# MÜNCHEN TO ROSENHEIM



Release Version 1.0

# CONTENTS



# 1 ROUTE INFORMATION

## 1.1 History

The 40 mile (65km) section of the München to Rosenheim railway connects the German cities of München and Rosenheim to the Austrian cities of Vienna and Salzburg via the Rosenheim-Salzburg railway. It also connects the two German cities to the Austrian city of Innsbruck via the Kufstein line and continues along the Brenner line to Verona, Italy. The route is also a key corridor of the Trans-Europ - Express and The Orient Express.

Built between 1860 and 1871, initially as a single-track route into Austria from Germany, the line was increased to two tracks and formed the main line trunk between Austria and Germany.

The line increased in popularity over the following years that traffic continued to increase and ultimately, by the time World War I occurred, there were as many as 50 trains a day.

During World War I, traffic on the line was severely limited and journey times increased dramatically. This was due to slower military trains on the line and the coal shortage, which caused the cancellation of many scheduled trains. The line returned to pre-war standards during the 1920's.

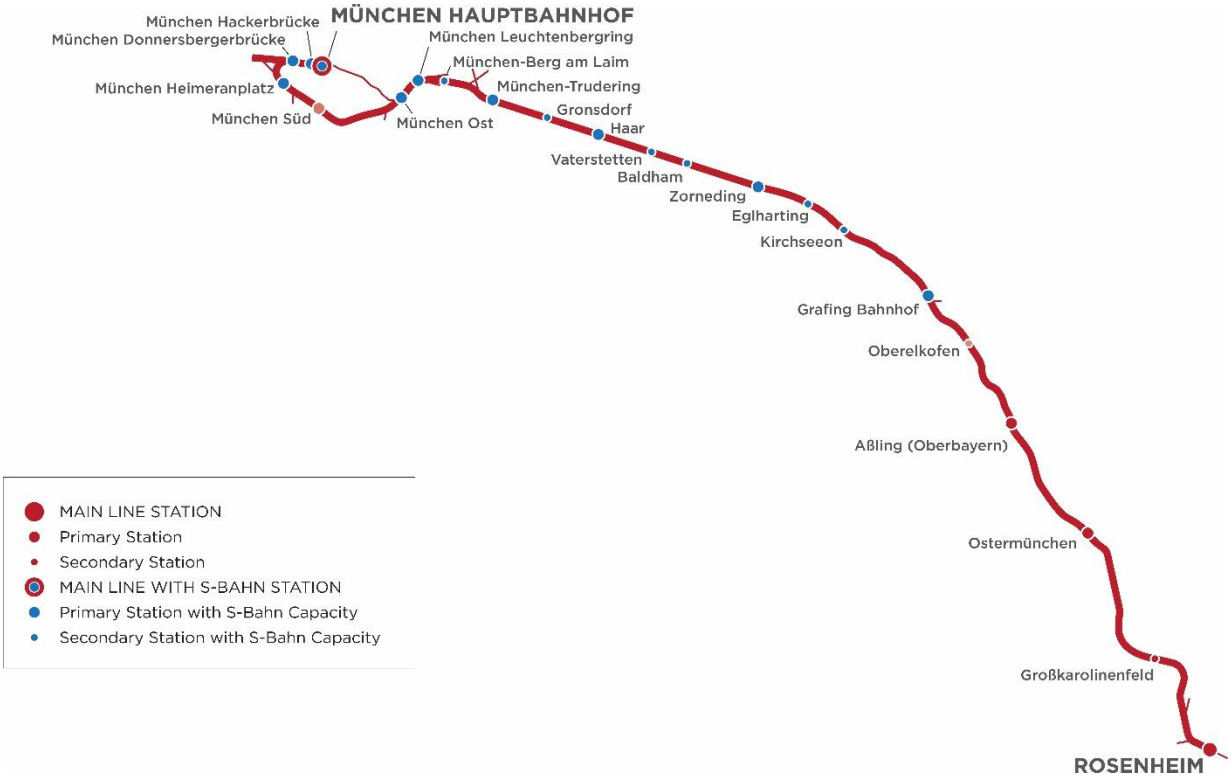
In World War II, passenger services were again severely reduced. During this period, the line was mainly used by the military to travel towards Eastern Europe and a delousing and "rehabilitation" facility was built at Rosenheim.

Today, there are multiple services that operate along this route. The Route DLC (downloadable content) we have provided covers a large section of the S-Bahn S4 and spans from München Pasing to Grafing Bahnhof, stopping at 22 different stations.

## 1.2 The Route

The München to Rosenheim Railway is a scenic route with electrified track along its length. There are multiple services that operate on this route in the modern day. With this route DLC we have provided a large section of the S-Bahn S4, stopping at 22 stations, from München Pasing to Grafing Bahnhof. There is also a mainline service operating out of München Hauptbahnhof that serves 7 stations, terminating in Rosenheim.

The route is varied; ranging from the busy city in the North, to the quiet picturesque country in the South.




## 1.3 Focus Time Period

The time period for this Route DLC is based around the present day (2015).

## 1.4 Rolling Stock

In place of the privately owned Meridian stock that normally operates on this route, we have provided the BR 423 S-Bahn commuter train in DB red livery and the DB BR101 with the IC coaches.

# 2 GETTING STARTED

## 2.1 Recommended Minimum Hardware Specification

The München to Rosenheim route is highly detailed, feature rich and incorporates detailed night lighting. Therefore, it will benefit from a higher PC specification.

- Windows Vista / Windows 7 / Windows 8
- Processor: 2.8 GHz Core 2 Duo (3.2 GHz Core 2 Duo recommended), AMD Athlon MP
- RAM - 2.0GB
- GFX - 512 MB with Pixel Shader 3.0 (AGP PCIe only)

SFX - Direct X 9.0c compatible

# 3 THE DB BR423


The BR 423 is an Electric Multiple Unit (EMU) made for the S-Bahn commuter networks of Germany (München S-Bahn, Cologne S-Bahn, Frankfurt S-Bahn and Stuttgart S-Bahn).

The BR 423 is similar to its predecessor, the BR 420 DMU. However, the BR 423 benefits from being lighter and from having one large passenger compartment, unlike the BR 420 which is divided into three.

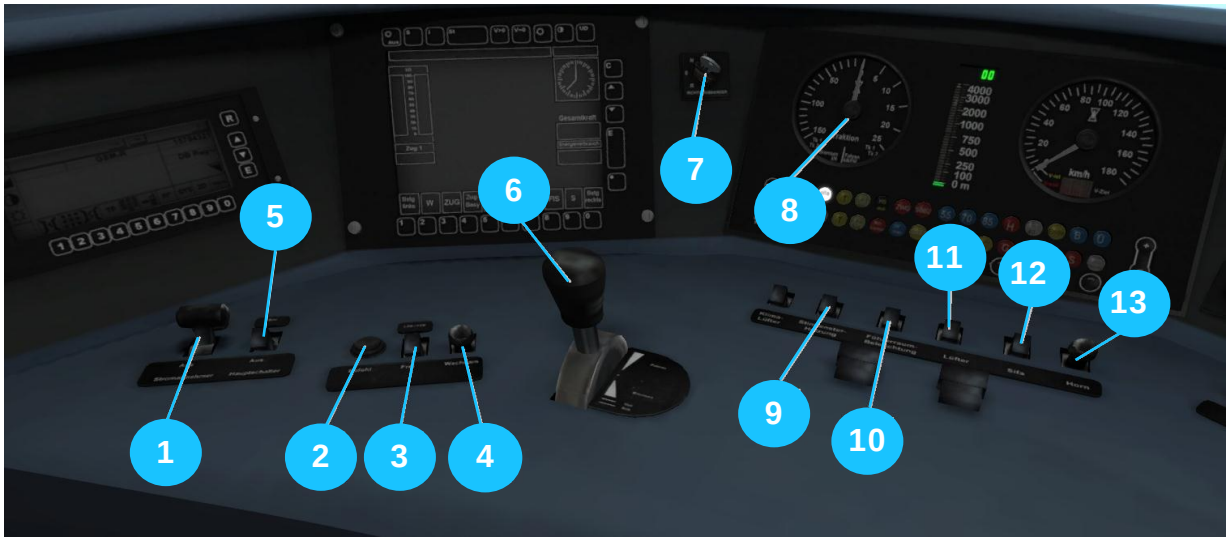
The BR 423 EMU is comprised of four cars which share three Jacobs bogies. These cars can only be separated at a maintenance facility. The two driving cars are each designated BR 423 and the two inner cars are designated BR 433.

The BR 423 EMU typically runs as either the four-car set, or as two four-car sets coupled together.

## TECHNICAL DATA

| | |
|---|---|
| **Total Built** | 462 |
| **Weight** | 105t |
| **Length** | 221ft / 67.4m |
| **Engine Power** | 3,393Hp (2,350kW) |
| **Max Speed** | 87mph (140km/h) |

## 3.1 Cab Controls




1 – Pantograph Up/Down
2 – PZB Befehl40 (Override)
3 – PZB Frei (Release)
4 – PZB Wachsam (Acknowledge)
5 – Start
6 – Throttle and Brake Lever
7 – Reverser
8 – Traction Effort Meter
9 – Cab Light
10 – Sander
11 – Headlights
12 – Sifa Reset
13 – Horn


1 – Speedometer
2 – Wipers
3 – Brake Pressure Dials
4 – Emergency Brake

## 3.2 Keyboard Guide

| Key Equivalent | Action |
|---|---|
|  | **Throttle.** Increase or Decrease Throttle. |
|  | Request Permission to Pass Signal Ahead. |
|  | Request Permission to Pass Signal Behind. |
|  | Change state of Junction Ahead / Behind. |
|  | **Reverser.** Move reverser control Forward or Backward. |
|  | **Horn.** Press once to sound the Horn. |
|  | **Load/Unload.** Press once to load/unload passengers. |
|  | **Headlights.** Turn headlights On / Off. |
|  | **Pantograph.** Raise and lower the selected pantograph. |
|  | **Emergency Brake** |
|  | **Windscreen Wipers.** Press once to switch on and again to switch off. |
|  | **Couple manually** |
|  | **Sifa Toggle** |
|  | **Sifa Acknowledge** |
|  | **LZB Toggle** (only needed for Non-LZB routes) |
|  | **LZB Automatic Brake Intervention Toggle** |
|  | **PZB Toggle** |
|  | **PZB Wachsam (Acknowledge)** |


**PZB Frei (Release)**


**PZB Befehl40 (Override)**


**Cab Lights.** Toggle the Cab lights on and off.


**Handbrake.** Press to toggle the train Handbrake on and off.


**(Expert) Sander.** Causes sand to be laid on the rails next to the wheels to assist with adhesion. Press and hold to activate sander, let go to stop.

# 4 THE DB BR101


First built in 1996, the 101 is Deutsche Bahn's star locomotive. It is used across most of Germany for express passenger travel. Able to achieve speeds of up to 220 km/h, the 101 is also among the fastest locomotives on the German Network.

The first 101 was delivered in 1996 and quickly earned a reputation for speed and reliability. The modern body design and advanced electronic systems made the BR101 a very efficient and economical train. Soon after its introduction, duties were quickly moved to Intercity routes and many InterRegio trains were pulled by this locomotive.

Despite production ending in 1999, the 101 is still at the forefront of reliable and efficient high-speed operations today. This all-purpose locomotive works fast passenger and freight trains alike and it has met the expectations of Deutsche Bahn throughout its service.

## TECHNICAL DATA

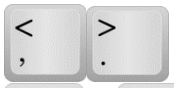
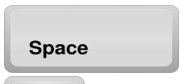
| | |
|---|---|
| **Total Built** | 145 |
| **Weight** | 83t |
| **Length** | 62'8" (19m) |
| **Engine Power** | 8,583Hp (6,400kW) |
| **Max Speed** | 136.7mph (220km/h) |

## 4.1 Cab Controls

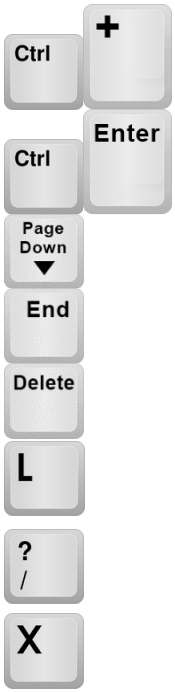

1 – PZB Befehl40 (Override)
2 – PZB Frei (Release)
3 – PZB Wachsam (Acknowledge)
4 – AFB Control Lever
5 – Power Handle
6 – Headlights
7 – Sander
8 – Instrument Lights
9 – Cab Lights
10 – Traction Effort Meter
11 – Speedometer
12 – Pantograph Up/Down
13 – Reverser


1 – Train Brake
2 – Dynamic Brake
3 – Direct Brake
4 – Horn
5 – Brake Pressure Dials

## 4.2 Keyboard Guide

| Key Equivalent | Action |
|---|---|
|  | **Throttle.** Increase or Decrease Throttle. |
|  | **Train Brake.** Increase or Decrease Train Brake. |
|  | **Direct Brake.** Increase or Decrease Direct Brake. |
|  | **Dynamic Brake.** Increase or Decrease Dynamic Brake. |
|  | **AFB.** Increase / Decrease AFB. |
|  | **Reverser.** Move reverser control Forward or Backward. |
|  | Request Permission to Pass Signal Ahead. |
|  | Request Permission to Pass Signal Behind. |
|  | Change state of Junction Ahead / Behind. |
|  | **Horn**. Press once to sound the Horn. |
|  | **Load/Unload.** Press once to load/unload passengers or freight. |
|  | **Headlights.** Turn headlights On / Off. |
|  | **Pantograph.** Raise and lower the selected pantograph. |
|  | **Emergency Brake** |
|  | **Windscreen Wipers**. Press once to switch on and again to switch off. |
|  | **Couple manually** |
|  | **Sifa Toggle** |
|  | **Sifa Acknowledge** |
|  | **LZB Toggle (only needed for Non-LZB routes)** |




**LZB Automatic Brake Intervention Toggle**

**PZB Toggle**

**PZB Wachsam / Acknowledge**

**PZB Frei / Release**

**PZB Befehl40 / Override**

**Cab Lights.** Toggle the Cab lights on and off.

**Handbrake.** Press to toggle the train Handbrake on and off.

**(Expert) Sander.** Causes sand to be laid on the rails next to the wheels to assist with adhesion. Press and hold to activate sander, let go to stop.

# 5 SIFA

Sifa is short for Sicherheitsfahrschaltung or “Safety Driving Switch”.

The Sifa vigilance alarm is disabled when starting a scenario, but can be activated (or deactivated) by pressing ‘Shift+Enter (Numpad)’. While activated, the Sifa light on the cab dashboard is switched off. The driver is required to acknowledge the alarm every 30 seconds if the train is moving.

When the 30 second alarm is triggered, the Sifa light on the cab dashboard will illuminate. After an additional 4 seconds, an audible alert will sound. Following a further 2.5 seconds, the emergency brake will be applied. This can be avoided by acknowledging the alarm at any stage. This can be done by pressing the ‘Enter (Numpad)’ key.

## 5.1 Key Controls

| Function | Keyboard |
|---|---|
| Activate/Deactivate | Shift+Enter (Numpad) |
| Alarm Acknowledge | Enter (Numpad) |

# 6 PZB SIGNALLING SYSTEM

PZB stands for Punktförmige Zugbeeinflussung. Loosely translated to English, this means “intermittent train protection”.

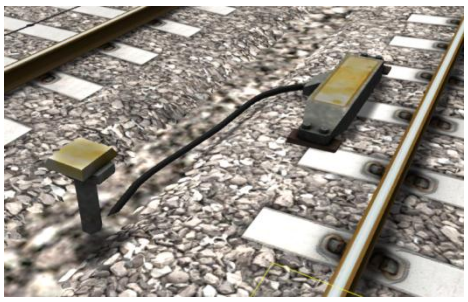
Safe distances between trains are managed conventionally through the use of block-based systems.

A given line is broken up into a series of blocks and trains are permitted (via green or yellow signals) to enter a block. While a train is present in a block the signal permitting entry is set to red, preventing any more trains to enter.

As railways have developed, more complex control systems and in-cab signalling have been implemented to improve the safety of the railways. To ensure that drivers are fully aware of what is happening around them, they are required to react to various alert systems depending on the situation.

PZB is a complex system that demands a very good understanding of the varying speed limits and the requirements to respond promptly to the signalling system.

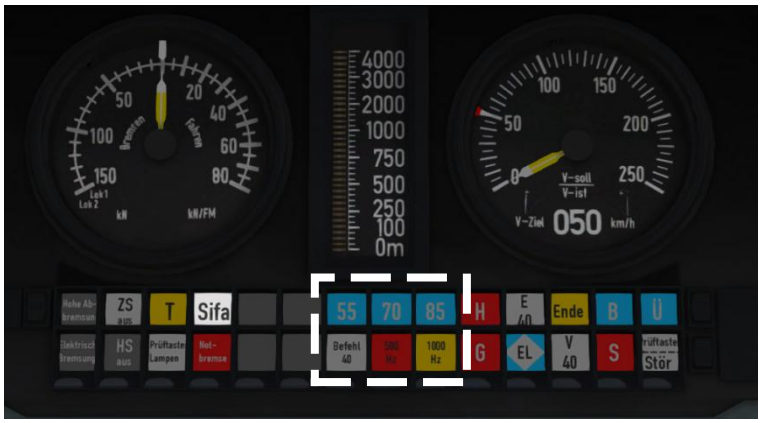
## 6.1 PZB Track Interface



The PZB system incorporates in-cab signalling. This is where the control desk has indicators, alarms and buttons that will react according to the signalling status on the railway. The mechanism by which this works is a series of “balise” magnets placed on the side of the track. An example of one of these magnets is shown in the image on the left.

## 6.2 In-Cab Indicators

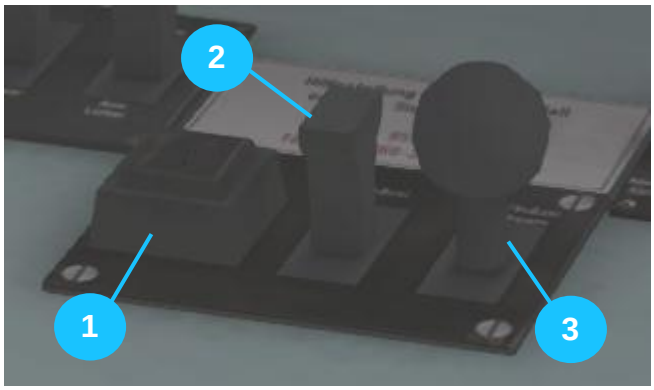
Inside the cab, there are lights indicating the current state of the PZB system (as shown in the diagram below):




Take a look at the picture above. The section inside of the white dashed box shows the lights related to the PZB. It would be worth noting that the controls in the DB BR146 are similar but are not identical.

## 6.3 Cab Controls

There are also three controls on the cab desk that you can use to interact with the PZB system.




PZB controls on the Cab Desk of a BR101 (other locomotive controls would be similar but not identical)

These three controls, to the left of the control desk on the BR101, are named as follows:

1 – German: Befehl40 / English: PZB Override
2 – German: PZB Frei / English: PZB Release
3 – German: PZB Wachsam / English: PZB Acknowledge

## 6.4 Train Types

The type of train you are driving is important in understanding how the PZB system works. It's also important to have a good understanding of the impact the PZB system has on the various speed limits.

There are three types of train that PZB deals with:

Type O (Obere) - Passenger trains
Type M (Mittlere) – Faster Freight Trains
Type U (Untere) – Slow / Heavy Freight Trains

The implementation of the PZB system within locomotives on the München to Rosenheim route automatically identifies the correct type of train. This is based on the train type configurations in the scenario. Once PZB is active you can see this in the PZB lamps as follows:

Type O – Lights up the 85 lamp
Type M – Lights up the 70 lamp
Type U – Lights up the 55 lamp

## 6.5 Key Controls

| Function | Keyboard |
|---|---|
| Activate/Deactivate | Ctrl+Enter(Numpad) |
| Acknowledge | Page Down |
| Release | End |
| Override | Delete |

## 6.6 Example

For this example, we are driving a passenger train. The speed limits indicated in this example are therefore specific to a Type O service and will be different to the two other services.


There are three primary points noted in the diagram above:

A – The Distant Signal is usually around 1.2km from the hazard (such as a converging junction).
B – A point usually about 250m before the Guarding Signal.
C – The Guarding Signal is normally placed around 200m before the hazard.

Let's take a look at what happens in this simple example. We begin on the left hand side of the image above and progress along the track until you get to the Guarding Signal on the right. We'll assume that in this case there is a converging junction set against us and therefore the Guarding Signal is indicating that you should stop.

As you approach point A, the Distant Signal will show a yellow light to let you know that the signal at C is a red light, indicating danger.

You will also notice that there is a magnet next to this signal. This is called a 1000hz magnet.

As the signal is at anything other than a green light, the magnet will energise and the PZB system on-board the train will sense its presence. As the train passes over the 1000hz magnet, the driver has up to 4 seconds in which to press the PZB Wachsam/ Acknowledge key (Page Down). If the driver fails to do this, the PZB system will apply the emergency brakes in order to stop the train.


Note that there is no alert in the cab when we pass over the 1000hz magnet. This is because the driver is expected to be aware that they have passed a Distant Signal and react accordingly. Once the PZB Wachsam/ Acknowledge control is pressed, the display will update to indicate that the locomotive is now in a monitored state. As we are a Type O train, the 85 light and the 1000hz light will be activated.

We must not be exceeding 165km/h (103m/h) as we pass the 1000hz magnet, regardless of the line speed. If we are, there is a good chance we will not be able to fully stop before the signal at point C. Therefore, the PZB system will apply the emergency brakes.

We now have 23 seconds in which to decrease our speed to 85km/h (53m/h). If after 23 seconds we are exceeding this speed then the PZB system will apply emergency brakes.

We now continue on towards the guarded signal at no greater than 85km/h (53m/h).

After 700 meters, the 1000hz lamp will go out and we will no longer be monitored. Now the driver can make a decision based on what they can see. Can you see the Guarded Signal and is it still red, indicating danger?

If it is, then we continue slowing down to stop. If the signal is now showing a clear aspect because the hazard has cleared, the driver has the option to release the locomotive from monitoring and they will then be permitted to return directly to line speed. Press the PZB Frei / Release button to do this *before* the train reaches point B or further restrictions are put in place.

Caution: Be careful to ensure that you only release when the signal is clear. If you release and the signal is not clear when you reach Point B the system will assume that you are incapable of safely driving the locomotive and will apply the emergency brakes.

Assuming the signal is still at danger and we haven't released from monitoring, we will then reach Point B. At Point B there is another track magnet; the 500hz magnet.


As we pass the 500hz magnet, we must have slowed down to 65km/h (40m/h) or else we might not be able to stop in time for the signal. If that's the case, the PZB system will apply the emergency brakes. There is no need to acknowledge the 500hz magnet. At this point, the 500hz light on the control desk will activate, indicating the current restriction.

After passing the 500hz magnet, we must now decelerate to 45km/h (28m/h) within 153 meters.

Having slowed down to 45km/h (28m/h), we can draw up safely to the red signal and stop.

If the signal changes to a clear aspect while we are approaching, then we must continue with the 45km/h (28m/h) speed limit as we are still being monitored. It is not possible to release (PZB Frei) from monitoring while under a 500hz restriction. This restriction will continue for 250 meters, taking you past the Guard Signal, after which you will be able to return to line speed. This is the primary reason for releasing from monitoring before Point B (if and only if the signal is seen to be clear), otherwise you would be tied to running past the clear signal at the much reduced speed limit for an extra 250 meters instead of being able to return to normal line speed earlier.

If you pull up to the signal and stop because it is still red you may seek to obtain permission from the controller to pass it at danger. If you need to pass a signal that is still showing a red aspect then you will need to use the Befehl40 (Override) key to do so as you approach the red signal.

At Point C the Guard Signal has the third and final type of magnet, a 2000hz magnet. This magnet will *always* stop the train if passed and is used to stop trains that pass the signal while it is at danger. Pressing and holding Befehl40 (Override) key *stops* the PZB system from reacting to the 2000hz magnet. Once the 2000hz magnet is detected, the Befehl40 lamp comes on and you will then be restricted to a speed limit of 40km/h (25m/h). You should remain at this speed until either you have travelled for 2km, or you have passed a signal showing a clear aspect. Once either of these conditions pass you can press PZB Frei to release from monitoring and return to line speed.

## Alternately Flashing PZB Indicators

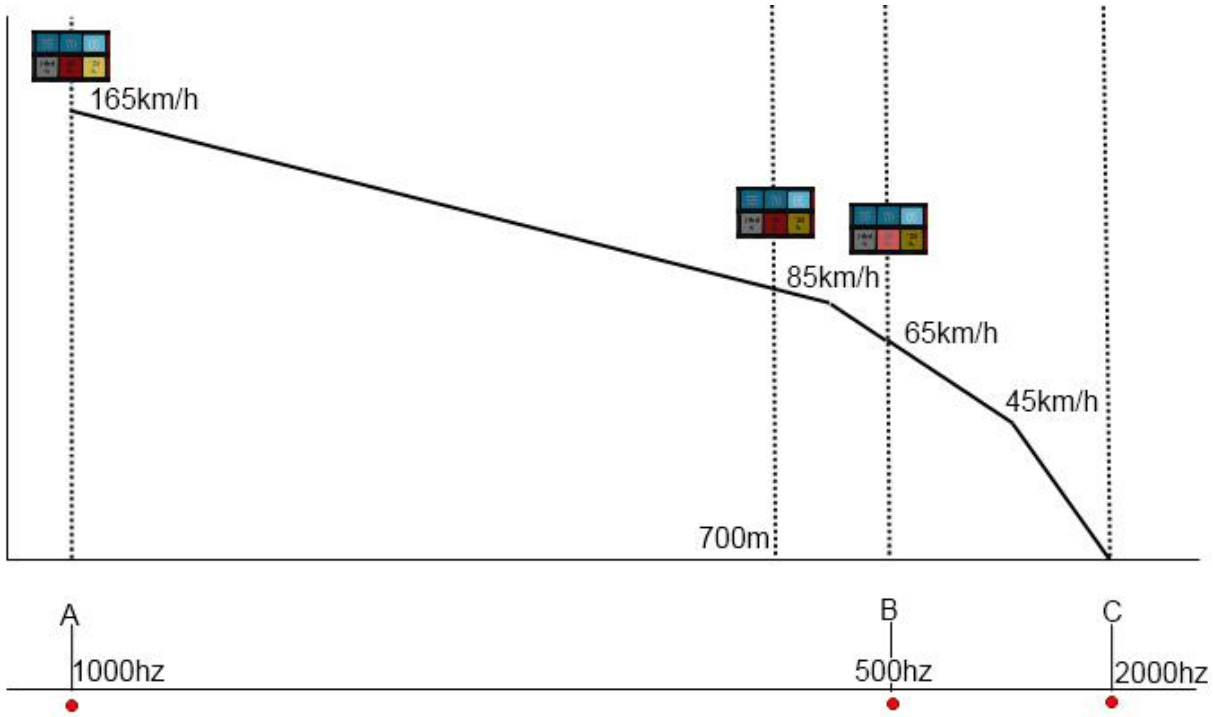
There is an additional state called Restricted Monitoring, which may engage while you are travelling under the control of either the 1000hz or 500hz magnets. If you travel below 10km/h for more than 15 seconds or you stop completely at any point, the PZB display will start alternating between two of the speed lamps such as the 70 and 85 lamps, to indicate that restricted monitoring is now in place. Under these circumstances the speed limits to be imposed are reduced further. Full details about speed limits for all types of trains in both normal and restrictive monitoring are below.

## PZB Speed Restrictions by Train Type

| Type of Train | Normal Monitoring | | Restrictive Monitoring | |
|---|---|---|---|---|
| | **1000hz** | **500hz** | **1000hz** | **500hz** |
| **O (Obere)** | 165km/h -> 85km/h In 23 seconds | 65km/h -> 45km/h In 153 meters | 45km/h constant | 45km/h -> 25km/h in 153 meters |
| **M (Mittlere)** | 125km/h -> 75km/h in 26 seconds | 50km/h -> 35km/h In 153 meters | 45km/h constant | 25km/h constant |
| **U (Untere)** | 105km/h -> 55km/h In 34 seconds | 40km/h -> 25km/h In 153 meters | 45km/h constant | 25km/h constant |

## Example Run Graph

Here's a graphical layout of what happened in our example run, indicating the magnets, speed limits and what you would expect to see in the PZB indicator lamps.



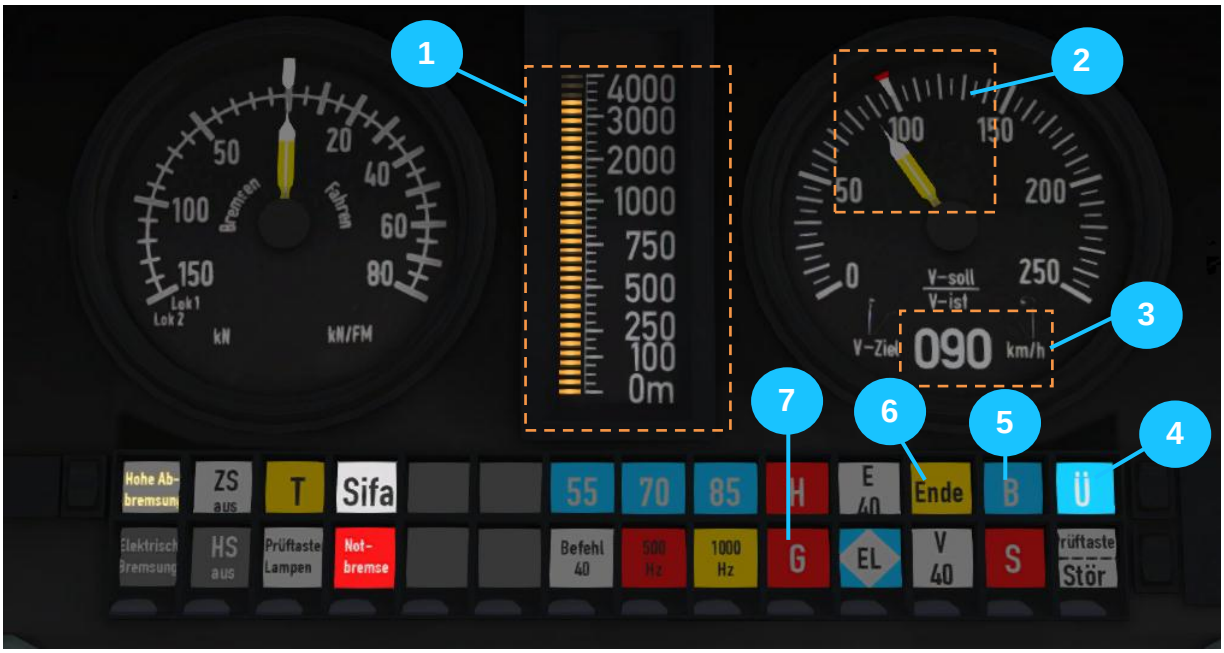

 

# 7 LZB SIGNALLING SYSTEM

The restriction of conventional block signalling is based on the amount of time taken by trains to ensure they can stop from their first notification of a signal at danger. This affect the maximum speed that trains can operate. The speed is determined by the length of the block. Unfortunately, while lengthening the block can allow trains to run faster, it means that fewer trains can run as the gaps between them get progressively longer.

The modern solution to this problem is to change from fixed block signalling to a dynamic sliding block that protects a range in front of the locomotive, which changes as the locomotive moves.

LZB is controlled by a central control station; each one monitors approximately 100 kilometres of line and informs the on-board LZB computer what speed is being imposed. The following image shows the displays related to LZB functionality on a BR101 locomotive cab dashboard. Note that the displays are standard across all LZB capable locomotives.




In the above example, LZB has been enabled and we can see the following:

1 – Distance to next speed change
2 – Target speed taking in to account LZB speed restrictions
3 – Target speed in digit form
4 – Indicator that LZB mode is enabled
5 – Automatic Brake Intervention enabled if lit
6 – LZB mode terminating if illuminated
7 – Overspeed Indicator


LZB is automatically enabled as you pass one of the LZB posts, as shows in the picture on the left.

If PZB is being used then it is automatically disabled and LZB gets switched on automatically.

If your AFB control is set to 0 (disabled) then the LZB system is simply there to instruct you on what to do. If AFB is being used then the target speed will be the lowest of your AFB setting and the current LZB speed restriction.

LZB mode will be automatically disabled when the train passes over an LZB termination balise such as the one shown in the picture on the right. If the PZB system was enabled previously, it will be switched back on when the LZB system is switched off.

You get an in-cab warning that LZB mode is terminating approximately 1.7km before it actually ends, with the “Ende” light illuminating and an audible alarm. This warning must be acknowledged by pressing the PZB Frei / Release button or the “End” key on the keyboard – if you do not and LZB Automatic Brake Intervention is enabled then the emergency brakes will be applied.

# 8 AFB TRAIN POWER CONTROL

AFB stands for Automatische Fahr- und Bremssteuerung – or loosely translated in to English it means "Automatic Driving and Braking Control"

AFB allows the driver of the locomotive to set the target speed and then the computer in the locomotive will apply the throttle to obtain that speed. The computer will keep applying throttle or brake in order to maintain the target speed. You can almost think of it as a kind of Cruise Control for trains.

To operate AFB, simply follow these steps:

1. Set the AFB control to the desired speed. Note on the speedometer a small red triangle “bug” will slide around to the configured speed.

2. Release the brakes.

3. Move the throttle control to the desired level of acceleration. At this point the train will begin moving and accelerate to the configured speed.

All speed changes should be managed with the AFB control. Simply change the target speed as required and the AFB Computer will apply throttle and brakes appropriately.

If you wish to come out of AFB control and return to manual control; simply set the target speed to 0km/h and then the throttle and brake controllers will return to normal manual functionality.

## 8.1 Key Controls

| Function | Keyboard |
|---|---|
| Increase | Y |
| Decrease | C |

# 9 SCENARIOS

## 9.1 Haven't the Foggiest

**Loco:** DB BR101 DBAG Red

**Season:** Winter

**Weather:** Foggy

**Description:** A Regionalbahn passenger service between Rosenheim and München. The weather is poor and you are following a delayed express.

## 9.2 Morning Run

**Loco:** DB BR101 DBAG Red

**Season:** Summer

**Weather:** Clear

**Description:** An express run between München and Rosenheim to give you a flavour of the route.

## 9.3 Rush Hour Challenge

**Loco:** DB BR101 DBAG Red

**Season:** Autumn

**Weather:** Foggy

**Description:** A Regionalbahn passenger service between Rosenheim and München. The preceding service reported having power issues at Rosenheim. Hopefully this won't cause any problems!

## 9.4 Going Underground

**Loco:** DB BR423

**Season:** Autumn

**Weather:** Stormy

**Description:** It's a typically busy day on the München S-Bahn. The first part of this two-part scenario takes place between München-Pasing and Ostbahnhof. The timetable is tight!

## 9.5 Morning Haze

**Loco:** DB BR423

**Season:** Summer

**Weather:** Overcast

**Description:** Drive an empty DB BR423 from the EMU depot at Berg am Laim to München Hbf where the train will begin a morning regional service.

## 9.6 S-bahn Run

**Loco:** DB BR423

**Season:** Spring

**Weather:** Clear

**Description:** It's a pleasant spring morning as we head between Grafing and München Hbf (Tier) on an all stations S-Bahn service.

## 9.7 Southbound S-Bahn

**Loco:** DB BR423

**Season:** Autumn

**Weather:** Stormy

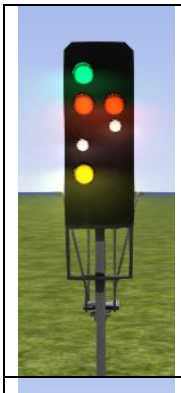
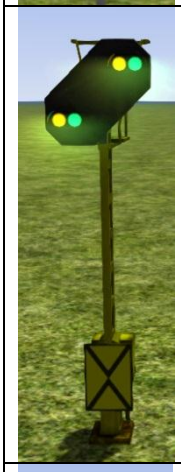
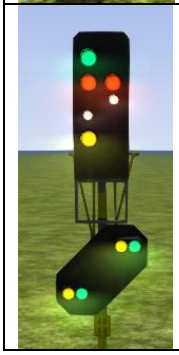
**Description:** Part two of the S-Bahn scenario sees the action take place between Ostbahnhof and Grafing. The timetable is still tight and the weather hasn't improved!

# 10 SIGNALLING

The signalling system employed on German Railways is extremely complex to understand at first; however, in reality each signal you encounter will be composed of one or more straight forward signals to give the final post.

This manual doesn't attempt to cover all the possible signal types and variations, but it should provide sufficient background as to let you work out what each signal post you come across is telling you by explaining the component parts. Note that any signal of a given type that you see should be interpreted the same whether it is on a post, on the ground, on a gantry or in any other position.

In the examples below, the image shows the signal with all lights on so that you can clearly see where they are. The description of the signal describes the various combinations of lights and what they mean when lit. The small code before the description is the technical name by which that combination of lights is known.

| | |
|---|---|
|  | **Signal Type: Hp**<br><br>This signal protects entry to a block.<br><br>Hp0 – Red, Stop - do not proceed<br>Hp1 - Green: Clear to proceed<br>Hp2 – Yellow and Green: Caution, Proceed at 40km/h<br>Sh 1 – Red and Double White: Shunting permitted |
|  | **Signal Type: Vr**<br><br>Vr signals are Distant Signal types and indicate to you what you should expect the *next* active signal to be showing.<br><br>Vr0 – Two Yellow – Caution, expect stop<br>Vr1 – Two Green – Expect Clear<br>Vr2 – Green/Yellow – Expect Caution with 40km/h restriction<br><br>Note the "X" post board at the bottom, any signal which has this board is indicating that the signal is to be interpreted as a Distant Signal. If this sign is not present the signal is at a reduced distance for braking and will display a white light on the top left edge. |
|  | **Combined Signal Type: Hp Vr**<br><br>This is an example of a combined signal, in this case the example shown is an "Hp Vr" combination. The functions of the individual signal heads are identical to those expained above but they are placed on the same post. |

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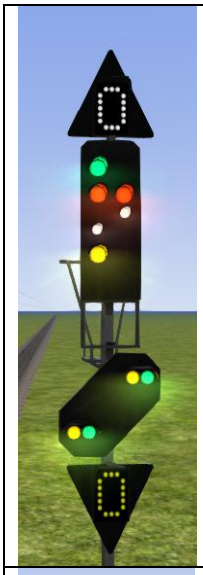
|---|---|
|  | **Combined Signal Type: Hp Vr Zs3 Zs3v**<br><br>An example of how the signalling can begin to look very complex, however this is simply four signal types combined on to one post. Here you can see:<br><br>• permission to enter the next block on the Hp signal,<br>• indication of the signal state for the next signal on the Vr signal<br>• speed restriction starting from this signal via the Zs3 at the top<br>• speed restriction in place from the next signal via the Zs3v at the bottom |
|  | **Combined Signal Type: Vr Zs3v**<br><br>This signal combination combines the distant Vr signal with the speed at the next signal in the Zs3v signal. |
|  | **Signal Type: Hp Shunt**<br><br>This very simple signal will often be found as a ground frame or on a small post and is frequently used in yards and sidings. It has two indications:<br><br>Two Red lights – Stop, do not proceed<br>Two White Lights - Proceed |

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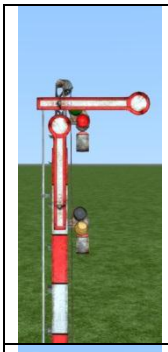
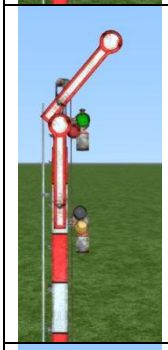
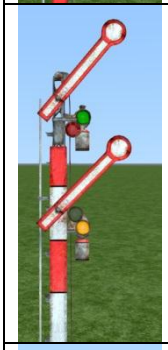
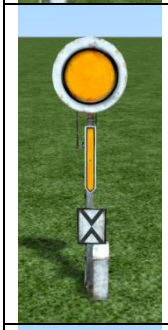
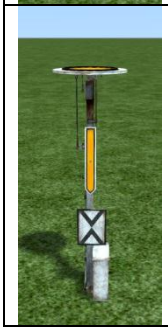
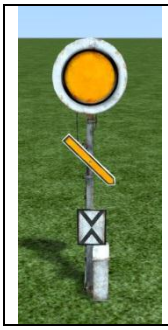
|---|---|
|  | **Signal Type: Hp**<br><br>This signal protects entry to a block.<br><br>Hp0 – Red, Stop - do not proceed |
|  | **Signal Type: Hp**<br><br>This signal protects entry to a block.<br><br>Hp1 - Green: Clear to proceed |
|  | **Signal Type: Hp**<br><br>This signal protects entry to a block.<br><br>Hp2 – Yellow and Green: Caution, Proceed at 40km/h |
|  | **Signal Type: Vr**<br><br>Vr signals are Distant Signal types and indicate to you what you should expect the *next* active signal to be showing.<br><br>Vr0 –Caution, expect stop<br><br>Note the “X” post board at the bottom, any signal which has this board is indicating that the signal is to be interpreted as a Distant Signal. |
|  | **Signal Type: Vr**<br><br>Vr signals are Distant Signal types and indicate to you what you should expect the *next* active signal to be showing.<br><br>Vr1 – Expect Clear<br><br>Note the “X” post board at the bottom, any signal which has this board is indicating that the signal is to be interpreted as a Distant Signal. |

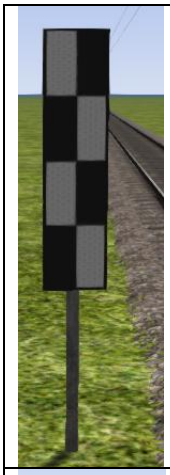


**Signal Type: Vr**

Vr signals are Distant Signal types and indicate to you what you should expect the *next* active signal to be showing.

Vr2 – Expect Caution with 40km/h restriction

Note the "X" post board at the bottom, any signal which has this board is indicating that the signal is to be interpreted as a Distant Signal.



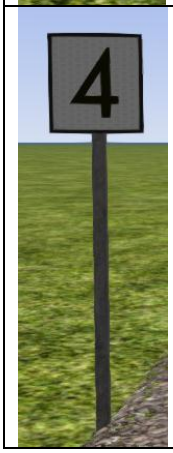
**Post Type: Ne4 Chessboard**

The Ne4 Chessboard is used to tell you that a signal that would normally be at this position has been placed in an alternative location, this could be further away from the track or on the other side of the track.

The Ne4 board is always located where the signal would normally expected to be positioned.


**Post Type: Lf6 Advance Warning Speed Post**

This speed post provides advance warning that a speed limit change is going to take place. In the example shown, the speed will soon be changing to 40km/h. Following an Lf6 you can expect an Lf7 to mark the start of the new speed limit.

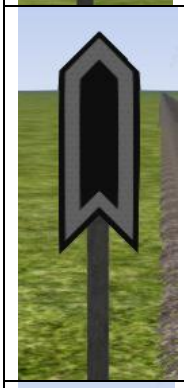



**Post Type: Lf7 Speed Post**

This speed post marks the beginning of a change in speed limit. The example indicated marks the beginning of a 40km/h speed limit and you should not be exceeding this speed as you pass the post.

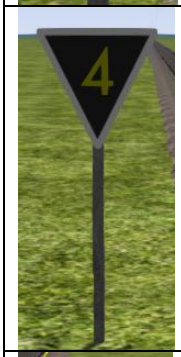

**Post Type: Arrow Indicator**

Where there might be confusion about which track a sign is associated with, a small arrow is placed to indicate which line the information applies to. In this example the Lf7 speed restriction applies to the track on the left of the post.



**Post Type: Zs10 End of Speed Restriction**

This post indicates the end of a speed restriction started by a Zs3.

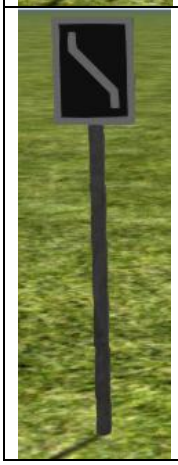


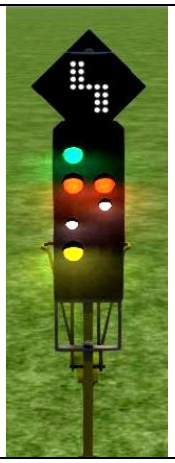

**Post Type: Zs3 Speed Post**

New speed limit takes effect immediately from this point. Shows one white number indicating the tenth the speed allowed from this point. This is normally used in conjunction with main signals. Permanent speed restrictions are instead indicated using Lf type signs.


**Post Type: Zs3v Distant Speed Post**

Shows one yellow number indicating the tenth of the speed allowed from the point where the following Zs3 signal is found. This plate is normally used in conjunction with distant (e.g. Vr) signals.





**Post Type: Zs6 Wrong Line Working**

This track change display is used to indicate that wrong line running (left hand) is to be used from this signal. It is only used in combination with main signals and only on lines where wrong line working is frequent.

# 11 CREDITS

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