



DB Class 181.2 Traffic Red + Hbillns 303 ProLine



Compatible with Train Simulator



DB Class 181 204-9 Traffic Red

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1 Information

1.1 DB Class 181.2

The Class 181.2 is a four-axle dual-voltage system alternating current locomotive. The Class 181.2 itself was originally created for cross border passenger and freight services. They were built from 1974 to 1975 following the 1966 E310 prototypes. Equipped with KWS, a push pull system, the BR181.2 can be used in double formations. No compatible driving trailer was ever built.

1.2 DB Class 181.2 - Functions available in the Simulation

The most important functions are summarised below. (Not all functions are listed)

- ✓ Prototypical driving behavior
- ✓ Tap-changer automatic notch control
- ✓ Monitoring function for important values like voltage, traction motor temperature
- ✓ Manually selection of the pantograph
- ✓ Delayed and smooth regulated e-brake
- ✓ Brake system with overcharging of the main air pipe pressure
- ✓ High braking for the locomotive brakes
- ✓ Realistic PZB90 v2.0
- ✓ Time-Time-Sifa
- ✓ vR EBUa system
- ✓ Switchable instrument lights
- ✓ Desk light and cab light
- ✓ Usable blinds and windows
- ✓ Standard TS2 Effects
- ✓ Extra camera positions
- ✓ vR ZZA compatible
- ✓ Real sounds optimized for EFX

1.3 Technical Data DB Class 181.2

Manufacturer: Krupp, AEG	Build dates: 1974 – 1975
Type: Electric	Wheel arrangement: Bo-Bo
Length / buffer: 17.94 m	Mass: 84 t
Perm. Output: 3300 kW	Maximum speed: 160 km/h

2 The Rail Vehicles



DB Class 181 204-9 and dynamic number



DB Class 181 211-4 LORRAINE



DB Class 181 212-2 LUXEMBOURG



DB Class 181 213-0 SAAR



DB Class 181 241-8 MOSEL



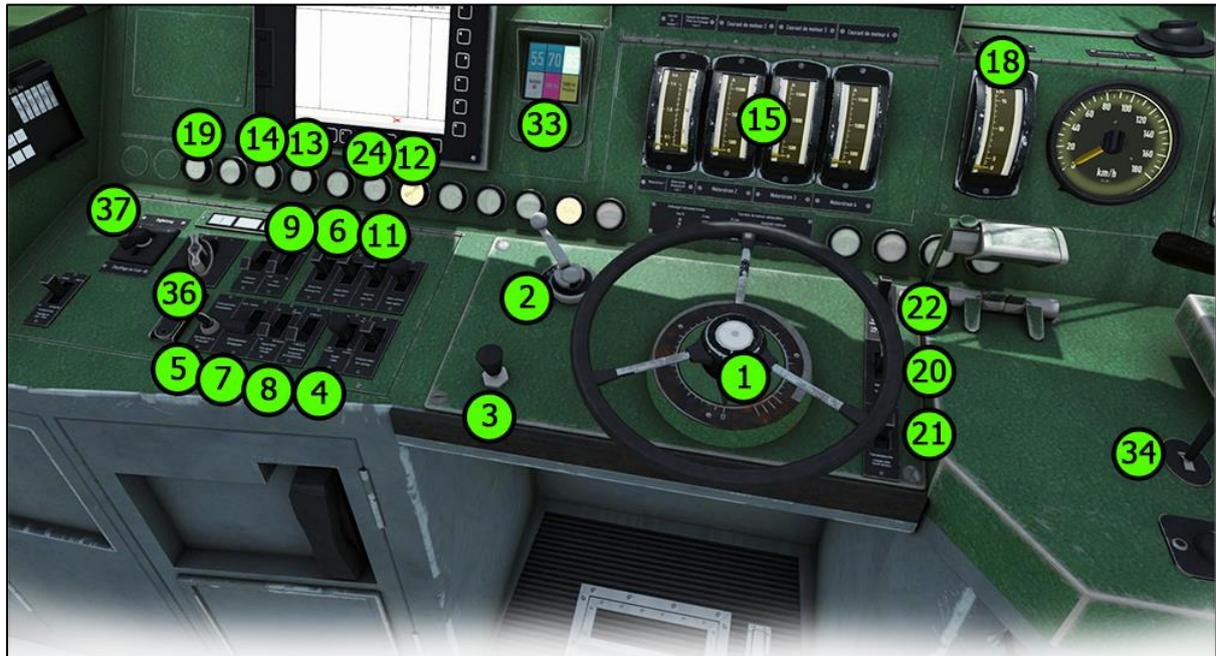
DB Class 181.2 Cabview



Hbillns 303

3 Cab and Controls

3.1 Class 181.2 Cab Controls



- | | |
|--|-----------------------------------|
| 1 - Regulator | 28 - Main reservoir pressure |
| 2 - Reverser | 29 - Brake pipe pressure |
| 3 - SIFA reset | 30 - Brake cylinder pressure |
| 4 - Sander | 31 - Brake pipe overload pressure |
| 5 - Pantograph key | 32 - Speedometer kph |
| 6 - Loco brake release | 33 - PZB lamps |
| 7 - Pantograph switch | 34 - Whistle |
| 8 - Main power switch | 35 - Dynamic brake decouple |
| 9 - Traction motor blowers on/off | 36 - Lamp test |
| 10 - Doors close | 37 - Heating voltage switch |
| 11 - PZB Trio Command Free Acknowledge | |
| 12 - Lamp traction motor blower state | |
| 13 - Lamp main power | |
| 14 - Lamp for faults | |
| 15 - Traction motor voltage | |
| 16 - Ammeter | |
| 17 - OHE voltage | |
| 18 - Brake force dynamic brake | |
| 19 - Heating voltage | |
| 20 - Headlights | |
| 21 - Desklight / cablight | |
| 22 - Instrument lights | |
| 23 - Wiper left | |
| 24 - Temperature warning | |
| 25 - Train brake | |
| 26 - Dynamic brake | |
| 27 - Loco brake | |



4 Driving the Class 181.2

4.1 ProLine and General hints

We are proud to present to you a new pack from our ProLine product line-up. As usual the delivered vehicles are intended to more experienced train simulator users but are not overly complicated so that newer users can pick it up after a short learning period.

Please read this manual for all the information you may require regarding how to drive them.

4.2 Startup Procedure (Cold Start)

By default, you do not need to go through the startup procedure. When starting a scenario, they are already set up and running. However, if you do require to start them from cold, we've implemented a scripted cold start feature. To force the cold start just type 'cold' next to the vehicle's numbering in the editor's flyout field.

4.3 Message and Help System

Messages:

The locomotive has a special message and help system to give you information about events and errors which occur. You can adjust the system's setting with <Shift+->

The system is switched on by default and has three settings: 1/only errors, 2/errors and further messages, 3/all messages and debug information for logmate.

Messages which are necessary can't be switched off.

PZB Help System:

The locomotive has a special help system for the PZB system. If you trigger an emergency brake due to incorrect operation, additional information will display in a message box.

Switch on or off the help system with <Shift+->

4.4 Battery

Battery Voltage:

Before you can start driving with the locomotive the battery needs to be switched on.

You do this by pressing <Shift+B>. The battery can only be switched on or off when the locomotive is not moving, and the reverser is set to 0 (zero). The battery is always fully charged and active upon scenario start (except in the case of cold start).

4.5 Pantograph and Main Switch

Pantograph preselection:

Before raising any pantographs you need to choose which of the two you wish to raise.

Press <Shift+P> to cycle through the four available options *both down*, *Pantograph 1*, *Pantograph 2* and *raise both*.

Please pay attention to the messages especially when selecting both pantographs.

Selecting pantographs is only possible when the locomotive is standing still.

Raising and Lowering the Pantograph:

To raise the selected pantograph the reverser needs to be set to M. To raise the pantograph, use the switch in the cab or press <P>. Raising and lowering a pantograph is possible when driving the locomotive. This might be necessary when you pass a neutral section.

Switching the Main Circuit Switch on or off:

After you have raised a pantograph you can turn on the main switch with the appropriate switch in the cab or with <Z>. The main switch can also be operated when the locomotive is

moving. Please keep in mind: the main switch will be set to off (tripped) when the pantographs are lowered, or other faults happen. Normally you can switch on the main switch again without any problems. If not, you will be informed by a message why not.

4.6 Regulator

Automatic Thyristor Control:

The regulator is used to select the required power output to the motors by setting the notches between 0 and 40. The regulation system then tries to reach the selected output by monitoring some important values. Are the values are exceeded, the regulation stops raising the voltage to the motors by itself. The notches 41 to 44 are field divert notches and are used to bring heavy trains to the max speed of 160 km/h if needed. Please be aware of the traction motor temperatures while using these field divert notches. Read more about temperatures in the fault section of this manual.

Fast Power Off:

The fast power off button in the middle of the regulator wheel allows you to shut down the applied traction power immediately. After a fast power off, you need to set the regulator to zero in order to power up again.

Regulator Locking:

The regulator is locked when:

- You used a brake while the regulator is not set to 0 (zero)
- An emergency brake application occurred
- A fault occurred
- The doors of the coaches are open

If the regulator is locked, you can't move the notch up or down. The tap changer runs automatically to notch zero.

To unlock the regulator again do the following:

- ✓ Set the regulator to notch 0 (zero)
- ✓ All brakes need to be released
- ✓ Check no emergency braking is active
- ✓ All faults are cleared
- ✓ The main switch is on
- ✓ The doors are closed

4.7 Brakes

The locomotive has three brake systems:

- loco brake (direct brake)
- train brake (automatic brake)
- E-brake (electric rheostatic brake)

Loco Brake:

When you enter the cab the loco brake is released. The brake is only used to brake the locomotive and not the train. You can use the brake when starting your train on a hill to

prevent the locomotive from rolling back. When you apply power, the loco brake should be released.

Train Brake:

The train brake is used to brake the whole train. It is a notched brake and can be precisely controlled. Use this brake with care, taking into account the train weight and track conditions.

When you apply power the train brake needs to be released.

E-Brake:

The E-brake works on all traction motors. If both the train brake and E-brake levers are in the release position they are automatically coupled when the train brake is used.

To use the E-brake independently from the train brake simply press the top of the lever down to decouple it and then move the lever within 5 seconds, or it will recouple again to the train brake lever.

How to Brake:

Braking with this locomotive requires a lot experience. You should drive with caution. You need to think at least 1000m ahead. Make sure to notch down on the regular sufficiently in advance.

You need to switch off power off before you can use the train brake.

Keep in mind: moving from notch 27 to 0 it takes nearly 14 seconds until you can use the brakes without getting a fault. Check the traction effort gauge and the transformer voltage gauge to see if power is down to 0 (zero).

High-Speed Braking:

On block-braked high-speed locomotives there is a system that uses more pressure to brake the loco itself at higher speeds. Block brakes are not as efficient as disc brakes at higher speeds, so they need more pressure to be effective. Above 60 km/h the system activates automatically and deactivates if you come back below 50 km/h. There is a lamp on the desk that will show you the actual state of the system. It is called "Hohe Abbremsung". The system works automatically but be aware that due to the additional pressure applied, the locomotive brakes will release more slowly than usual. Release the brakes earlier to prevent too much reduction in speed.

Air Pipe Overcharging, Time Reservoir and Pressure Equalisation:

We have implemented a new function for the brake system. A feature of locomotives equipped with a Knorr D2 self-regulating brake lever system is that you can overcharge the air pipe with more than 5 bar pressure. It is used to release the brakes that are dragging. But if you do it too often you may cause a brake system fault where you can't release the brakes anymore. That happens when the pressure in the equalizing reservoir grows too high (greater than 0.4 bar). Normally the over pressure releases very slowly over time. But not if the pressure is too high in the whole system. If you reach that state, you have two options to get the system working again. First one is to simply wait until the pressure is back to normal, which means the pressure in the equalizing reservoir needs to be zero. The second option is to even up the pressures manually. For that you can use the key command <Shift+A> to speed up the equalizing reservoir air release a bit. This function is somewhat random.

In real life, the process also involves releasing the excess pressure along the whole train, it is not possible to replicate this in Train Simulator.

To cause overcharging you should hold the train brake against the spring in the max fast release position and watch the pressure gauge. Don't apply overcharging for too long. In real life, it is recommended that if possible, you do not apply the air brakes again for several minutes after doing this.

4.8 FML (Traction Motor Blowers)

The locomotive has a manual traction motor blower system with a brake application triggered on notch 9 or above. Switch on the blowers with <Shift+F> and <Ctrl+F>. Look into the fault section for more information about temperatures.

5 SiFa and PZB

5.1 SiFa (Vigilance Alarm)

The locomotive has a working Zeit-Zeit-Sifa (vigilance alarm) which can be activated or deactivated with <Shift+7> or <Shift+NumpadEnter>. The purpose of the SIFA is to keep the driver vigilant at all times and to allow the locomotive to come quickly and safely to a stop should the driver become incapacitated or otherwise not be in proper control of the train.

If you switched on the SIFA you have to press the space bar every 30 seconds to reset the timer.

If you forget to reset the SIFA timer, the SIFA lamp will light up on the desk to remind you to press the SIFA button. If you miss this, after 2 seconds you will get a warning audio message that will last for a further 2 seconds after which the train will begin braking automatically and provide you an emergency warning audio message. You can stop the brakes each time with a press on the SIFA pedal to reset the timer. It's not a real emergency brake application.

The SIFA will pause if you switch to an outside view. So you can have it switched on even if you want to admire the route. Upon returning to the cab view the SIFA timer will reset its 30-second countdown and resume as normal.

5.2 PZB 90 (Train Protection)

The locomotive has a realistic built in PZB90 system used in Germany for the speed control of trains. We have now overhauled the whole function with better prototypical replication.

Use <Shift+8> or <Ctrl+NumpadEnter> to switch the PZB on or off.
Change the train PZB mode with <Ctrl+8> or <Ctrl+Shift+NumpadEnter>.

After switching the PZB on or changing its mode it will launch a self-test. The PZB can only be switched on or off and the train mode can only be changed when the train is not moving, and the reverser is set to V.

Use the following keys to control the PZB:

- = PZB Befehl40 / Command40
- <End> = PZB Frei / Free
- <Page down> = PZB Wachsam / Acknowledge

Important: The use of the PZB Wachsam / Acknowledge switch is different to earlier vR locomotives with PZB. The use of the switch will be registered by the PZB system when the switch is released! That is a prototypical behaviour and different to earlier PZB systems installed in vR locomotives or other vehicles with PZB equipped. You can switch and hold PZB Wachsam / Acknowledge switch when you pass a 1000 Hz magnet but need to release the switch within 4 seconds to avoid an emergency brake application.

PZB help system:

The help system will assist you if you have no experience with the PZB.

It tells you in a message box how you triggered an emergency brake application when it occurs.

An additional yellow needle on the speedometer gives you information about the target speed. You can switch the help system on or off with <Ctrl+[>.

5.3 PZB 90 Overview

The PZB 90 system is used to ensure that trains are running at correct speeds in certain controlled sections (for example, leading up to signals) and also to ensure that no train can pass a signal at danger.

There are three types of train controlled via the PZB system, these are described as:

Zugart O	Obere (Upper)	Light trains / Passenger trains
Zugart M	Mittlere (Medium)	Heavy trains / Freight trains
Zugart U	Untere (Lower)	Very heavy trains / Freight trains

When you enable PZB with Shift+8 it will start up ready for a Zugart O train.

Zugart can be read in the vR Message window to the right in the cab.

You can use <Ctrl+8> or <Ctrl+Shift+NumpadEnter> to cycle between the train types until you have the one most appropriate for your train. The key differentiators are the maximum speed and the ability to stop, so a long slow heavy freight train should be a Zugart U, for example.

In the descriptions below, the process that is followed is exactly the same regardless of the train type selected, what differs is the speed limits that are enforced.



PZB is implemented by means of three kinds of magnets that are placed on the track; these are described as 500 Hz, 1000 Hz and 2000 Hz. These magnets are only powered if their associated signal is set at a non-clear aspect, if the aspect is clear ('green / green') then the magnets have no effect on the train.

When approaching a controlled section, such as section guarded by signals, each of the magnets will be placed in the following order:

- 1000 Hz - at some remote point on the track such as the distant signal
- 500 Hz - usually 250m before the main signal being checked
- 2000 Hz - placed at the signal itself

For this description, the train is assumed to be set to **Zugart O**.

Note: If the line limit is below the speed limit described here, the former always overrides the later. For example, if the description says that you must be below 85 km/h and the line limit is 60 km/h then the latter takes precedence.

1000 Hz Magnet

A passing train will first meet the 1000 Hz magnet and the 1000 Hz lamp will light on the PZB display after pressing PZB Wachsam / key Page Down while passing the signal. On the Train Simulator HUD, the exclamation point indicator will light up with an alternating black/yellow pattern, but there is no audible indicator. The driver now has four seconds within which to press the PZB Wachsam button (Page Down). Failure to do this will result in emergency brakes being applied.

Having acknowledged the 1000 Hz magnet, the driver now has 23 seconds to drop their speed to 85 km/h (Note: A different Zugart (M or U) would use a different speed) or emergency brakes will apply.

After the train has passed 700 m from the 1000 Hz magnet the 1000 Hz lamp will go out and at this point the driver *may* choose to press PZB Frei (End) to get out of the speed restriction if, and only if, they can clearly see that the controlled signal is now showing a clear aspect. If the driver presses PZB Frei and then runs over an active 500 Hz magnet the train assumes the driver has made a mistake and will apply emergency brakes.

500 Hz Magnet

On passing the 500 Hz magnet, the train must not be exceeding 65 km/h or the emergency brakes will be applied. The 500 Hz lamp on the PZB display will light up. The train now has 153 meters to reduce speed to 45 km/h.

The 45 km/h speed limit is now in force for the next 250 m. It is not possible to release from this with the PZB Frei button.

2000 Hz Magnet

If the train passes an active 2000 Hz magnet then it will always apply its emergency brakes as the only time this can happen is if the train is passing a signal at danger.

Other notes

If, while under the control of a 1000 Hz or 500 Hz magnet, the train stops or spends more than 15 seconds at less than 10 km/h the enforced speed limit will be reduced by a further 20 km/h and this is then called a restrictive speed limit. This is indicated on the PZB display by the speed indicators (the top row) alternating between two lamps (70 and 85).

Once the magnet lamp goes out you can press PZB Frei (END) to get out of the restrictive speed limit.

Befehl40 ('Order 4 km/h')

The Befehl40 button (DEL) allows a special case that instructs the train to *ignore* a 2000 Hz (red signal) magnets that it comes across. You are submitted to an enforced speed limit of 40 km/h while this is active, exceeding this limit will cause the emergency brakes to apply.

To pass the red signal press and hold DEL for PZB Befehl40 until the Befehl40 light lights up.

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

Further Reading

You can find more recommended reading about the German PZB90 system at these links:

- <http://www.marco-wegener.de/technik/pzb90.htm>
- <http://www.sh1.org/eisenbahn/rindusi.htm>

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6 Additional Systems

6.1 Door Control

The locomotive has a programmed door control that could be used with different passenger wagons from the vR Shop. If you open the doors the T light positioned at the left console will go off and you will hear a beep sound. To close the doors, use <Shift+T>.

When the doors are opened the regulator is disabled. It may be necessary to engage the loco brake to prevent the train from rolling.

6.2 Destination Board Control

The locomotive can handle coaches with the vR destination board system.

The Class 181.2 itself has no destination boards but those on the coupled coaches can be selected with <0> and <Shift+0> (zero).

6.3 Faults / Observation

Traction Motor Heating:

To prevent the traction motors from overheating it is necessary to keep an eye on the ammeter gauge. Please use the following maximum values when notching up the power:

- over 330 A maximum 2 min.
- over 200 A maximum 15 min.
- under 200 A permanent traction effort

These values are valid when the traction motor blowers are working. You can hear them on the loco. If the blowers are not working the motors will start overheating rapidly.

To prevent this rapid overheating, you need to switch on the blowers manually with <Shift+F>. If you want to switch the blowers back to off use <Ctrl+F>.

Do not use the off position for the blowers to avoid damage to the motors while moving.

6.4 AI Pantograph Selection

If you create your own scenarios, you can decide which pantograph should be raised when the locomotive is used as an AI vehicle. Use the listed codes next to the locomotive number in the editor's ID field:

- SA-00- = no pantograph is raised
- SA-10- = pantograph No. 1 is raised
- SA-01- = pantograph No. 2 is raised
- SA-11- = both pantographs are raised

You can see the result of the preset in the editor right after entering it into the number field.

6.5 EBUla

We implemented a basic functionality to give you the ability to use a working EBUla that is organised into pages and chapters much like a book. The EBUla is pre-equipped with an empty plan in this package. To flip the pages or the plans you need to use the in-cab mouse controls on the pushbuttons next to the EBUla system. There is also a cab camera position for this that you can access by pressing <Right arrow> once from the default position.

7 Key Layout

Function	Key	Key
Battery isolating switch on/off	Shift	B
Pantograph Selection	Shift	P
Pantograph up / down		P
Main switch on/off		Z
Regulator		A / D
Regulator fast up / down	>1sec. press	A / D
Reverser		W / S
Traction motor blower	Shift / Ctrl	F
Air pipe pressure aligning	Shift	A
Hand brake		/
Train brake		; / ' /
E-brake		< / >
E-brake decoupling	Shift	D
Loco brake		[/]
Emergency brake		Backsp (←)
Sander		X
SIFA on/off	Shift	NumpadEnter
SIFA Reset		NumpadEnter
PZB on/off	Ctrl	NumpadEnter
PZB train mode change	Ctrl+Shift	NumpadEnter
PZB Wachsam / Acknowledge		Page down
PZB Frei / Free		End
PZB Befehl40		Del
Horn long		Space
Horn short		B
Doors closing	Shift	T
Wipers on/off		V
Cab light and desk light	(Shift)	L
Instrument light		I
ZZA up		0
ZZA down	Shift	0
PZB help system on or off	Shift	[
Message level	Ctrl]
Locomotive information	Ctrl+Shift	8

8 Included scenarios

8.1 [BR 181 PL] DGS to Koblenz Mosel

Drive this freight train to Cochem. Your maximum allowed speed is 100 km/h. It is your last service this day.

Duration: 40 minutes

Difficulty: Medium

8.2 [BR 181 PL] Cargo to Wittlich

You will drive a cargo train from Koblenz to Wittlich. Instead of a Class 189, today the train is pulled by a Class 181, that was rented from DB Fernverkehr.

Duration: 50 minutes

Difficulty: Hard

8.3 [BR 181 PL] RB 12501 to Wittlich

Today you will have a special job. DB Regio borrowed you a German Class 181 for you as an alternative train. This ride is expected to be relaxed due to there being less traffic today. But you have to hurry, the schedule is tight.

Duration: 60 minutes

Difficulty: Hard

9 Hints for Scenario Creators

Please place the locomotives so that cab 1 points toward the driving direction. This will prevent the driving detection being detected incorrectly in terms of placing the driver and raising the correct pantograph.

This ProLine pack can use Train Simulator's save and resume function. Important system states are saved so you can save your scenario and resume it later. Please note that some system values are not stored like an active PZB monitoring.

10 Credits

We would like to extend our Thanks to all of the people who helped with the realization of this pack.

The virtualRailroads Team

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