



## Automatic Plug and Sliding Door System

# LHB coaches – Automatic Door Control System

## Company Introduction

IFE-Victall Railway Vehicle Door Systems (Qingdao) Co., Ltd.



IFE-Victall Qingdao



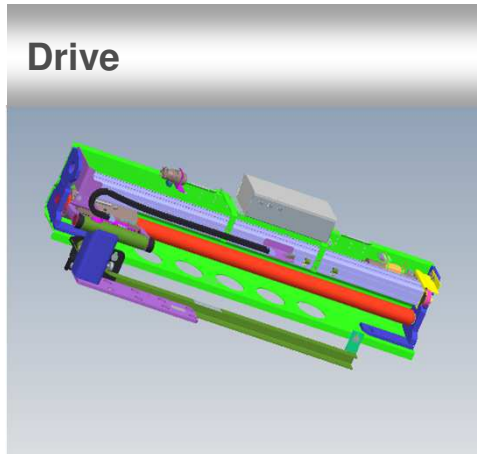
Knorr-Bremse Group

# Main components

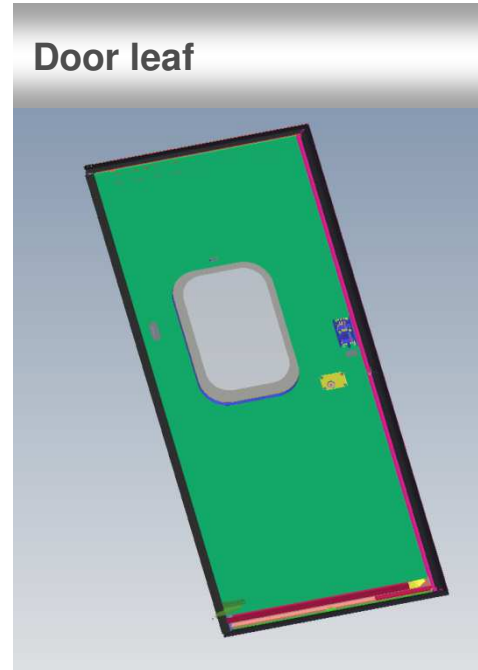
## Door system



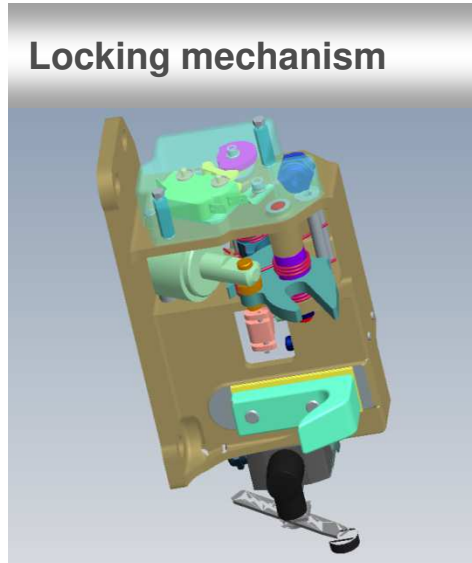
## Drive



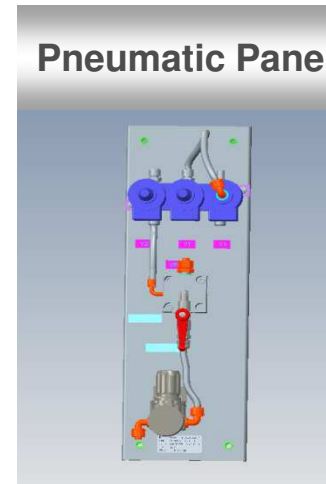
## Door leaf



## Locking mechanism



## Pneumatic Panel



## LHB coaches – Automatic Door Control System

### Product Characteristics

Operating Speed up to 200 Km/h

Free opening Single leaf door : 800 mm

Opening time 4sec+1 sec. (single leaf, 800 mm free opening width)

Closing time 4sec+1sec. (single leaf, 800 mm free opening width)

Effective clamping force max. 150N (first closing attempt)

Effective clamping force max. 200N (further closing attempt) (for electrical system only)

Peak clamping force max. 300N  
(According to standard EN 14752)



## LHB coaches – Automatic Door Control System

### Power consumption

- Power supply            110VDC
- Peak power consumption (<500ms):             $\leq 500$  W  
(locking, unlocking, re-opening)
- Average value:             $\leq 120$  W  
(During opening and closing movement)
- Door control unit:             $\leq 25$  W



# LHB coaches – Automatic Door Control System

## Environment Conditions

Temperature range:

-20°C to +70°C

Humidity:

up to 100%

Max. design speed:

200 km/h

Max. speed of passing train:

200 km/h

Technical life time of the doors:

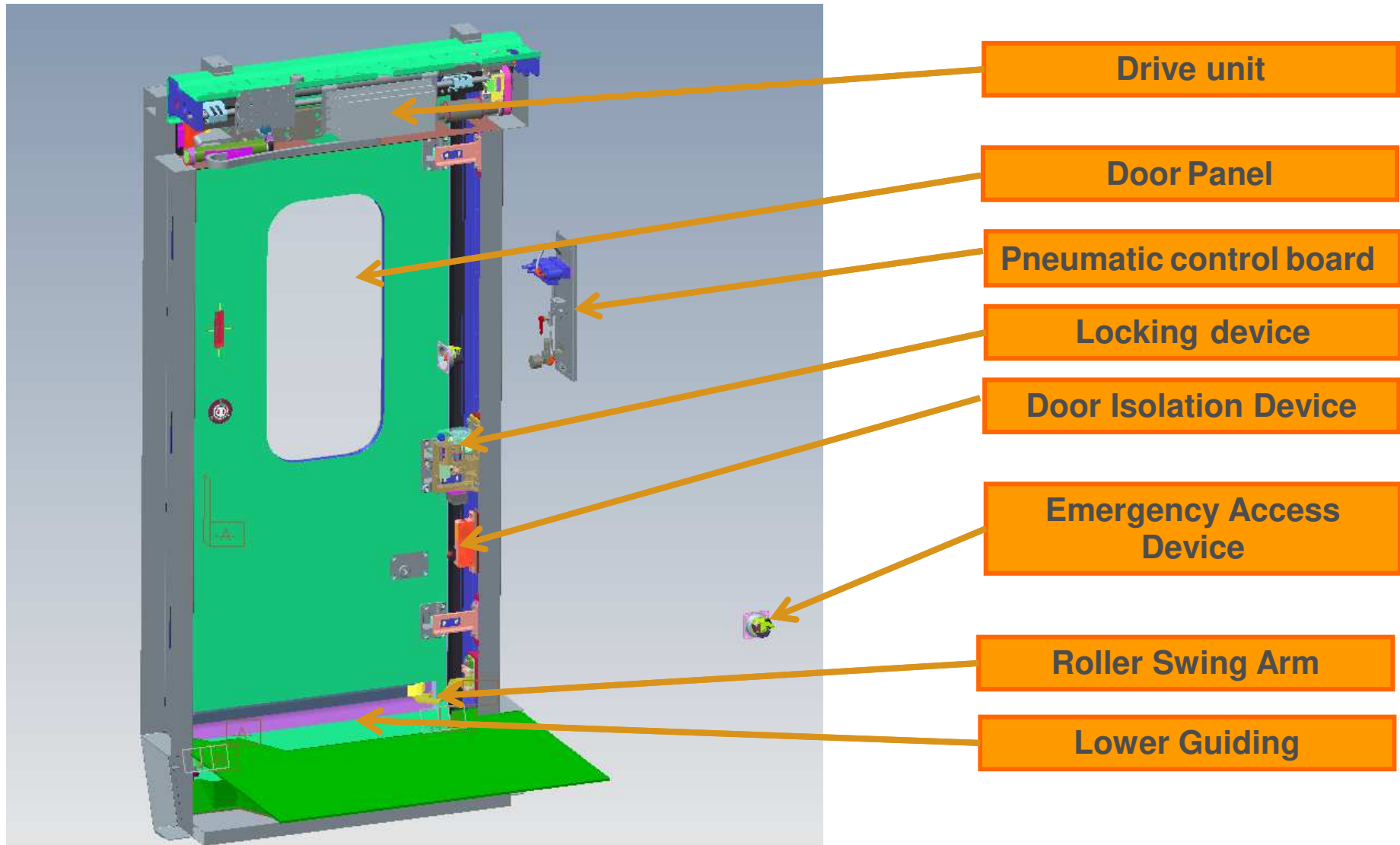
30 years

With respect to IFE maintenance instructions. Maintenance to be executed according to IFE maintenance plan and manuals by skilled personal.



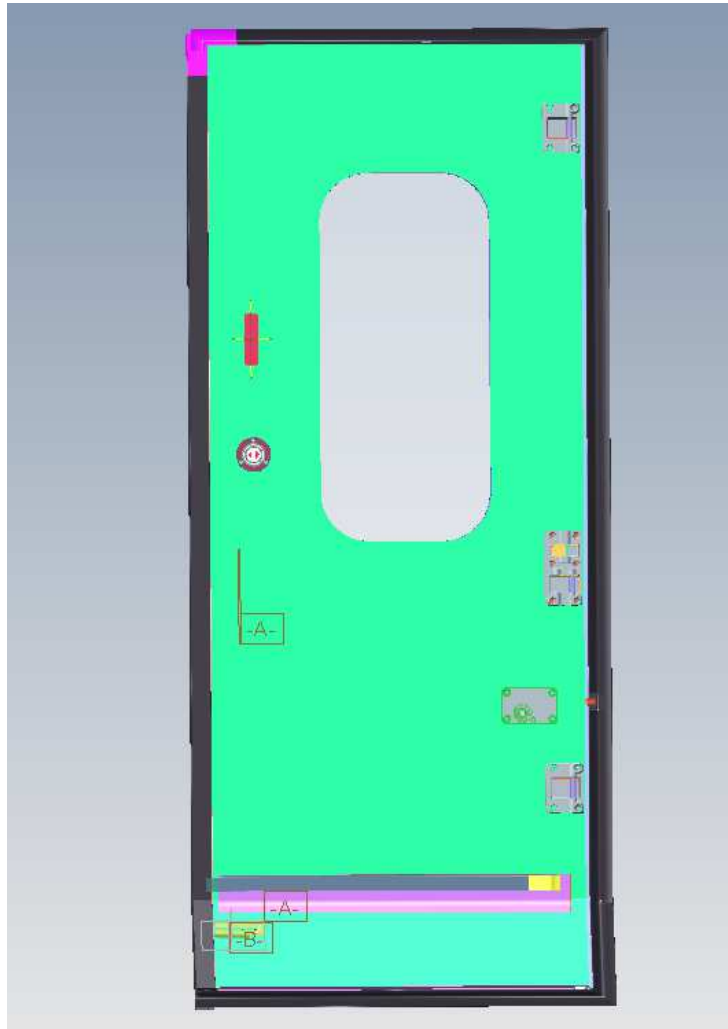
# LHB coaches – Automatic Door Control System

## Door system main components



# LHB coaches – Automatic Door Control System

## Door leaf



### Frame:

Aluminum frame, welded, with straight corners.

### Sandwich:

42 mm thickness, covered with 1 mm aluminum sheets inside and outside, filled with PU-foam core, bonded together via special hot-bond process with the skins and the frame.

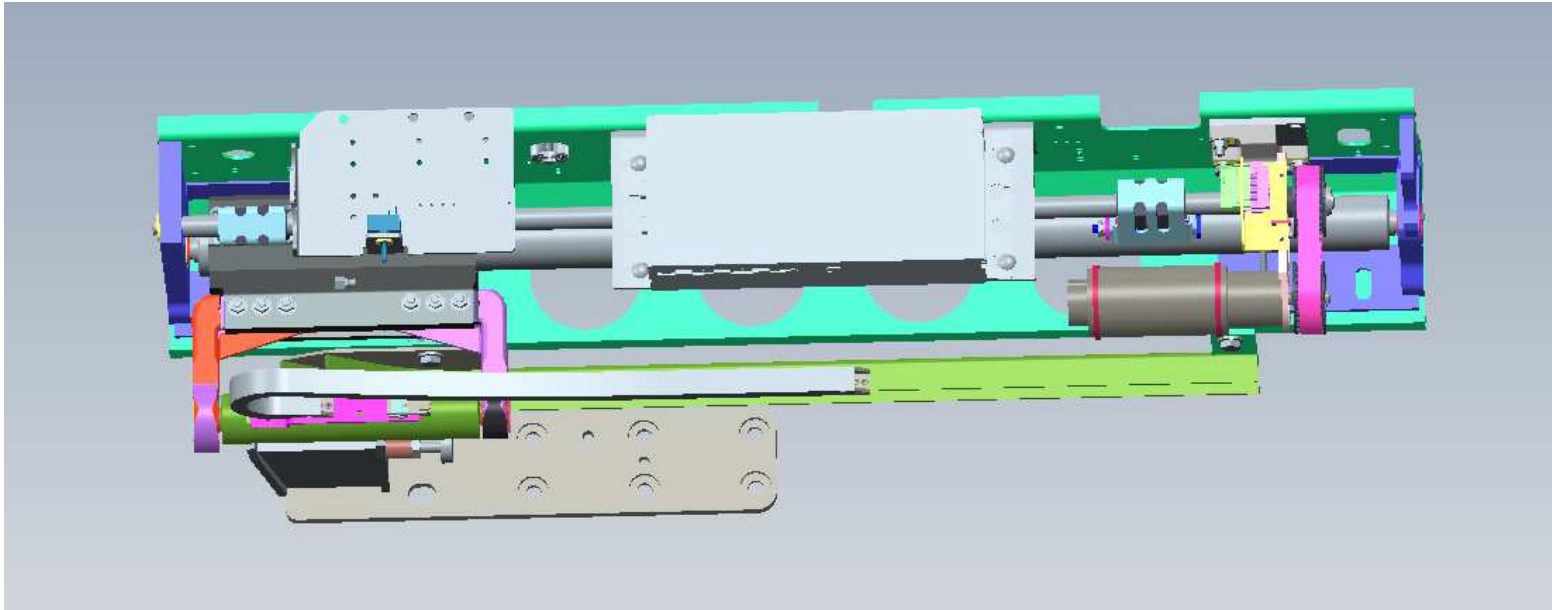
### Surface:

Painted according to IFE standard paint system



# LHB coaches – Automatic Door Control System

## Drive Unit

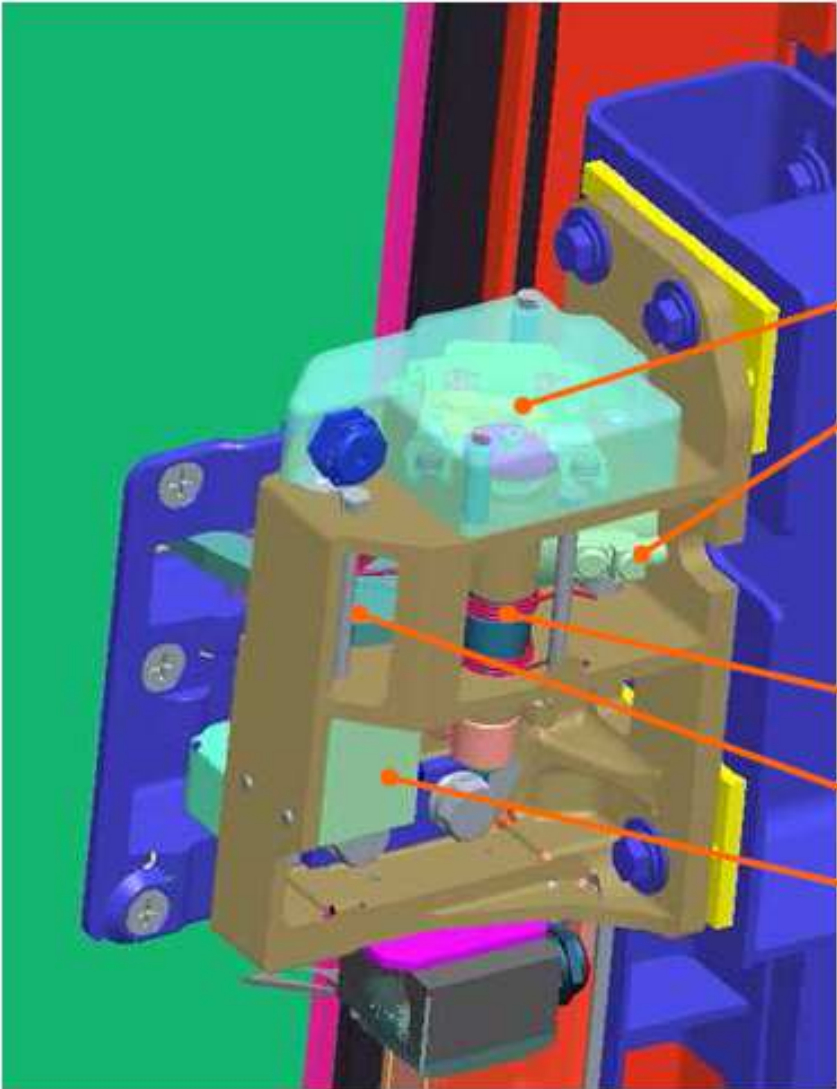


To a base plate following parts are pre-mounted, pre-adjusted and pre-wired.

guiding rail, guide rod, door leaf-carrier, energy chain for door leaf wiring and grounding, buzzer, DCU

# LHB coaches – Automatic Door Control System

## Pneumatic Locking System



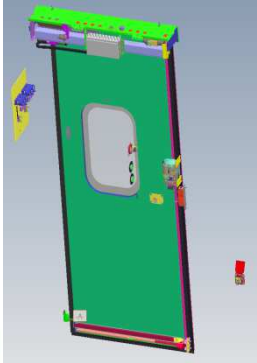
Closed and locked limit switch

Locking Cylinder

Locking Pawl

Locking Hook

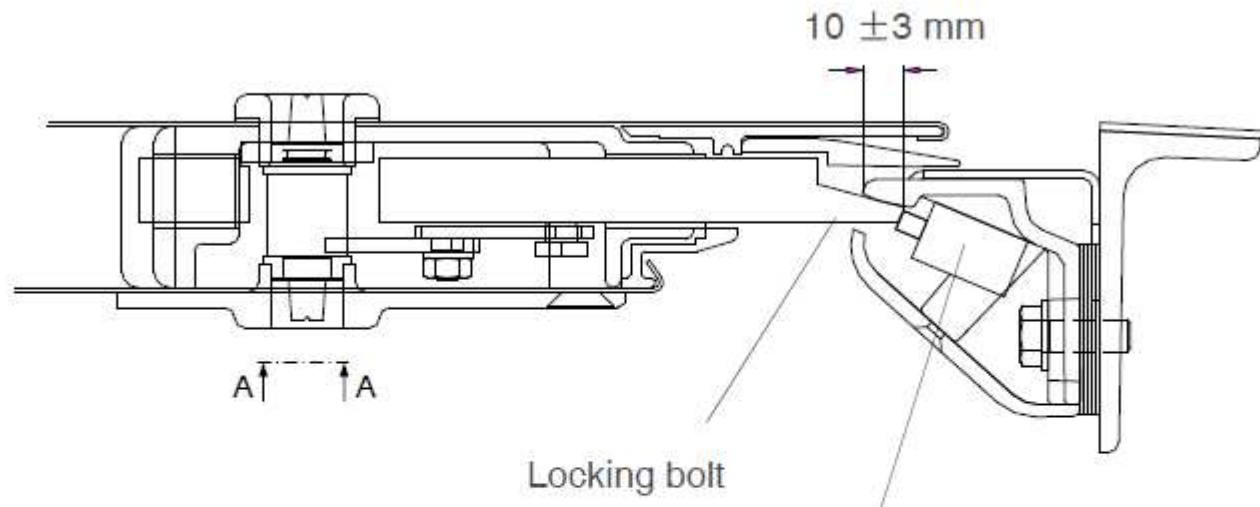
Unlocking Cylinder



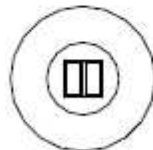
# LHB coaches – Automatic Door Control System

## Door Isolation

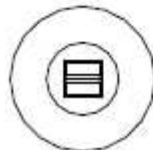
### Door Isolation



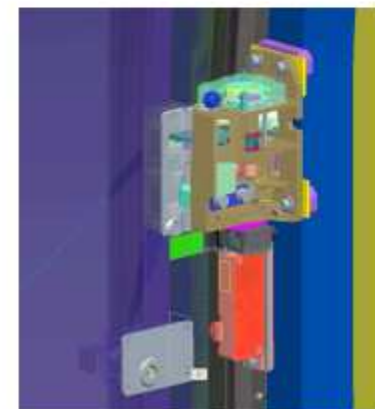
View A-A



unlocked

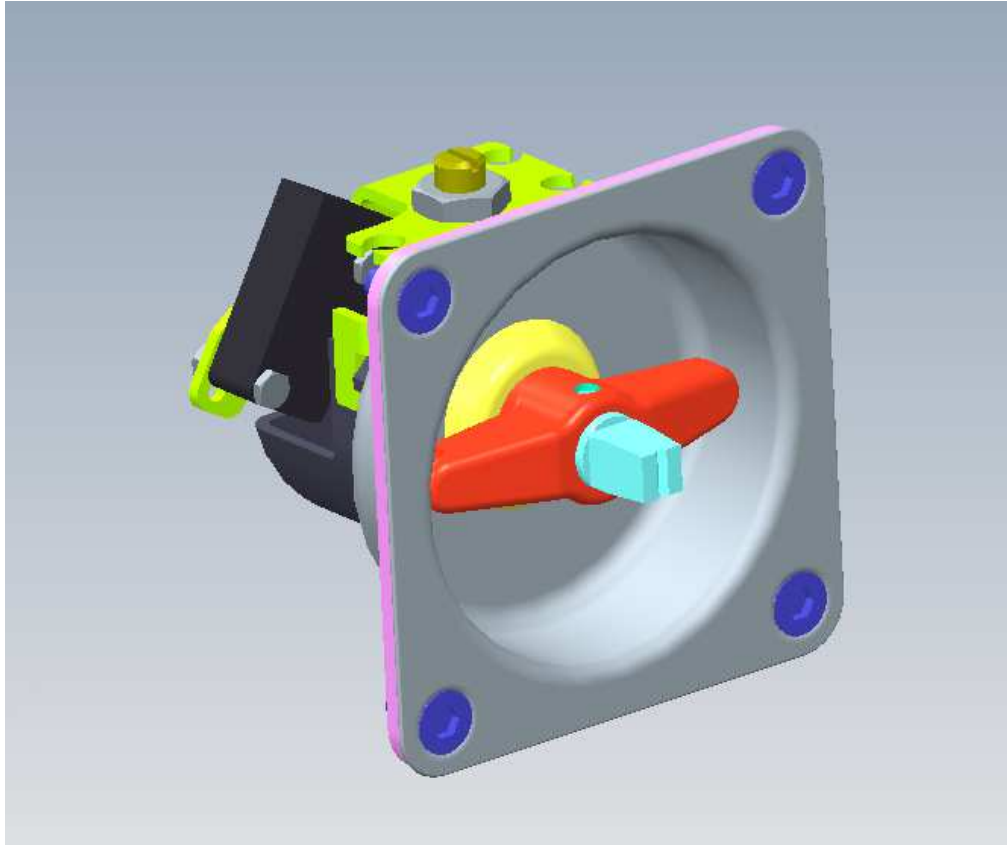


locked



## LHB coaches – Automatic Door Control System

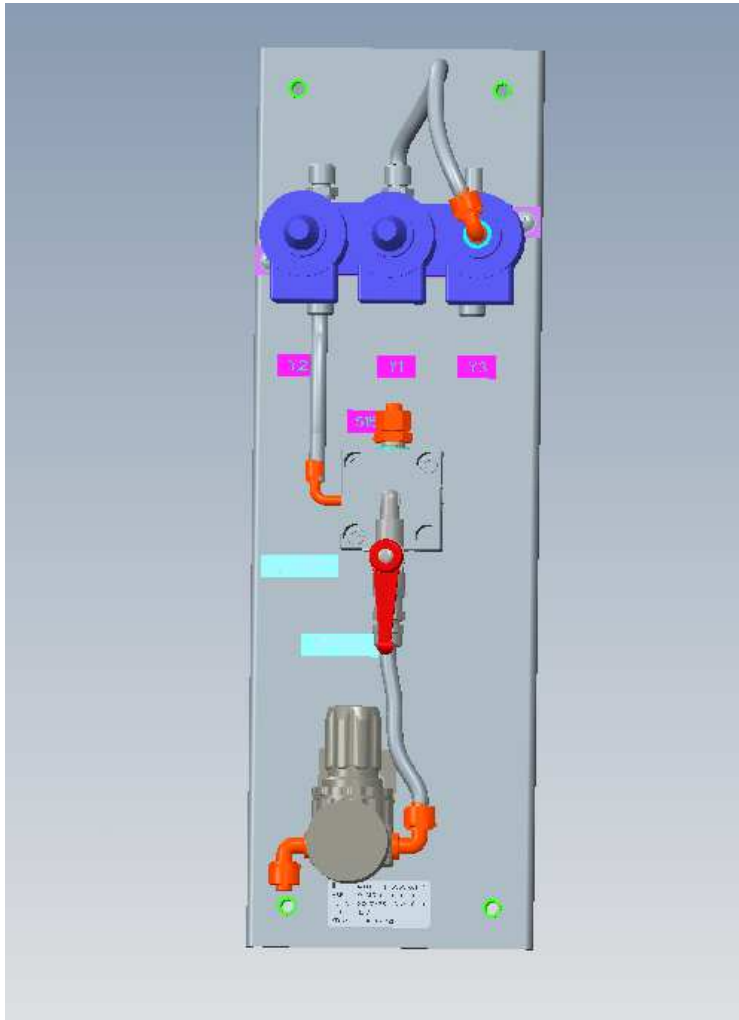
### Emergency egress/access device



Rotary handle, to turn 90° out of normal position for emergency operation, spring loaded to normal position. Including limit switch “emergency access device operated”. Doors can be opened manually.

## LHB coaches – Automatic Door Control System

### Pneumatic Control Board



The board includes an opening valve, closing valve, blocking at  $v > 5\text{km/h}$  valve, and pressure switch.

# LHB coaches – Automatic Door Control System

## Door control unit



- operating temperature:  $-40^{\circ}\text{C} \dots +85^{\circ}\text{C}$
- storage temperature: max.  $+95^{\circ}\text{C}$
- shock and vibration resistant according EN61373
- environmental tested according EN50155, IEC60571
- EMC tested according EN50121-3-2

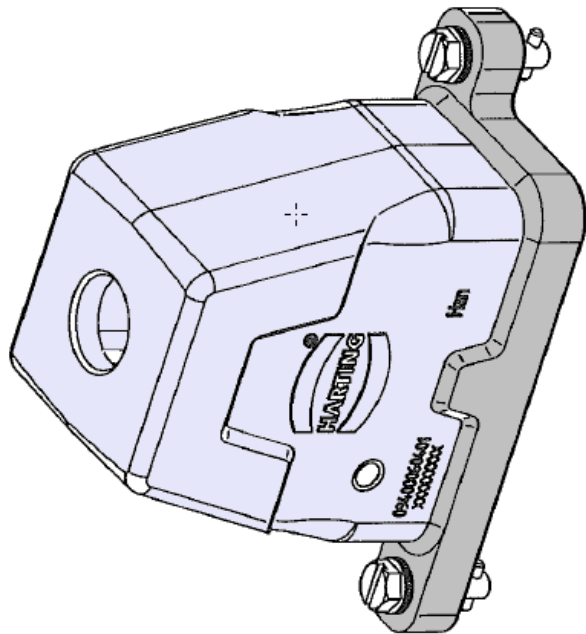
# LHB coaches – Automatic Door Control System

## Guard Panel



# LHB coaches – Automatic Door Control System

## Jumper Connector



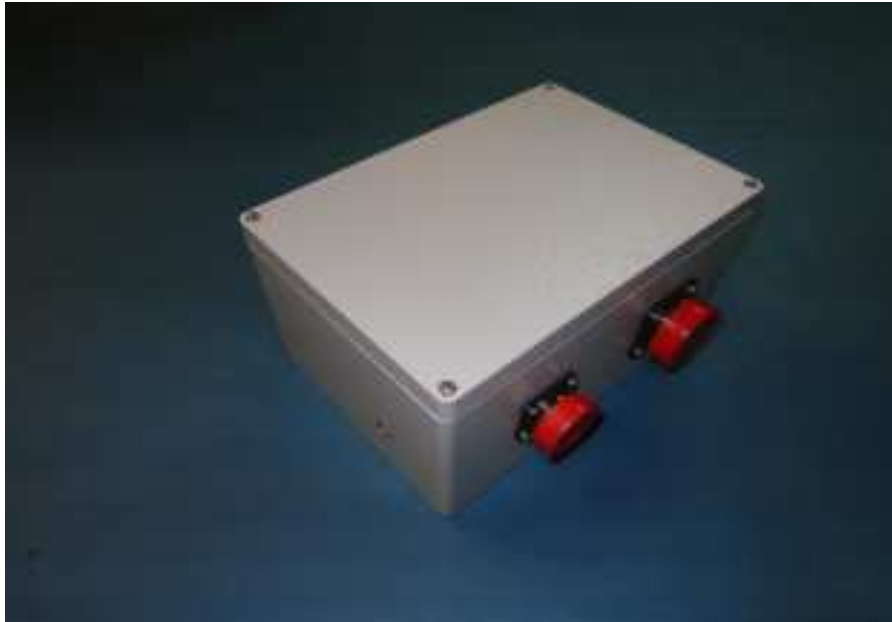
- Connector + Connector Socket





## LHB coaches – Automatic Door Control System

### Junction box



- Proposed installation position between the doors under the roof

# LHB coaches – Automatic Door Control System

## SST Door System

### System Mockup in Qingdao





# Automatic Door Control System

# LHB coaches – Automatic Door Control System

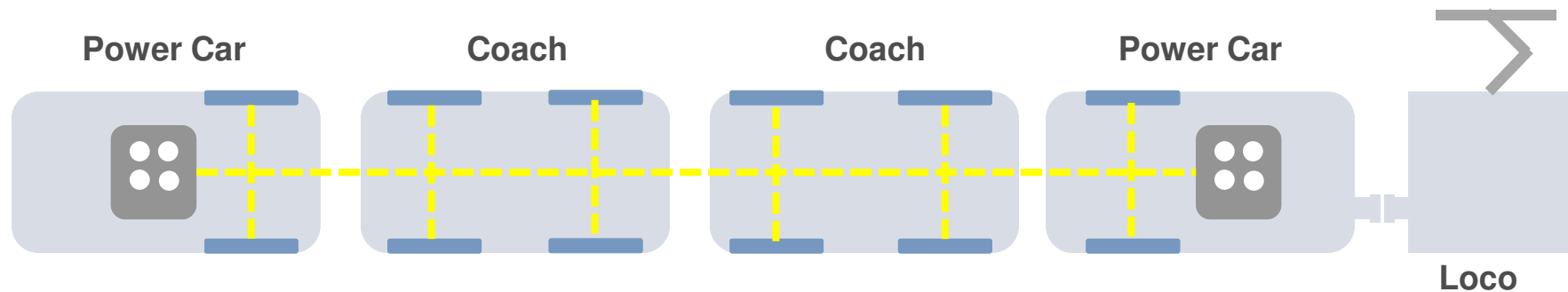
## Agenda

- **Door Control System (Train wide)**
- **Functions of Guard Panel**
- **Architecture / Block Diagram of System**
- **Components (Junction Box, Guard Panel, Connector)**
- **Simulator Presentation**
- *Questions / Answers*



# LHB coaches – Automatic Door Control System

## Door Control System



- Per Power Car:
  - 1x Guard Panel
  - 2x Automatic Plug Slide Doors

- Per Coach:
  - 4x Automatic Plug Slide Doors



*Guard Panel*



*Autom. Plug Slide Door*



*Train Lines*



# LHB coaches – Automatic Door Control System

## Guard Panel Functions

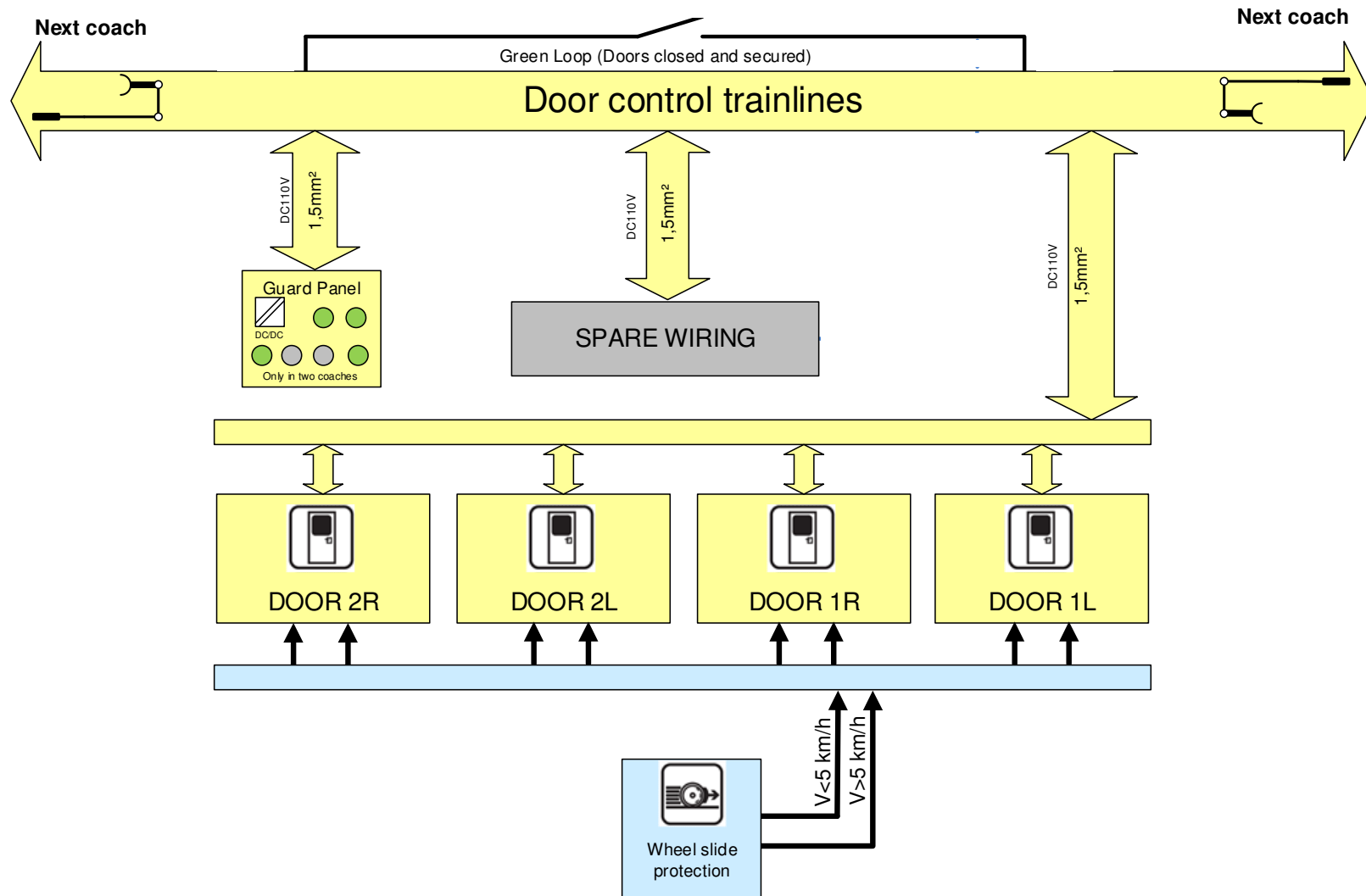
Function	Illumination
1 Key Switch ON / OFF	×
2 Other Panel Enables	●
3 Indicator Test Button	×
4 Release Left Button	●
5 Open Doors Button	×
6 Release Right Button	●
7 All Doors Closed Loop	●
8 Close All Doors Button	●
9 Open / Close Guard Door	×
	×

Guard Panel



# LHB coaches – Automatic Door Control System

## Block Diagram



# LHB coaches – Automatic Door Control System

## Agenda

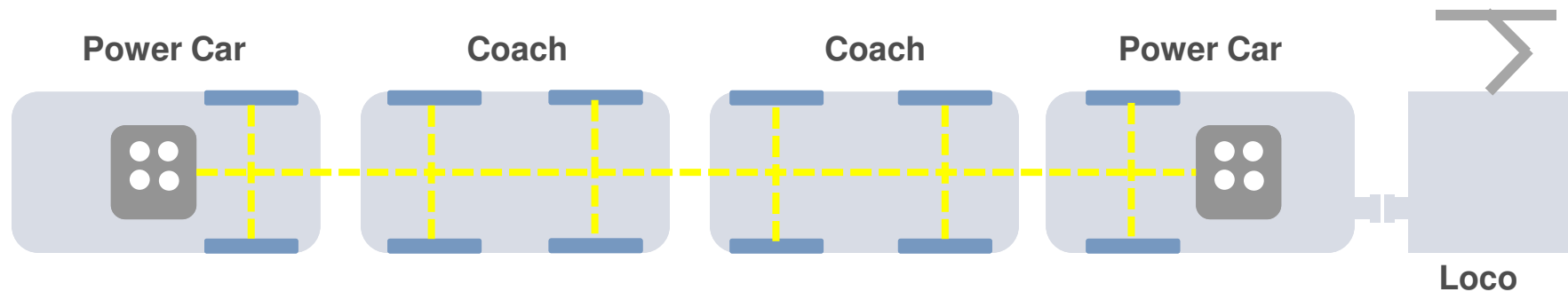
- **Door Control System (Train wide)**
- **Functions of Guard Panel**
- **Architecture / Block Diagram of System**
- **Components (Junction Box, Guard Panel, Connector)**
- **Simulator Presentation**
- *Questions / Answers*





# LHB coaches – Automatic Door Control System

## Door Control System



- Per Power Car:
  - 1x Guard Panel
  - 2x Automatic Plug Slide Doors

- Per Coach:
  - 4x Automatic Plug Slide Doors



*Guard Panel*



*Autom. Plug Slide Door*



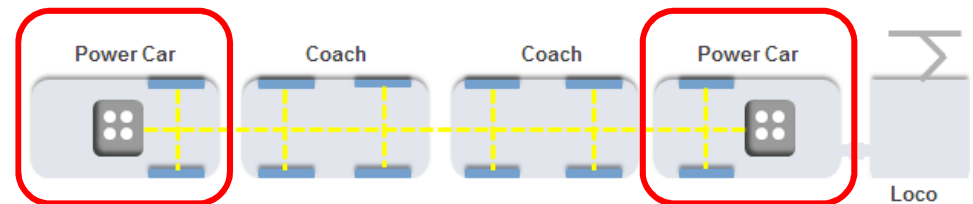
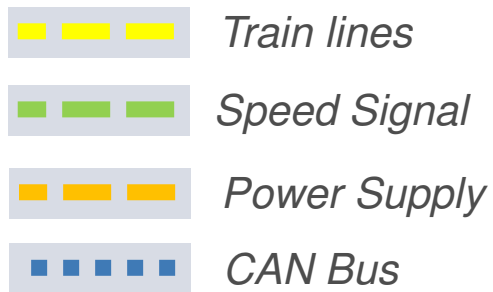
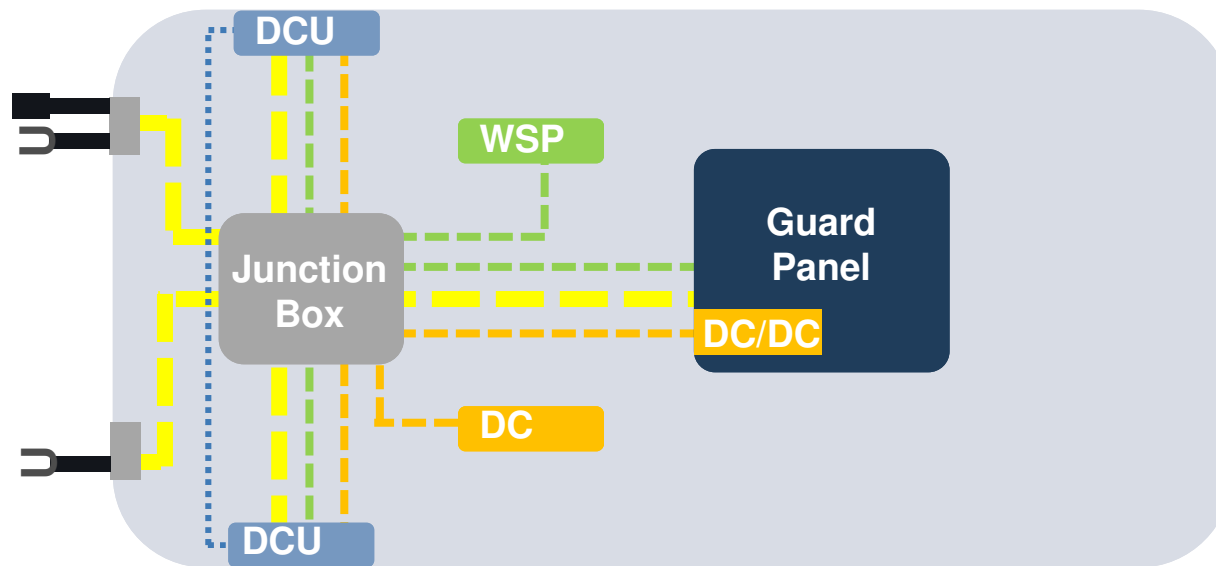
*Train Lines*



# LHB coaches – Automatic Door Control System

## Architecture of System / Block Diagram

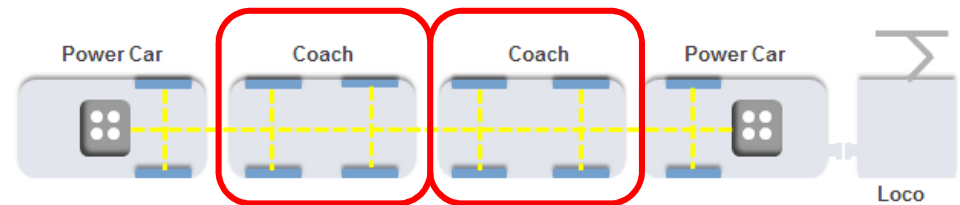
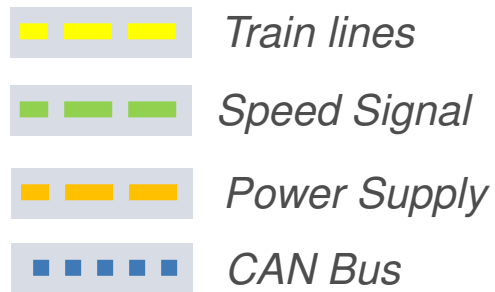
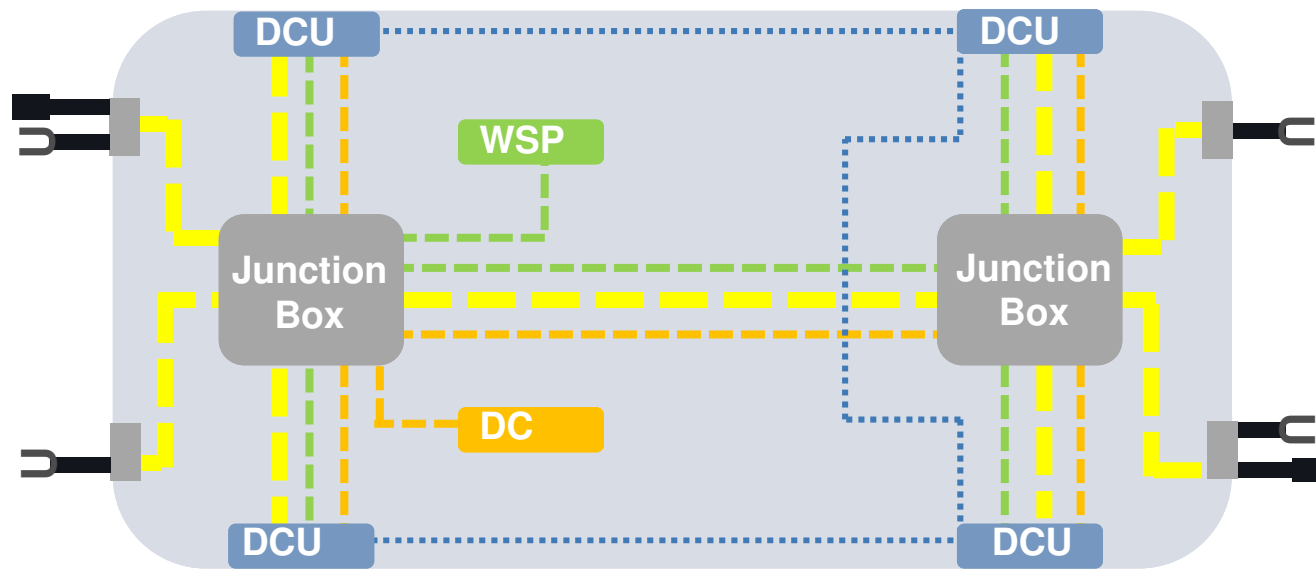
### Power Car



# LHB coaches – Automatic Door Control System

## Architecture of System / Block Diagram

### Intermediate Coach





# Green Loop Emergency Brake

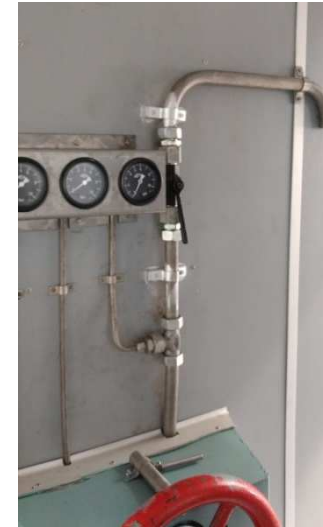
## LHB coaches – Automatic Door Control System

### Green Loop Emergency Brake

- To meet the passenger safety requirement pertain to the operation of automatic doors
- This system will prevent the train from moving by applying penalty brake if all doors are not closed.
- This system is active only in the active Guard Panel



## System Requirement



- The door system will be controlled by a guard panel which is installed in the power cars, (2 power cars per rake) whereas only one guard panel will be active.
- The status of the doors (open / closed ) is monitored by a so called green loop.
- When all doors are closed the guard will be informed by an indication lamp on the guard panel.
- Only after he got this indication, he will give the loco driver a signal (e.g. by flag) that the train is ready to start operation.
- Without being sure that all doors are closed the train is not allowed to start operation.
- In order to prevent that the train will operating with open doors, an emergency brake would be applied automatically.



## Condition for Automatic Brake Application

The brakes of the train (indirect brake) should be automatically activated when:

- Green loop signal is LOW (at least one door in consist is open) AND speed signal is HIGH (V 5 kmph).
- This safety function would only be active on the active guard panel.
- Once these trigger events have been given - the automatic brake (venting of brake pipe) would remain active (=locked)
- The automatic brake can only be reset (unlocked) manually by the guard, after ensuring that all doors are closed and everything is OK.
- The automatic brake will be generated by venting the brake pipe.
- This venting shall happen by a high-flow valve with big cross section (e.g. emergency brake valve).
- It would be possible to completely deactivate the function manually by a switch or a handle bar (i.e. isolation cock).
- The brake pipe shall be vented down to 0 (Zero) bar for brake application.







# LHB coaches – Automatic Door Control System

## Simulator



Off On

Other Panel enabled

Blind cap

Release Left

Open released doors

Release Right

All doors closed loop

open/close guard door

close all doors

The left control panel features a vertical slider switch labeled 'Off' and 'On'. Below it are nine circular buttons arranged in a 3x3 grid. The buttons are labeled: 'Other Panel enabled', 'Blind cap', 'Release Left', 'Open released doors', 'Release Right', 'All doors closed loop', 'open/close guard door', and 'close all doors'.

Speed

0 km/h

The speed control panel has a digital display showing '0 km/h' and two triangular buttons (up and down) for speed adjustment.

Off On

Other Panel enabled

Blind cap

Release Left

Open released doors

Release Right

All doors closed loop

open/close guard door

close all doors

The right control panel is identical to the left one, featuring a vertical slider switch and nine circular buttons with the same labels.



**Rail Coach Factory**  
*Serving customers with a smile*



**Thank you for your attention**