



**Technical Description**

**05.03.2023**

**IPS System for Locomotive**

**Positioning in the Tunnel**

**I. The principle of operation of the system**

The principle of operation of the system is based on reading information from contactless sensors located on the walls of the tunnel. The information read from the sensors is transmitted to the monitor of each of the locomotive drivers, the TPMC operator and the dispatcher on the surface. The system determines the position of the locomotive in the tunnel relative to the face at each time.

If two locomotives start moving towards each other on the same line and there is no interchange between them, the system notifies operators of an emergency situation. An alarm sounds when approaching dangerously.

Through the network that is installed in the tunnel, the dispatcher and the TPMC operator can notify the driver whether he should accelerate, wait at the interchange, or slow down, thus optimizing logistics in the tunnel and speeding up the passage.

Sensors are installed in the tunnel every 50 meters, in areas with increased requirements for positioning accuracy, sensors can be installed closer. The positioning system monitor is installed separately from the main systems and connected to the local network in the tunnel. Interactive screens have a Touch Screen system.

The position relative to each of the sensors is determined by measuring the radiation intensity of the sensor. Диагональ контрольного экрана: от 5 до 12 дюймов (по выбору заказчика)

1030 Pine Tree Cir. N.,  
Buffalo Grove, IL, 60089  
+1 847 997 39 17  
JP Morgan Chase Bank,  
Routing Number: 071000013  
Account Number: 829631867

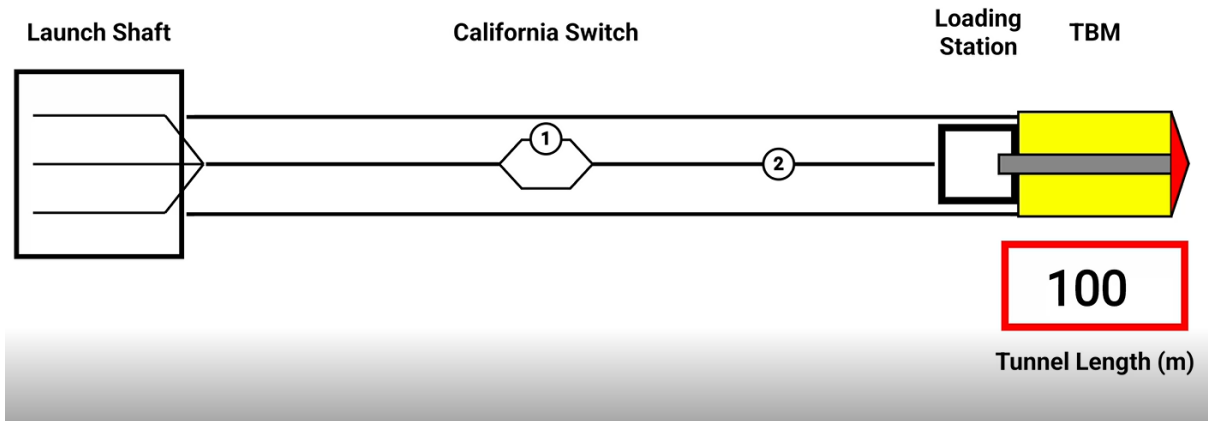
For international transfers:  
Chase Swift Code:  
CHASUS33  
For Domestic transfers, Chase ABA Routing /Transit Number:  
021000021  
Receiving Bank Address:  
850 S Buffalo Grove Rd, Buffalo Grove, IL, 60089



Размер каждого датчика: 10x10x4 см. Корпус датчика пластиковый. Класс защиты IP 63.

### I. System interface and its settings

1. Main screen (translation of the interface into Russian is possible):



1. The main screen is turned on when the locomotive is moving and reflects the position of each of the locomotives. The driver knows the number of his locomotive and understands his position relative to the face and relative to all trains in the tunnel.
2. 1. The display of the speed of the rolling stock is shown in the table at the bottom of the main screen and is available to all participants in the process

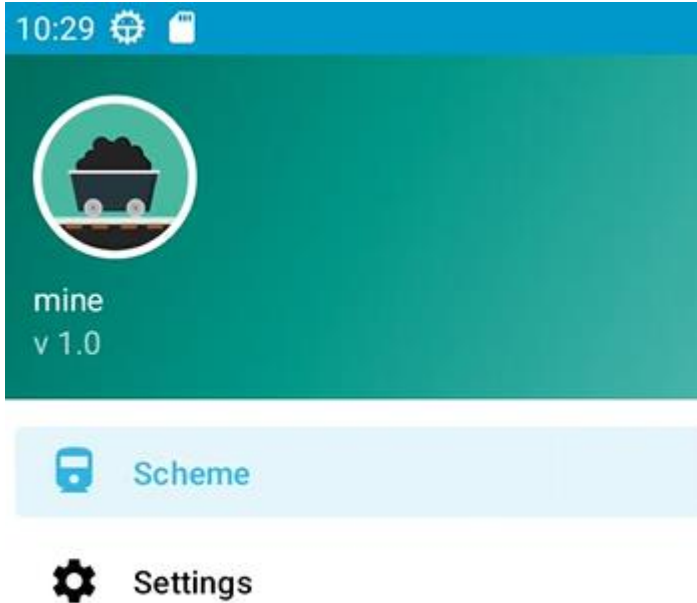
Number of the Train	Speed
Train 1	10 km/h
Train 2	5 km/h
Train 3	3 km/h

### 3. System Settings:

When you click the System Settings button at the top of the main screen, a menu pops up to the left of the tunnel diagram:

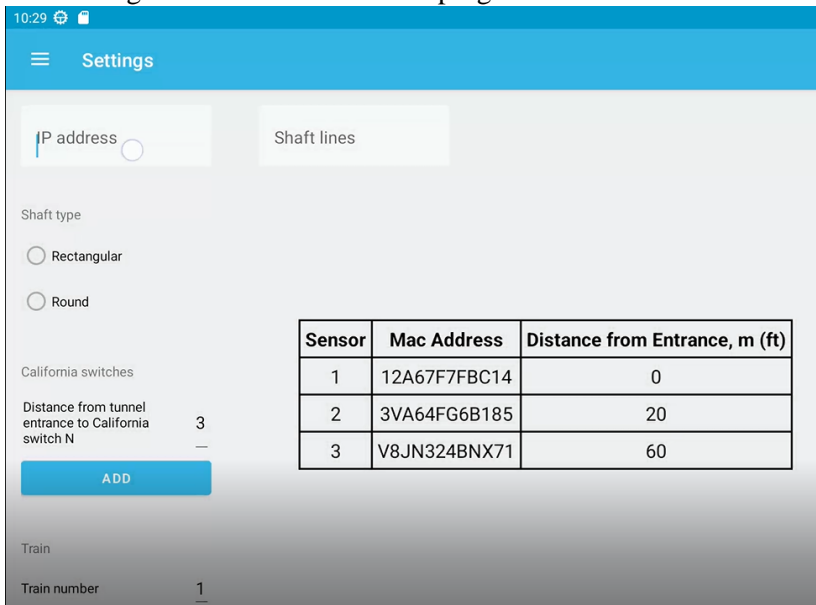
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The Settings function is used to set the type of mine (round or rectangular), programming the number and position of interchanges, as well as the number of interchanges and arrows in the mine.

The Settings function is also used to program the MAC addresses of sensors and the number of trains.



To switch to the driving mode, the Scheme function is used, which activates the main screen with the image of the tunnel diagram and the position of the locomotives.

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I. The cost of the system, warranty obligations and delivery dates

Offers will be provided at request

The warranty for every individual element is 1 year. In case of system failure, the Customer calls the supplier's specialists to the facility. If the cause of the system failure was a breakdown of system elements, or a software problem, then the case is considered warranty and the supplier corrects the defect at its own expense. If the breakdown was the result of erroneous actions of the customer, such as changing the settings of the modems of the local network, or incorrect input of the sensor address, the specialist's time is paid according to the tariff specified above.

The delivery time of the system for a tunnel up to 5 km long is 3 months.

The delivery time of the system for a tunnel with a length of 5 to 10 km is 5 months.

Projects with a length of more than 10 km are considered separately and are considered separately from this commercial offer due to the need to increase the bandwidth of standard network solutions.

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