DB BR150 orient red
Expert-Line

Compatible with Train Simulator 2017 and later

BR150 030-5 DB orient red

Content

1 Information

1.1 DB BR150

The DB Class 150 is a six-axle alternating current locomotive and a part of the "Einheitslokomotiven" series that was designed to use standardized parts and techniques to produce a range of identical Locomotives adapted for specific duties. The DB Class 150 itself was originally created for heavy fright services.

1.2 DB BR150 - Functions available in the Simulation

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

- ✓ Prototypical driving behaviour
- ✓ 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
- ✓ Real sounds optimized for EFX
- ✓ Realistic PZB90
- ✓ Time-Time-Sifa
- ✓ vR EBuLa system
- ✓ Switchable instrument lights
- ✓ Desk light and cab light
- ✓ Separately switch-able wipers with speed control
- ✓ Standard TS Effects
- ✓ TS2017 Camera positions
- ✓ vR ZZA compatible

1.3 Technical Data DB BR150

Manufacturer:	Henschel, Krauss-Maffei, Krupp, AEG, BBC, Siemens-Schuckertwerke	**Build Dates**:	1957 – 1973
Type:	Electric	**Wheel arrangement**:	Co-Co
Length / buffer:	19.49 m	**Mass**:	126 t
perm. Output:	4500 kW	**Maximum speed**:	100 km/h

2 The rail vehicles

DB BR150 030-5 or dynamic numbering

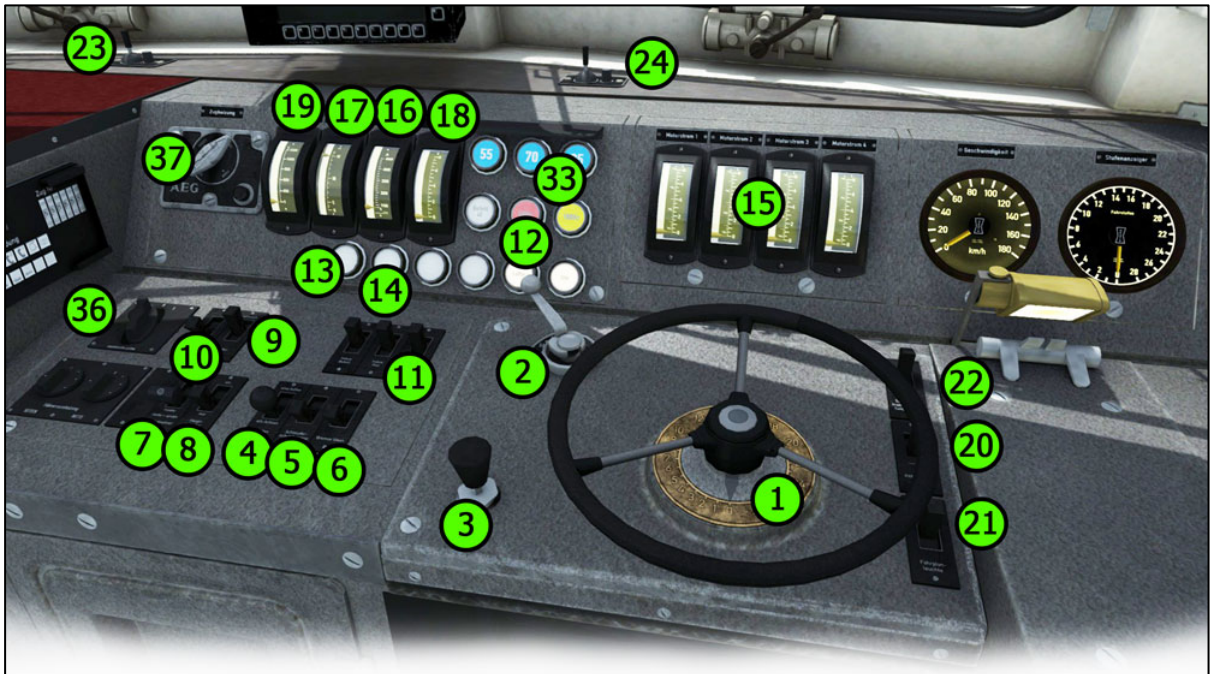
BR BR150 142-8 or dynamic numbering

DB BR150 168-3 or dynamic numbering

DB BR150 cabview

3 Cab and Controls

3.1 BR110



1 - Regulator
2 - Reverser
3 - SIFA reset
4 - Sander
5 - Wheelslip protection brake
6 - Loco brake release
7 - Pantograph
8 - Main power switch
9 - Traction motor blowers
10 - Compressor start
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
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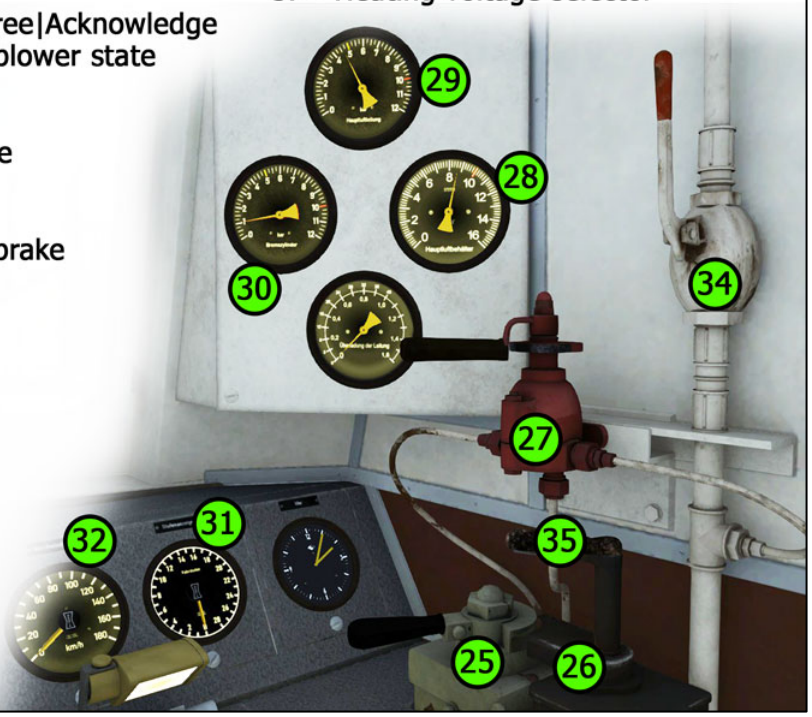
21 - Desklight / cablight
22 - Instrument lights
23 - Wiper left
24 - Wiper right
25 - Train brake
26 - Dynamic brake
27 - Loco brake
28 - Main reservoir pressure
29 - Brake pipe pressure
30 - Brake cylinder pressure
31 - Tap gauge
32 - Speedometer kph
33 - PZB lamps
34 - Whistle
35 - Dynamic brake decouple
36 - Lamp test
37 - Heating voltage selector



4 How to drive

4.1 Expert-Line and general hints

We are proud to present to you a new package from our Expert-Line product line-up. As usual the delivered vehicles are oriented to more experienced train simulator users but not that complicated so all users can handle them after a short time. Please read this manual for all needed information how to drive them.

4.2 Start-Up Procedure (cold start)

It is not necessary to start the locomotive for driving. They already started up upon scenario start. But if you need to start them cold, we implemented a cold start feature into the scripts. To force the cold start just type 'cold' appended to the vehicles numbering in the editors flyout field.

Notice: We can't give a guarantee that this will work every time because TS is not suitable for such things.

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 systems level with <Shift+->
The system is switched on by default and has three levels: 1/only errors, 2/errors and further messages, 3/all messages and debug information for log-mate.
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 get an emergency brake due to incorrect operation you will get additional information 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 need 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 on a cold start).

4.5 Pantograph and Main Switch

Pantograph pre-selection:

Before raising a pantograph you need to choose one or two. Press <Shift+P> to cycle through the four available options *both down*, *Pantograph 1*, *Pantograph 2* and *raise both.*
Please look at the messages especially when you choose both pantographs.
Choosing a pantograph 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 notching control:

The regulator is used to select the required notch from 0 to 28. The tap changer will then automatically notch up or down to the selected notch at a pre-set speed. If you switch the regulator directly from notch 28 to 0 it will take approx. 14 seconds to reach notch 0. Please keep in mind that selecting too high a notch will result in an overload and the main switch will be tripped. The chosen regulator notch and tractive effort can be checked with the ammeter effort gauge to the left instruments (second gauge from right) It should not exceed 420A to avoid an overload.

Fast power off:

The fast power of 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 to raise power up again.

Regulator locking:

The regulator is locked when:

- An overload occurred because you selected too high a notch with the regulator
- 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 notch up or down. The tap changer runs automatically to notch zero.

To unlock the regulator again do the following things:

- ✓ 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 take 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 the brake with care, according to the train weight and track conditions. When you take power the train brake needs to be released.

E-brake:
The E-brake works on all traction motors. If both 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 needs a lot experience. You should drive with caution.
It is necessary to think at least 1000m ahead. Notch down in good time with the regulator.
It is necessary to switch off power before you can use the train brake.
Keep in mind: 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 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 60km/h the system activates automatically and de-activates if you come back below 50km/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 5BAR pressure. It is used to release 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. 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 equipped with some randomness. In real life, the process also involves releasing the excess pressure on the whole train, it is not possible to replicate this in TS.

To initiate 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. Switch on the blowers with <Shift+F> and <Ctrl+F>. See the fault section for more information.

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> 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 must press the space bar every 30 seconds to reset it.

If you forget to reset the SIFA, the SIFA light will start glowing on the console to remind you to press the SIFA button. If you miss this, after 2 seconds you will hear a warning beep that will last for a further 2 seconds after which the train will begin emergency braking.

The SIFA will pause if you switch to an outside view. So, you can have it switched on even if you want to have some route explorations. Back in cab the SIFA timer runs again from 30secs down.

5.2 PZB 90 (train protection)

The locomotive has a near realistic build in PZB 90 v2.0 system used in Germany for speed control of trains.

Use <SHIFT+8> to switch PZB on or off.
Indusi train mode you can switch with <Ctrl+8>.

After switching on the PZB will start a self-test. The PZB could only be switched on or off when the train is not moving and the reverser is set to 0 (zero).

Use the following keys to control the Indusi:

- <DEL> = PZB Befehl / command 40
- <End> = PZB Frei / release
- <Page down> = PZB Wachsam / acknowledge

Important: The usage of the PZB acknowledge switch will be registered by the PZB system when the switch is released! That is a prototypical behaviour installed in vR locomotives. You can switch and hold the acknowledge switch when you pass a 1000Hz magnet, but need to release the switch in between 4sec. to avoid an emergency brake.

PZB help system:
The help system will assist you when you have no experience with the PZB.
It tells you in a message box why you have an emergency braking when it occurs.
Switch on or off the help system with <Shift+->

Overview of PZB 90

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 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 could be read in the vR Message window to the right in the cab.
You can use Ctrl+8 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 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 500Hz, 1000Hz and 2000Hz. 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.

For some controlled element, such as a signal, each of the magnets will be placed in the following order:

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

For this description, a **Zugart O** train is assumed.

Note: In the speed limit descriptions below the line limit always overrides that given in the description. For example, if the description says that you must be below 85km/h and the line limit is 60km/h then this takes precedence.

1000Hz Magnet

A passing train will first meet the 1000Hz magnet and the 1000Hz lamp will light on the PZB display after pressing PZB Wachsam / key Page Down while passing the signal.
On the Train Simulator 2012 HUD, the exclamation point indicator will light up with a wasp 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 1000Hz magnet, the driver now has 23 seconds to drop their speed to 85km/h (Note: A different Zugart (M or U) has a different speed) or emergency brakes will apply.

After the train has passed 700m from the 1000Hz magnet the 1000Hz 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 500Hz magnet the train assumes the driver has made a mistake and will apply emergency brakes.

500Hz Magnet

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

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

2000Hz Magnet

If the train passes an active 2000Hz 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 1000Hz or 500Hz magnet, the train stops or spends more than 15 seconds at less than 10km/h the enforced speed limit will be reduced by a further 20km/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 40km/h')

The Befehl40 button (DEL) allows a special case that instructs the train to *ignore* a 2000Hz (red signal) magnets that it comes across. You are put in to an enforced speed limit of 40km/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**	
	1000Hz	500Hz	1000Hz	500Hz
O (Obere)	165km/h -> 85km/h in 23 seconds	65km/h -> 45km/h in 153m	45km/h constant	45km/h -> 25km/h In 153m
M (Mittlere)	125km/h -> 75km/h in 26 seconds	50km/h -> 35km/h in 153m	45km/h constant	25km/h constant
U (Untere)	105km/h -> 55km/h in 34 seconds	40km/h -> 25km/h in 153m	45km/h constant	25km/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 Protective section

The locomotive can recognize and react to EL (overhead wire) signals. Two types of signals are possible: Main switch off and pantograph down.
If you miss one of these signals you will get a message about this. If you pass the pantograph down signal with a raised pantograph the pantograph will be destroyed. Then you need to use the other one or better restart the scenario.

6.2 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 open the regulator is disabled. It may be necessary to engage the loco brake to prevent the train from rolling.

6.3 Destination board control

The locomotive can handle coaches with the vR destination board system.
The 150 itself has no destination boards but those on the coupled coaches can be switched with <0> and <Shift+0> (zero).

6.4 Faults / Observation

Electrical fault:
The maximum voltage the locomotive can handle is 420A. If you move over this value power will trip and power will be switched off automatically. If this happens set the regulator to notch zero. After that you can use the regulator normally. To check the amperage, use the second vertical gauge from right on the left desk. It should not show more than 420A.

Traction motor heating:
To prevent the tractions motors from overheating it is necessary to keep an eye on the ammeter gauge. Please use these maximum values when notching up the power:

- over 330A maximum 2min.
- over 200A maximum 15min.
- under 200A 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 get overheating fast.

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.

6.5 AI Pantograph selection

If you write scenarios by yourself you can decide which pantograph should be raised when the locomotive is used as an AI vehicle. Use the listed codes appended 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 preselection in the editor right after entering it into the numbering field.

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	7
SIFA Reset		Space
PZB on/off	Shift	8
PZB Wachsam / Acknowledge		Page down
PZB Frei / Free		End
PZB Befehl40		Del
Horn long		B
Horn short		N
Doors closing	Shift	T
Wiper right on/off		V
Wiper left on/off		C
Wiper right speed faster	Shift	V
Wiper left speed faster	Shift	C
Wiper right speed slower	Ctrl	V
Wiper left speed slower	Ctrl	C
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
Hide window heating elements	Ctrl+Shift	-

8 Hints for scenario creators

Please place the locomotives so that cab 1 points into the driving direction.
This will prevent a false detection of the driving direction for placing the driver and raising the correct pantograph.

If you want to use more than one locomotive in your train, the additional locomotives should have their pantographs lowered. Set them to dead engine within the flyout. Note, that since TS2015 more than one locomotive can be set to dead engine state.

This Expert-Line can follow the save and resume function of TS. All 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.

9 Credits

We say Thank you to all people who helped realizing this package.

Your virtualRailroads Team

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