics is designed to be user friendly and may be done by the Customer independently using software for diagnostics. Diagnostics can be accessed locally or remotely.



Tram control application



Depot control application

### System information output

- SIL 4 train wheel detection
- Direction
- Clear/occupied status
- Diagnostic data
- Number of axles

### System benefits

- Simple and robust axle counting solution
- 2 wire connection from indoor to outdoor equipment
- Up to 20 km distance between sensor and BO23 evaluator

### Application

#### Railwheel sensor ZK24-2

- Passenger information systems
- Hot box and flat wheel detection systems
- Automatic warning systems
- Track lubrication
- Switch triggering

#### Axle counter system BO23

- Train detection
- Track vacancy detection
- Primary and secondary detection system
- Level crossing protection

### Technical data for outdoor equipment: VUR and sensor ZK24-2

- Sensor mounting bracket for all rail types – version with clamp (no need for rail drilling) and version for drilled rails.
- Mechanical protection of the sensor with shields (optional).
- 3 - stage protection against overvoltage, lightening and traction return current.

|                                       |                                     |
|---------------------------------------|-------------------------------------|
| Supply voltage                        | 40 - 120 VDC (96 VDC)               |
| Operating temperature range<br>ZK24-2 | - 40°C - +80°C                      |
| Operating conditions                  | Up to 100% humidity                 |
| Wheel detection                       | According to TSI (ERA/ERTMS/033281) |
| Water and dust protection             | IP68 sensor ZK24-2<br>IP65 VUR      |
| ZK24-2 operating frequencies          | H: 330 kHz, L: 300 kHz              |

### Technical data for indoor equipment: BO23 Axle Counter

- Vital electronic circuitry galvanically isolated from power supply and from outdoor equipment.
- Eurocard 19" case with PCB modules; modules are plugged in according to the application layout / configuration.

|                             |                    |
|-----------------------------|--------------------|
| Supply voltage              | 18 – 80 VDC        |
| Operating temperature range | - 30°C - +70°C     |
| Dimensions (w x l x h)      | 240 × 483 × 133 mm |

#### Order codes

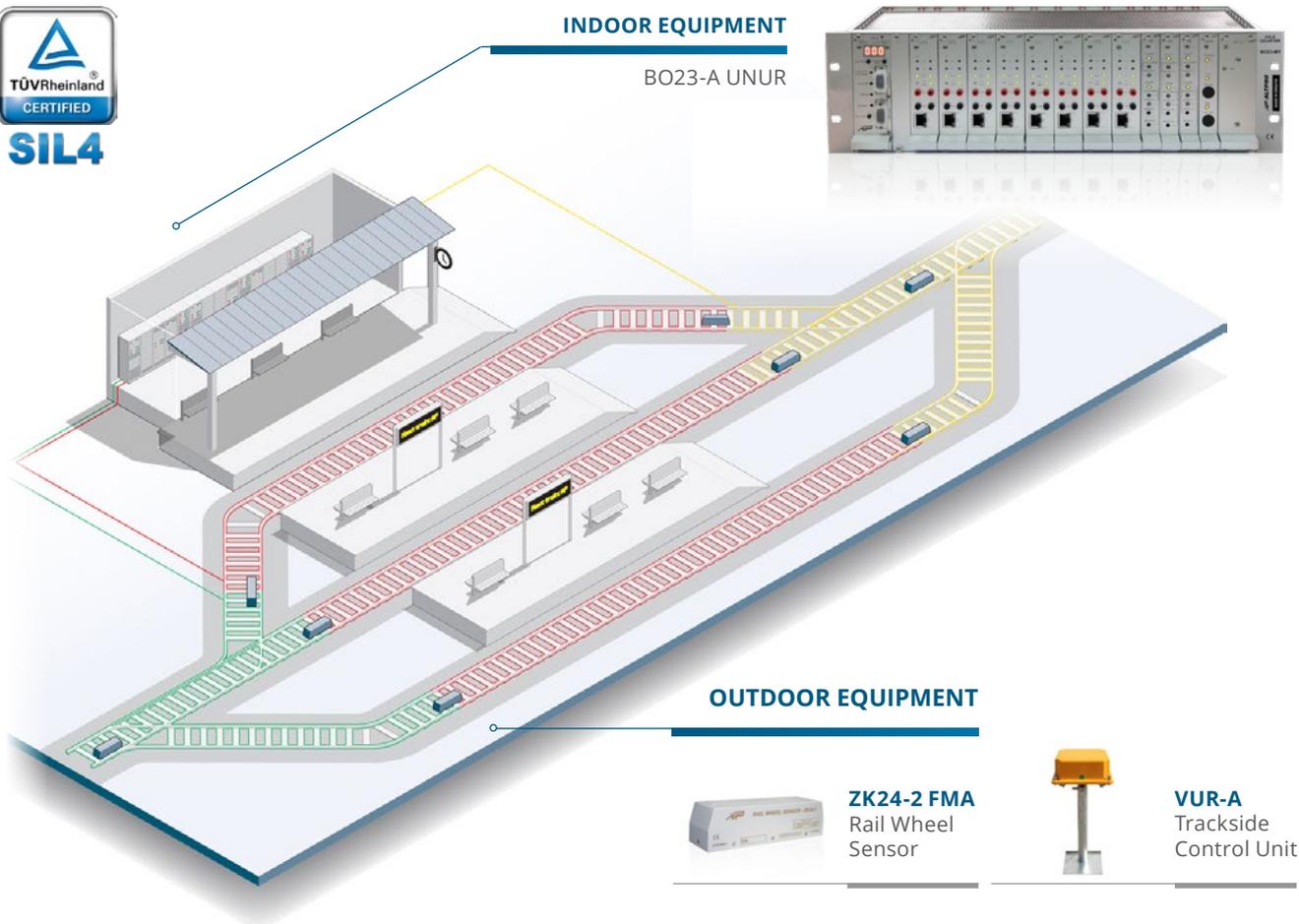
BO23 System  
AP215600

BO23 Indoor Equipment  
AP215620

Trackside Control Unit VUR  
AP215512.00

Rail Wheel Sensor ZK24-2  
AP215595

# AXLE COUNTER BO23-A



BO23-A is a multisection based axle counter system used for train detection applications. It consists of BO23-A evaluator, trackside control unit VUR-A and wheel sensor ZK24-2FMA. **BO23-A Axle Counter** is a robust and exceptionally resilient solution used in harsh environments for reliable and safe train detection.

## Functionality

The system is flexible and can be paired with regular ALTPRO wheel sensors as well as „M“ sensor series. By processing raw analog signals from wheel sensors directly beside the rail, BO23-A shows great results in harsh environments. As signal is processed directly at its source, there is no possibility for it to be influenced on its path to the indoor unit. The system shows exceptional results in railwheel distinguishing from other metal objects and adaptation to environmental influences like temperature change, EMI, overvoltage, traction currents, different rail and wheel/train profiles, worn-out flanges and rails. Furthermore, implemented self adjustment to aging of system components and preventive maintenance features increase the availability of the system.

## RAMs

High availability levels are achieved using advanced system

intelligent processes for self-adjustment and project specific adjustments in order to have the best operation in each particular application. BO23-A is certified according to the relevant CENELEC standards (EN50238, EN50126, EN50128, EN50129, EN50121-4, EN50125-3) and latest EU legislation satisfying safety integrity level SIL4.

## Maintenance

There is no need for complex maintenance works. System maintenance includes periodical reviews of installed indoor and outdoor equipment. Reviews consist of simple and fast checks of sensor and evaluator using tools which are easy to operate.

## Connectivity

Possibility of interfacing with relay and electronic signalling systems. Output information (section clear/occupied) is sent by safety relays. If SEC module (remote communications module - optional) is used, Ethernet RJ45 connection of the SEC module is available for connection to a certain network.

## Analytics

System analytics is designed to be user friendly and may be done by the Customer independently using software for diagnostics. Diagnostics can be accessed locally or remotely.



ZK24-FMA sensor application in harsh environment



BO23-A system application paired with M series sensors

### BO23-A system application

- Track vacancy detection for wide range of applications (conventional railway, tramway, metro, rubber tyred metro, APM, monorail...)
- Train detection – electronic treadle functionality (activation/deactivation of different measuring system, train announcement...)
- Level crossing protection
- Speed measurement

### System benefits

- 2 wire connection from indoor to outdoor equipment
- Low life cycle costs
- Minimal equipment quantities (no trackside electronics)
- Additional train detection treadle function
- Safety direction output

### System information output

- Section occupancy
- Wheel detection signals
- Wheel/train direction signals
- Operational data: section occupancy, number of axles, train direction, reset status etc. with time stamp
- Diagnostic data: configuration, power supply status, disturbance in detection, error in detection, counting point status (signal out of range, interruption or short circuit, permanent activation, disturbance, preventive maintenance information)

### Technical data for outdoor equipment for ZGK (over-voltage protection) and wheel sensor

- Sensor mounting bracket for all rail types – version with clamp (no need for rail drilling) and version for drilled rails.
- LED-indication of a sensor current state.
- Traction current immunity, lightning overvoltage protection.

|  |                                     |
|--|-------------------------------------|
| Supply voltage                             | 35 VDC (± 8%)                       |
| Operating temperature range for ZK24-2-FMA | - 40°C - +80°C                      |
| Operating conditions                       | Up to 100 % humidity                |
| Wheel detection (ZK24-2-FMA)               | According to TSI (ERA/ERTMS/033281) |
| ZK24-2-FMA operating frequencies           | H: 330 kHz, L: 300 kHz              |
| Water and dust protection                  | IP68 for sensor<br>IP65 for ZGK     |

### Technical data for indoor equipment BO23-A UNUR

- Vital electronic circuitry galvanically isolated from power supply and from outdoor equipment.
- Eurocard 19" case with PCB modules; modules are plugged in according to the application and the number of counting points and sections.

|                                      |                                      |
|--------------------------------------|--------------------------------------|
| Supply voltage                       | 18V – 80 VDC                         |
| Operating temperature range BO23-MTA | - 30°C - +70°C                       |
| Dimensions                           | 240 × 483 × 133 mm<br>(19 inch rack) |

### Order codes

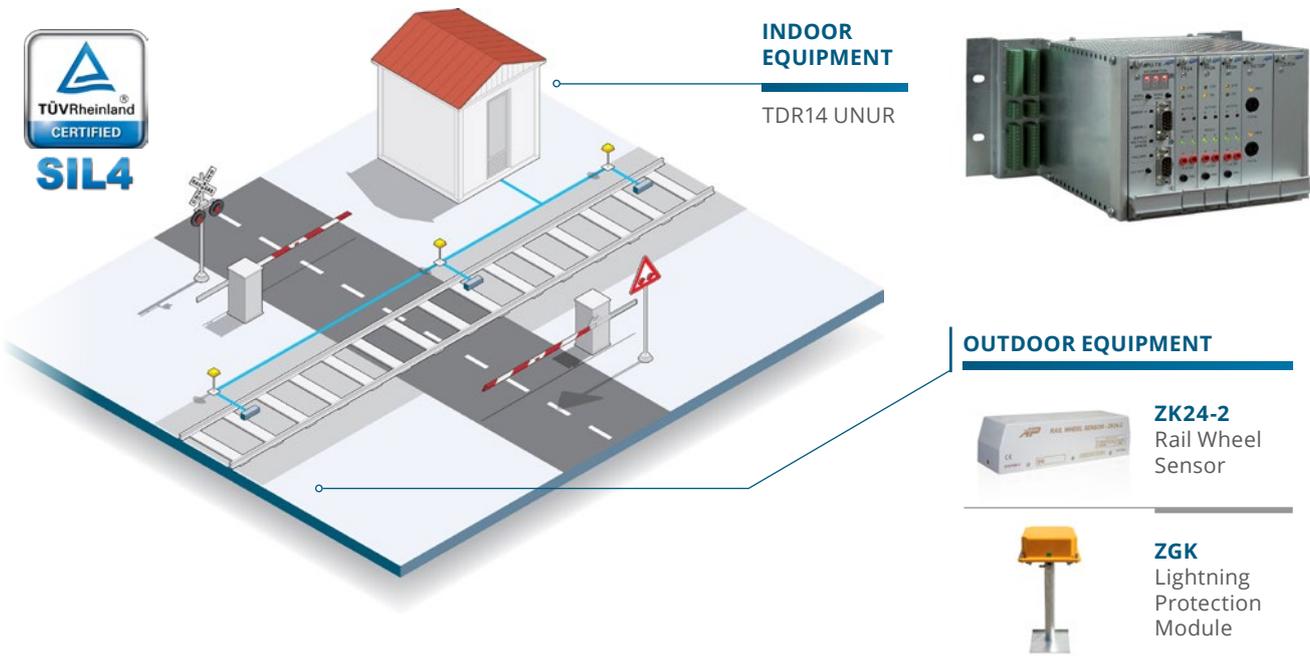
Indoor Equipment BO23-A  
AP215620.66

Trackside Control Unit VUR-A  
AP215512.06

Rail Wheel Sensor ZK24-2 FMA  
AP215595.66

# TRAIN DETECTION

## Train Detection System TDR14



**Train Detection System TDR14** is a SIL4 certified train detection solution which uses wheel sensors ZK24-2 for detection of the train. The system consists of indoor TDR14 evaluation unit, wheel sensor and outdoor lightning protection module. It is ideally used as train detection part of level crossing protection system, for activation or triggering of various systems (HOT BOX, passenger information...).

### Functionality

TDR14 system is using ALTPRO wheel sensor technology for detection of the arriving train. Beside train detection its functionality includes extensive event recording - train passage over each wheel sensor (bidirectional and unidirectional), date, time, speed, train movement direction, number of axles, disturbances / errors etc.

### Safety

The system is developed, designed and certified according to the CENELEC standards EN 50126, EN 50128, EN50129, for the highest safety integrity level SIL4, as well as EN50125-3 for harsh environmental conditions and according to EN 50121-4 for EMC. TDR14 is assessed and certified by TUV Rheinland.

### Application

- Level crossing protection system
- Hot box
- Passenger information systems
- Flat wheel detection systems
- Automatic warning systems
- Track lubrication

### System information output

- Wheel passage
- Direction output
- Extensive diagnostic information

### System benefits

- Bidirectional or unidirectional operation
- Configurable strike-in and strike-out configurations
- Configurable time delay for relay and optocoupler safety output
- Protection against intentional switching off the level crossing

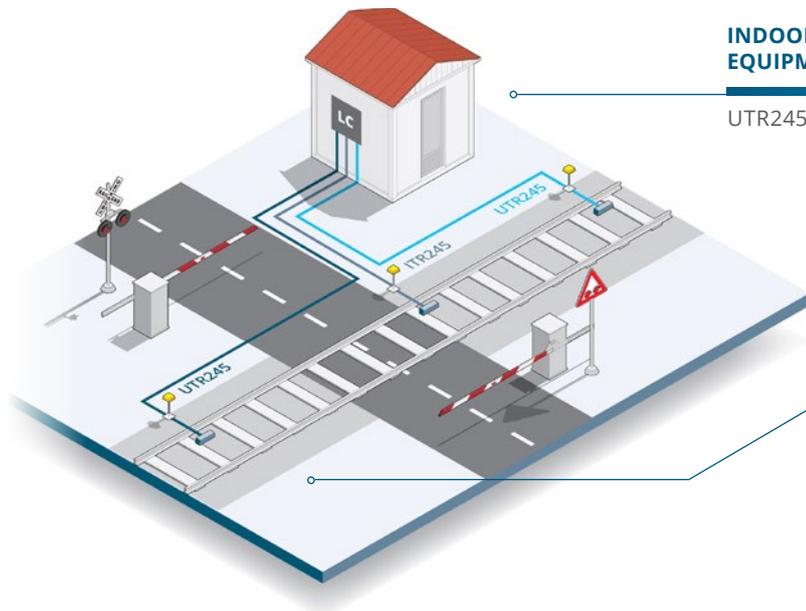


Level crossing modernization



Level crossing modernization

## Train Detection System UTR / ITR



### INDOOR EQUIPMENT

UTR245 / ITR245



### OUTDOOR EQUIPMENT



**ZK24-2**  
Rail Wheel  
Sensor



**ZGK**  
Lightning  
Protection  
Module

**Train Detection System UTR/ITR** is using ALTPRO wheel sensing technology for train detection. It is characterized by exceptional simplicity in operation, installation and maintenance. This reliable solution is ideally used in simple train detection applications for activation and triggering of any kind of a system.

### Functionality

UTR/ITR system is using ALTPRO inductive wheel sensor technology for detection of the arriving train. It is an ideal replacement for old mechanical or magnetic switch on / switch off detectors, track circuits or loops.

### Safety

Train detection system UTR / ITR is certified for harsh environmental conditions (temperature, humidity, pressure, vibrations and shocks) according to EN50125-3.

### Maintenance

The system requires simple maintenance with periodic checks which include voltage measuring and other simple maintenance activities.



UTR / ITR installation

### Connectivity

UTR / ITR provides relay outputs and transistor/optocoupler outputs whose activation delays are time configurable. Transistor / optocoupler outputs enable UTR / ITR to be used as an interface between ALTPRO wheel sensors and other systems like HOT BOX, train weighing systems and similar.

### Analytics

Possibility of connecting data logger which enables personnel to track UTR/ITR performance while the train is passing.

### System information output

- Wheel passage

### System benefits

- Simplicity
- Small dimensions
- Easy-to-read user interface

### Technical data for outdoor equipment

Wheel detection According to TSI (ERA/ERTMS/033281)

### Order codes

System TDR14  
AP215570

System UTR  
AP215593

Lightning Protection Module ZGK  
AP215534

Rail Wheel Sensor ZK24-2  
AP215595

# AUTOMATIC TRAIN PROTECTION SYSTEM RAS90 (INDUSI PZB90)

## IDENTIFICATION SYSTEM



**GPS**  
Vehicle  
Position

## INFORMATION SYSTEM

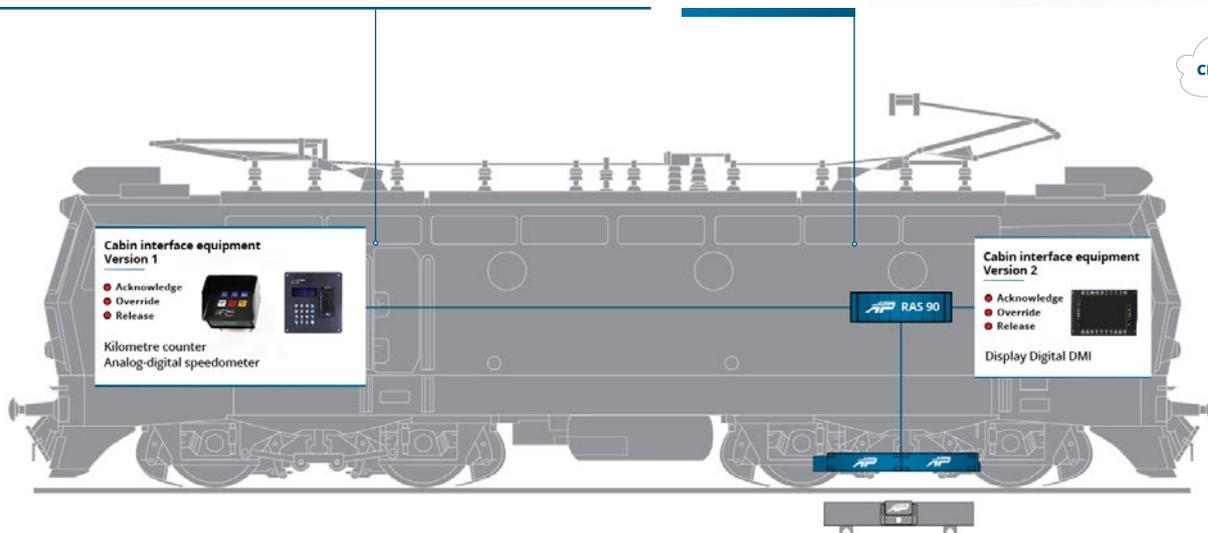


Display  
Digital  
DMI

**RAS90**  
Automatic Train  
Protection  
System



CENDIS



**Automatic Train Protection System RAS90** is an INDUSI PZB90 based ATP system. It is designed in order to increase the safety of railway traffic. RAS90 system consists of central device RAS90, locomotive balise, track balises and signalling and operating elements located in the locomotive cabin.

## Functionality

The main function of the system is to initiate automatic braking if the driver doesn't comply with safety regulations. RAS90 is continuously monitoring the speed of the train and does not allow overspeeding at any point during the run. RAS90 can be additionally upgraded with various other functions like dead man's system, train driver registration, event recording, speed monitoring, wheel lubrication and similar.

## Safety

Track and locomotive balises are certified in TUV Rheinland according to EN norms 50121-3, 50121-4, and 50125-3. RAS90 is developed and certified according to EN 50155, EN 50121-3 and EN61373.

## Application

- Automatic train protection system
- Dead man's system
- Wheel lubrication
- Event recording

## System information output

- Systems activity
- Vehicle speed control
- Diagnostic information

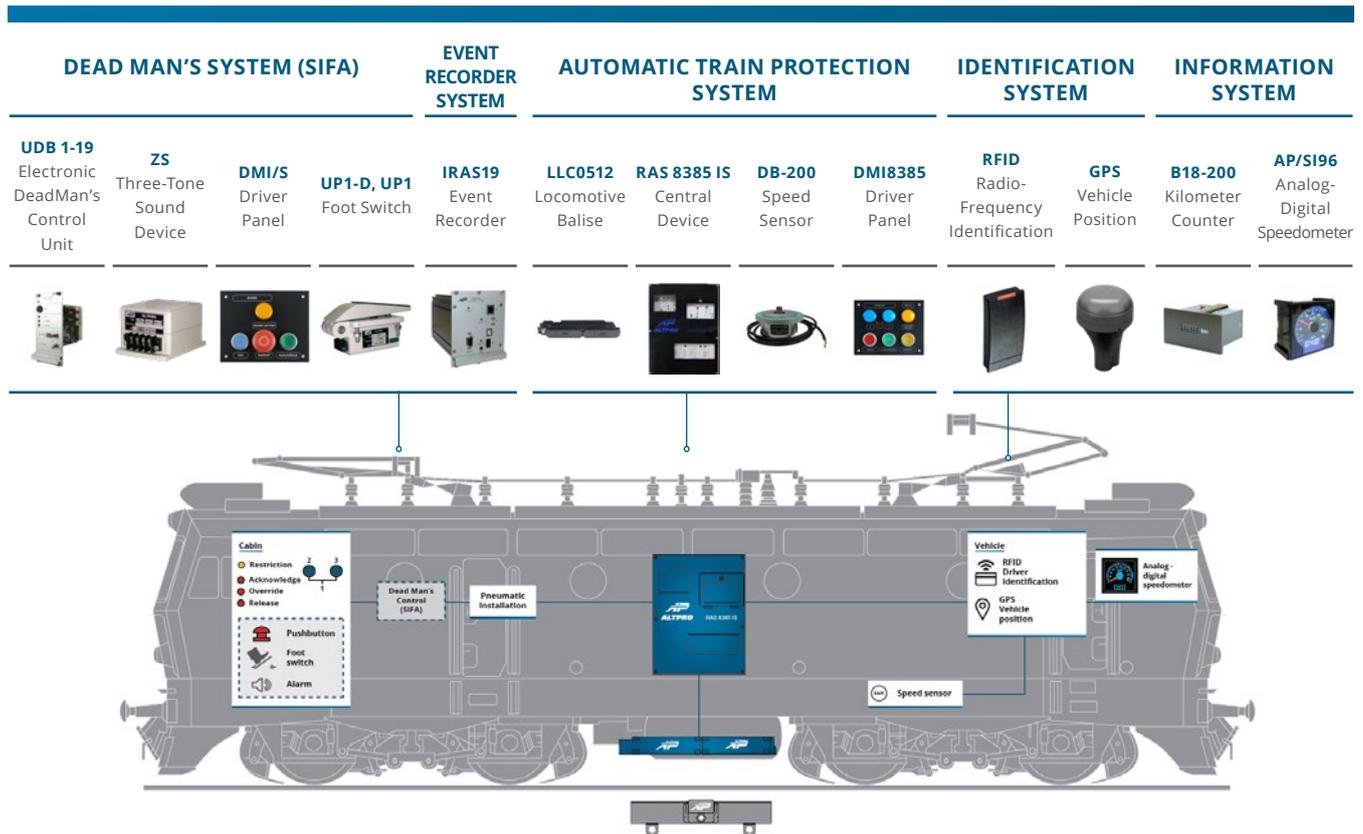
## System benefits

- Track and locomotive balises encased in robust (fire, water, vibration resistant) casings
- Equipment compatible with other INDUSI track balise producers
- Decentralized architecture
- Minimum cable infrastructure - CAN BUS connectivity
- Configurable parametring of peripheral units
- Low life cycle costs
- Low initial investment
- High level of customization possibilities
- Project management (turn key solution)

## Technical data

|  |   |
|--|---|
| Device input voltage                                   | 15 - 150 V DC   |
| Nominal value of resonant current of locomotive balise | 500 Hz, 1000 Hz i 2000 Hz:<br>274 mA (±10%)             |
| Influence current threshold of a locomotive balise     | 500 Hz, 1000 Hz i 2000 Hz:<br>148 mA (± 10%)            |
| Operating temperature range                            | -20°C - +70°C   |
| Real time diagnostic                                   | RAS90LiveViewer application                             |
| Event Logger   | RAS90Evaluator application,<br>GPS position log, CENDIS |
| Continuous speed monitoring                            | PZB90 running modes U/M/O                               |
| Dimensions (w x l x h) RAS90 CU                        | 240 × 483 × 133 mm                                      |

# AUTOMATIC TRAIN PROTECTION SYSTEM RAS8385 IS (INDUSI I60)



**Automatic Train Protection System RAS8385 IS** is an INDUSI I60 based ATP system. It is designed in order to increase the safety of railway traffic. Altpro ATP system consists of central device RAS8385 IS, locomotive balise, track balises and signalling and operating elements located in the locomotive cabin.

## Functionality

The main function of the system is to initiate automatic braking if the driver doesn't comply with safety regulations. RAS8385 IS can be additionally complemented with various other functions like dead man's system, train driver registration, event recording, speed monitoring, wheel lubrication and similar.

## Safety

Track and locomotive balises are certified in TUV Rheinland according to EN norms 50121-3, 50121-4, and 50125-3. RAS8385 IS is tested and certified according to EN 50155, EN 50121-3 and EN61373.

## Application

- Automatic train protection system
- Dead man's system
- Wheel lubrication
- Event recording

## System benefits

- Exceptional simplicity of the whole system and its handling
- All system components encased in robust (fire, water, vibration resistant) casings
- Equipment compatible with other INDUSI track balise producers
- Integrated event recorder / diagnostic
- Low maintenance cost

- Extended warranty
- Short lead times
- Low life cycle costs
- Low initial investment
- High level of customization possibilities
- Project management (turn key solution)

## System information output

- Systems activity
- Vehicle speed control
- Diagnostic information

## Technical data

|  |  |
|--|--|
| Device input voltage                                   | 15 - 150 VDC   |
| Time control   | 4, 16, 20, 26, 34 s  |
| Nominal value of resonant current of locomotive balise | 500 Hz, 1000 Hz i 2000 Hz:<br>274 mA (±10%)                    |
| Influence current threshold of a locomotive balise     | 500 Hz, 1000 Hz i 2000 Hz:<br>148 mA (± 10%)                   |
| Operating temperature range                            | -20°C to +70°C   |
| Event recorder   | Recording: speed, pressure,<br>16 digital signals ( 6 of ATPs) |
| Speed check at 500Hz for running mode                  | E 90 km/h  |
|  | 1 65 km/h  |
|  | 2 50 km/h<br>3 40 km/h   |
| Speed check at 1000Hz for running mode                 | E 130 km/h, after 16 s   |
|  | 1 90 km/h, after 20 s  |
|  | 2 65 km/h, after 26 s<br>3 50 km/h, after 34 s                 |
| Dimensions (w x l x h)                                 | 660 × 460 × 220 mm   |

# INDUSI TRACK AND LOCOMOTIVE BALISES

## Track Balises PM500 / PM1020

Track balises (magnets) PM500 and PM1020 are parts of INDUSI based automatic train protection systems used in order to increase the safety level in railway traffic. Balises are the track (infrastructure) part of ATP system and they perform resonant influence on the locomotive part of the system when the train passes over it.

### Functionality

Track balises are active on 500 Hz (PM500) frequency and on 1000/2000 Hz frequency (PM1020). 500 Hz influence controls speed at the detection approaching to the red light. 1000 Hz influence activates awareness and time control of the engine driver. It also triggers speed control once the time control begins. 2000 Hz influence immediately activates emergency braking.

### Safety

Track balises PM500 and PM1020 are tested according to CENELEC norms EN 50121-4 (EMC) and EN 50125-3 (electromagnetic immunity). Track balises are IP68 protected against water and dust. Complete interior of the balise is protected by special resin which enables its operation even after heavy mechanical damage.

### Maintenance

No need for frequency adjustment or any form of maintenance. Adjustable mounting bracket enables quick position changes and track balise can be mounted on multiple rail types. ALTPRO can provide a testing device (PMI3) which measures all track balise parameters. PC database and reporting application processes data generated by PMI3.

### Application

As a part of any INDUSI based ATP system regardless of the producer (SIEMENS, SEL, ALTPRO...)

### System information output

Track balise frequency (500Hz, 1000 Hz, 2000 Hz)

### System benefits

- Exceptional simplicity of the device and its handling
- Encased in robust (fire, water, vibration resistant) casing
- Long guarantee period
- Low life cycle costs
- Low initial investment
- Balise compatible with other INDUSI producers
- Short lead times

#### Order codes:

Central Device RAS8385  
AP108170

Track Balise PM1020  
AP215400

Track Balise PM500  
AP215401

Locomotive Balise LLC0512  
AP108120

## Technical data

|                      |                  |
|----------------------|------------------|
| Operating frequency: |                  |
| type PM500           | 500 Hz           |
| type PM1020          | 1000 Hz, 2000 Hz |

|                             |                   |
|-----------------------------|-------------------|
| Operating temperature range | - 40 °C - + 80 °C |
|-----------------------------|-------------------|

|                           |       |
|---------------------------|-------|
| Water and dust protection | IP 68 |
|---------------------------|-------|

|        |       |
|--------|-------|
| Weight | 12 kg |
|--------|-------|

|            |                    |
|------------|--------------------|
| Dimensions | 650 x 300 x 132 mm |
|------------|--------------------|



PM1020 mounted on track

## Locomotive Balise LLC0512 / LLC0512 SA

Locomotive balise (locomotive magnet) LLC0512 / LLC0512SA is a part of INDUSI automatic train protection system. It provides signal transfer from the track balise to the central unit of the ATP system.

### Functionality

Locomotive balise LLC0512 has 3 working frequencies: 500 Hz, 1000 Hz and 2000 Hz. Its main role is to read the frequencies from the track balise as it passes and transfer that specific information to the central part of the ATP system.

### Maintenance

No need for frequency adjustment or any form of maintenance. Resonant frequencies resonant frequencies of 500, 1000 and 2000 Hz signal; 500 Hz  $\pm 1\%$ , 1000 Hz  $\pm 1\%$ , 2000 Hz  $\pm 1\%$  and those frequencies are permanent unless balise suffers heavy mechanical or electrical damage. ALTPRO can provide a testing device (LMI18) which measures all balise frequencies.

### Safety

Locomotive balise LLC0512 is certified for electromagnetic immunity (EN 50121-3) in TUV Rheinland and it is IP67 protected

against water and dust. Complete interior of the balise is protected by special resin which enables its operation even after heavy mechanical damage. As the most vulnerable part of the system, the connector is protected from damage either by protective shield and/or placement.

### System benefits

- Exceptional simplicity of the device and its handling
- Encased in robust (fire, water, vibration resistant) casing
- Extended warranty
- Long life cycle (up to 40 years)
- Low life cycle costs
- Low initial investment
- High level of customization possibilities
- Equipment compatible with other INDUSI track balise producers
- Short lead times

### Application

As a part of any INDUSI based ATP system regardless of the producer (SIEMENS, THALES, ALTPRO...)

### Technical data

|  | LLC0512            | LLC0512 SA   |
|--|--------------------|--|
| Input voltage of serial resonant circuit:  | 36 - 40 Vpp        | 28 - 36 Vpp (voltage on connector is up to few hundreds VAC) |
| Resonant current of circuits (500, 1000 and 2000 Hz)                               | 270 mA ± 10%       | 200 mA ± 10%   |
| Resonant current of circuits under influence of track balise 500, 1000 and 2000 Hz | < 140 mA           | < 120 mA   |
| Temperature operating range  | -40°C - +80°C      | -40°C - +80°C  |
| Dimensions (w × l × h)   | 650 x 300 x 132 mm | 650 x 300 x 132 mm   |
| Weight   | 30 kg              | 20 kg  |



Locomotive Balise LLC0512

## TESTING DEVICES FOR ATPS

INDUSI based ATP protection systems consists of central device, locomotive and track balises as well as signal and operating elements located in the locomotive's cabin. As a safety system, ATP system should be carefully installed and maintained in proper working condition by regular and specific testing of its central and peripheral units.

### Testing Device for ATPS RAS8385 Type ASI



Testing device for central unit of INDUSI I60 (ALTPRO, Siemens, SEL) based ATP system. It can simulate all actual working conditions in order to test them. There is a possibility to test with external or internal (integrated) locomotive balise.

### Testing Device for Locomotive Balises LMI18



Testing device for locomotive balises. It is used for functional testing of ALTPRO, Siemens and SEL INDUSI locomotive balises used as a part of any INDUSI ATP system.

- Suitable for all types of locomotive balises
- Automatic / manual measuring procedure
- 12 hour measuring autonomy
- IP67 robust casing
- Intuitive UI design

## Testing Device for INDUSI Track Balises PMI3



Testing device for track balises. It can test track balises made by any producer worldwide. It offers contactless frequency measuring and storing the information directly to the internal memory of the device. Long-life accumulator battery enables daylong (up to 12 hours) outdoor measuring.

## Testing Device for INDUSI Remote Control IDTD RC



Testing device used for track balise control which is capable of generating short impulse while track balise is active (the rest of time test track balise) or inactive. The width of that impulse is proportional to the travel speed of the train.

## Testing Device for Speed Sensor SSTD



Testing device used for incremental encoder and pick up sensors testing. It is designed to be simple and easy to use for field testing activities.

### Order codes

Testing Device for Locomotive Balise LMI18  
AP108131

Testing Device for Track Balise PMI3  
AP215460

Dead Man's Control Unit UDB1  
AP108205

Three Tone Sound Indicator ZS  
AP108230

## DEAD MAN'S CONTROL SYSTEM (SIFA)



**UDB1**  
Dead Man's  
Control Unit



**ZS**  
Three - tone  
Sound Indicator



**UP1-D, UP1**  
Foot Switches  
wide and narrow

The Dead Man's control system is designed for all kinds of rail vehicles and consists of the control unit (UDB1), the foot switch (UP1) and the three-tone sound indicator (ZS24, ZS72, ZS110). The function of the system is to control the alertness of the locomotive driver. In case that the driver, for whatever reason, is not alert, light and sound signals are produced and eventually the braking process is initiated.

### Three - Tone Sound Indicator ZS

The three - tone sound indicator signals problems with the safety devices in the locomotive or train and is used for signalization within the dead man's control system.

- Different types for different supply voltages 24 VDC (ZS24), 72 VDC (ZS72), 110 VDC (ZS110).
- Massive cast metal case. Special loudspeaker with a plastic membrane; water resistant
- Three sound frequencies(tones): 400 Hz, 600 Hz, 1200 Hz
- The device is powered only if one of the frequency inputs is activated, what makes the device lifecycle much longer
- Operating temperature: from -40°C - +80°C

### Dead Man's Control Unit UDB1

Tested according to EN50155, EN 50121-3 and EN 61373, as well as UIC 641, IEC 571, IEC 571-1, IEC 571-2.

- Supply voltage: 24 VDC, 64 VDC, 72 VDC, 110 VDC
- Operating temperature: from -30°C - +70°C

### Foot Switches UP1/UP1-D

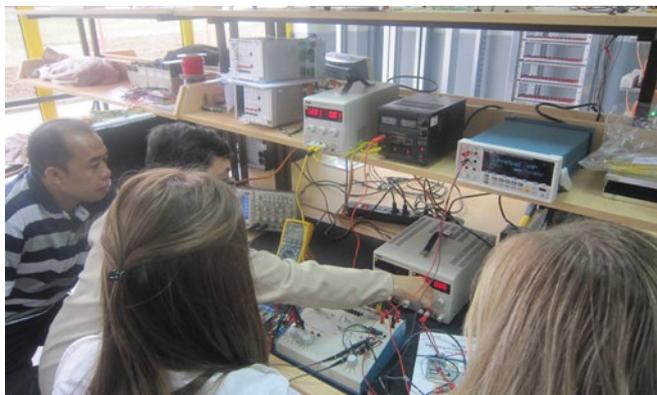
The foot switch is used on a locomotive for various systems, e.g. horn activation, dead man's control system or sand-nozzle.

- Two types: wide UP1-D or narrow UP1 version
- Plastic coating surface protection
- Tested and approved for various harsh environmental conditions shock and vibration according to standards IEC571 and UIC 641..
- Operating temperature: from -40°C - +80°C

## PROJECTS AND SERVICES

High tech products require high quality and timely service. That is why **ALTPRO** provides prompt customer service available to every customer at any time anywhere in the world. We offer a complete set of services regarding our products and systems, which includes project design, education and training, support

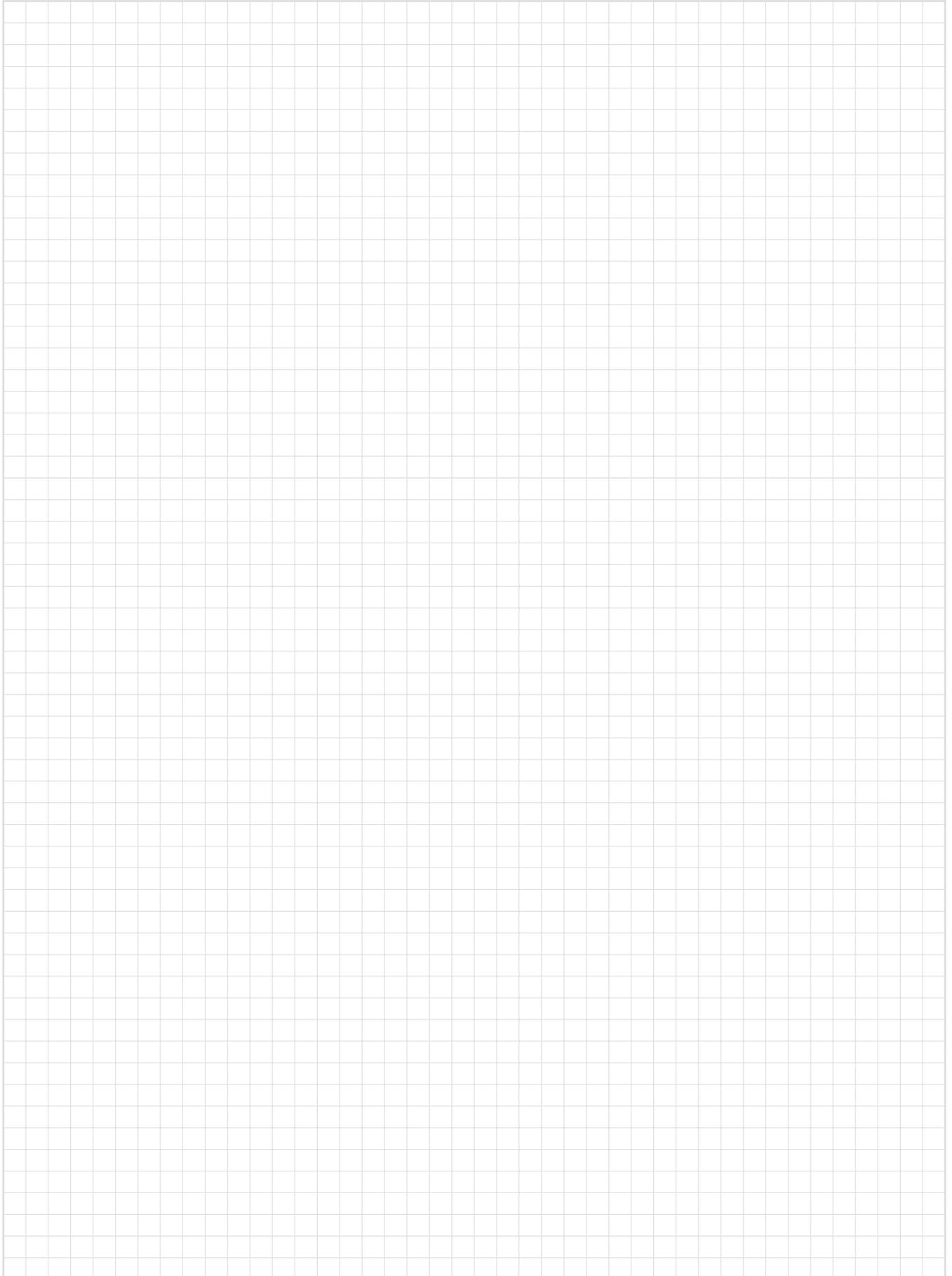
with installation and activation of **ALTPRO** systems, all the way to professional advice and technical support during the product operational lifetime

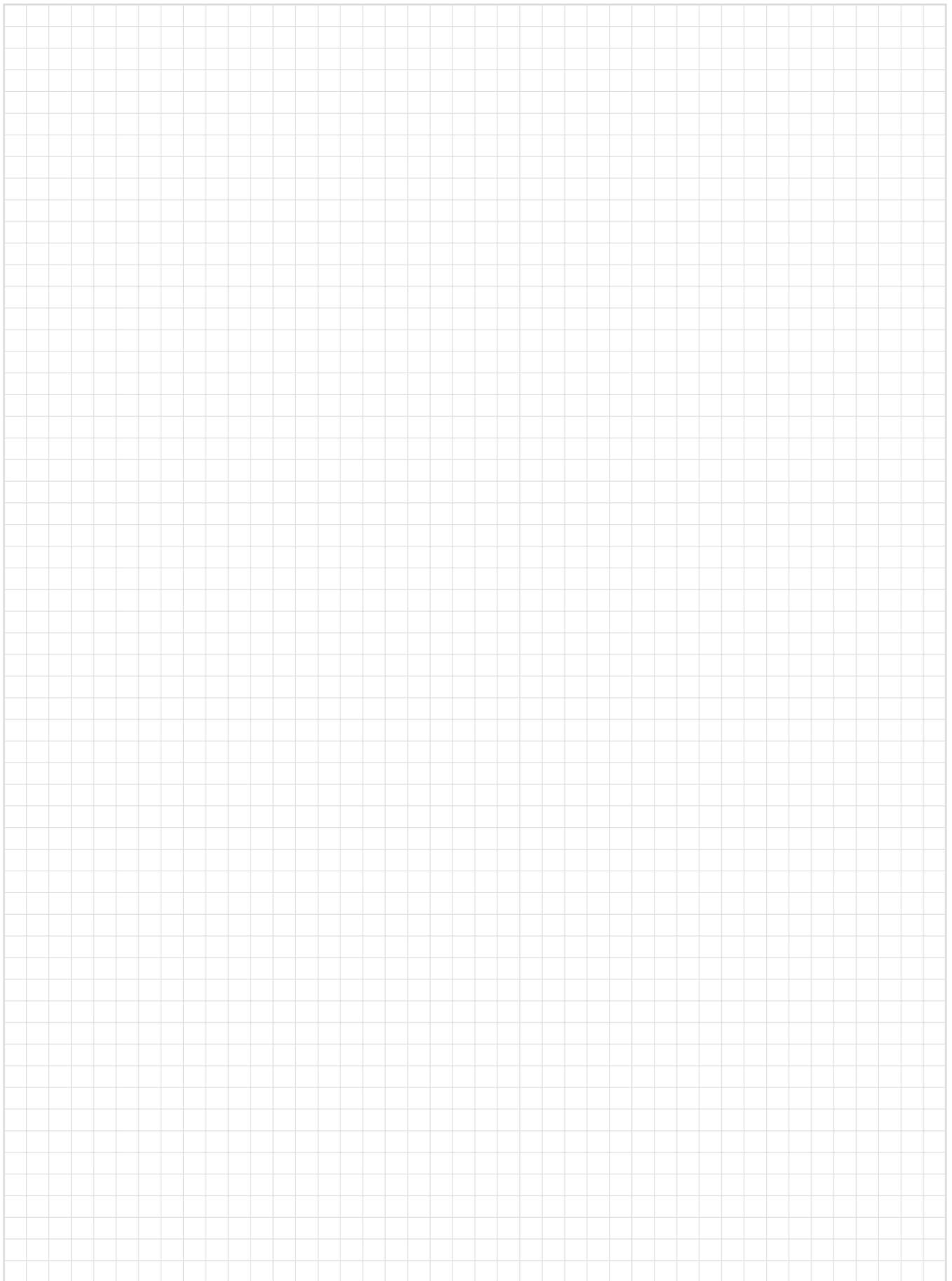


# NOTES

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A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.







6320

REGISTRATION ONLY

