

Manual

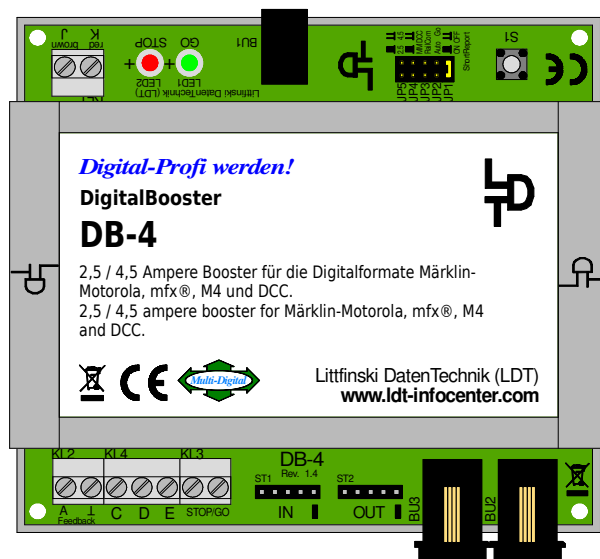
DigitalBooster DB-4

The **DigitalBooster DB-4** is a short-circuit protected Power-Amplifier (Booster) for digital Model Railway Layouts from the *Digital-Professional-Series!*

The **DB-4** amplifies the digital formats of Märklin-Motorola, mfx[®], M4 and DCC.

DB-4-G Part-No.: 080073

>> finished module in a case <<

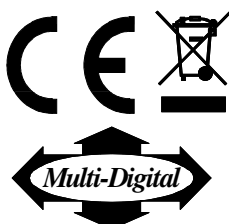


The DigitalBooster DB-4 provides a maximum digital current of 2.5 or 4.5 Ampere and amplifies the digital formats of Märklin-Motorola, mfx[®], M4 and DCC.

The DB-4 can operate with several digital command stations by using the 5-poles booster bus, the CDE booster bus or the Roco-booster bus.

The DigitalBooster DB-4 receives the power supply not from a classical model railway transformer but from the switched mode mains power supply DB-4 PowerSupply. On this unit is the stabilized digital track voltage adjustable between 15 and 24 Volt, suitable for all track gauges.

This product is not a toy! Not suitable for children under 14 years. Improper use will imply danger or injuries due to sharp edges and tips! Please store this instruction carefully.





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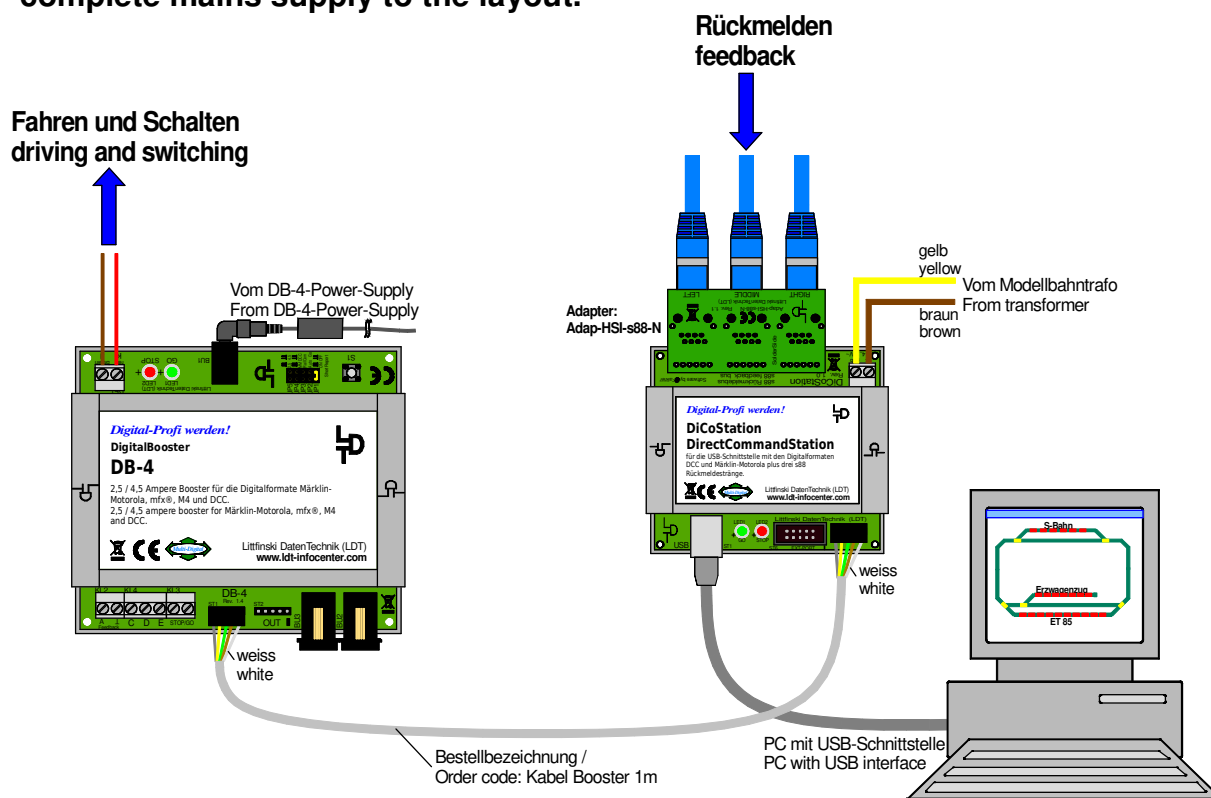
1. Preface / Safety Instruction:

You have purchased the **DigitalBooster DB-4** within the assortment of **Littfinski DatenTechnik (LDT)** for your model railway layout.

We are wishing you having a good time using this product!

The finished module in a case comes with **24 month warranty**.

- Please read the **following instructions carefully**. **Warranty will expire** due to **damages** caused by **disregarding the operation instructions**. **LDT will not be liable** for any **consequential damages** caused by improper use or installation.
- Also, note that electronic semiconductors are very sensitive to electrostatic discharges and can be destroyed by them. Therefore, discharge yourself before touching the modules on a grounded metal surface (e.g. heater, water pipe or protective earth connection) or work on a grounded electrostatic protection mat or with a wrist strap for electrostatic protection.
- We designed our devices for indoor use only.
- You can download this **manual** from **our Web-Site (www.ltd-infocenter.com)** at the section **“Downloads”** as **PDF-file with colored pictures**. You can open the file with the **Acrobat Reader** and you can make a print-out.
- Many **illustrations** at this **manual** are **identified** with a **file name** (e.g. **page_937**). You can find those files on **our Web-Site** at the section **“Sample Connections”** of the **DigitalBooster DB-4**. You can **download** the files as **PDF-File** and make a **colored print** at the **DIN A4** format.
- **Attention:** Before starting the installation **switch off the drive voltage** by **disconnecting all model railway transformer from mains** and/or **switch off the complete mains supply to the layout**.



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2. DB-4 connection to the Digital-Command-Station or to other Booster:

The **galvanic separated boosterbus connections** enables the application of the **DigitalBooster DB-4** in connection with **several command stations** by using the **5-poles Boosterbus**, the **CDE-Boosterbus** or the **Roco-Boosterbus**.

The **DB-4** is no **Booster-Adapter**. A change of the bus-system is impossible. The **booster-bus** used for the connection of the **first DB-4** to the **digital command station** has to be **used furthermore**.

The below **table** indicates the **possible connections** to the **available command station**.

	5-poles Boosterbus	CDE- Boosterbus	Roco- Boosterbus
Control Unit	X		
Central Station 1	X	X	
Central Station 2	X		
Central Station 3 and 3 plus		X	
Mobile Station 2 with Track Box		X	
ECoS 1 (50 000)	X	X	
ECoS 2 (50 200)	X	X	
Intellibox 1	X	X	
IB-Basic		X	
IB-COM		X	
Intellibox 2	X	X	
EasyControl / RedBox	X	X	
DiCoStation	X		
KeyCommander	X		
TWIN-CENTER	X	X	
Roco 10761 (multiMAUS)			X
Roco 10764 (multiMAUS)			X
Fleischmann 680801 (multiMAUS)			X
Roco / Fleischmann multiZENTRALEpro			X
Roco / Fleischmann z21 and Z21			X
Digikeijs Digicentral DR5000			X
PIKO SmartControl		X	
Lenz Digital plus LZ100		X	
Lenz Digital plus LZV200		X	
Viessmann Commander	X	X	

2.1. DB-4 connection via the 5-poles Boosterbus:

The **DigitalBooster DB-4** can be connected by use of the **5-poles boosterbus cable** (**order code: Kabel Booster 1m, Part-No.: 000123**), to one of the command stations as per above table or to other boosters (e.g. DB-4, DB-2, 6015, 6017, Power 2, Power 3). The first booster shall be always connected to the command station by use of a 5-poles boosterbus cable. The second booster shall be connected to the first one and so on.

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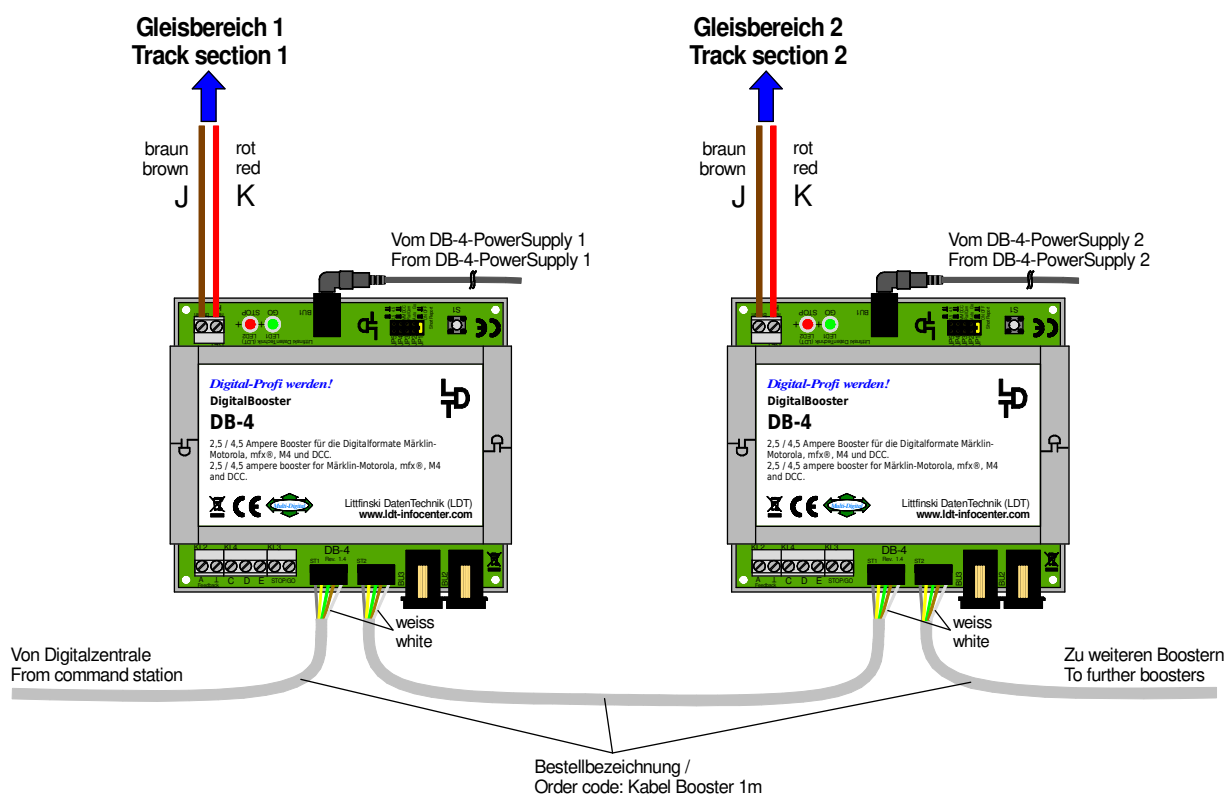
Please connect a plug of the 5-poles boosterbus cable onto the command station or to the previous booster. The connection of the plug is correct at the **Control Unit, Intellibox, TWIN-CENTER, Märklin Booster 6017, Power 2 and Power 3** if the direction of the **cable shows to the bottom**. For the **Märklin Booster 6015** is the correct position of the **Boosterbus-Cable showing to the top**.

The second plug of the boosterbus cable has to be connected at the **DigitalBooster DB-4** to the **pin bar ST1** with the marking **“IN”**.

Please attend that the **white single wire** of the 5-poles cable **corresponds to the white marking** at the **pin bar ST1**.

The plug position of the 5-poles boosterbus cable is correct on the **DigitalBooster DB-4** if the twisted cable has a direction away from the booster.

If a following booster shall be connected with a 5-poles boosterbus cable to the **DigitalBooster DB-4** this has to be done via the **pin bar ST2 (“OUT”)**.



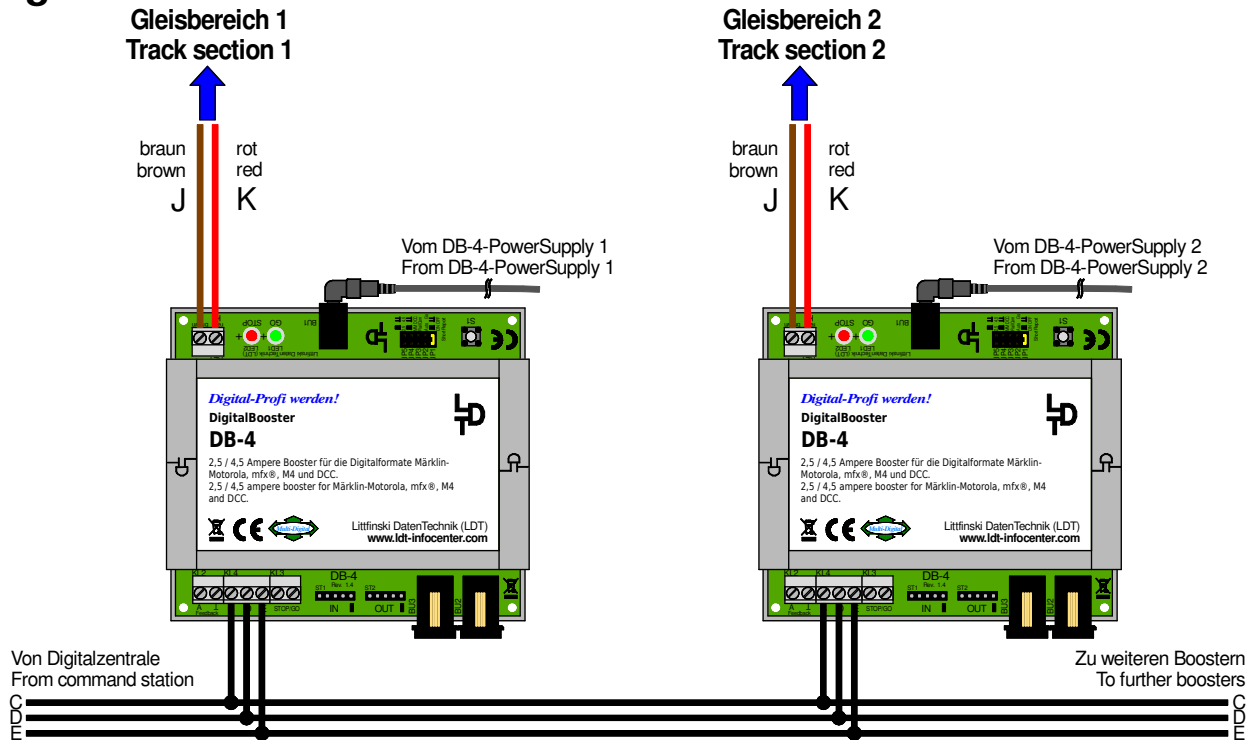
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DigitalBooster DB-4 connection to the command station and between each other via the 5-poles boosterbus.

2.2. DB-4 connection via the CDE-Boosterbus:

If your **Command Station** contains a **CDE-Boosterbus** the connection to the **DigitalBoosters DB-4** can be realized with three cables. Connect the **connection wires C, D and E** of the **Command Station** with the **clamps C, D and E** of the following **DigitalBooster DB-4**.

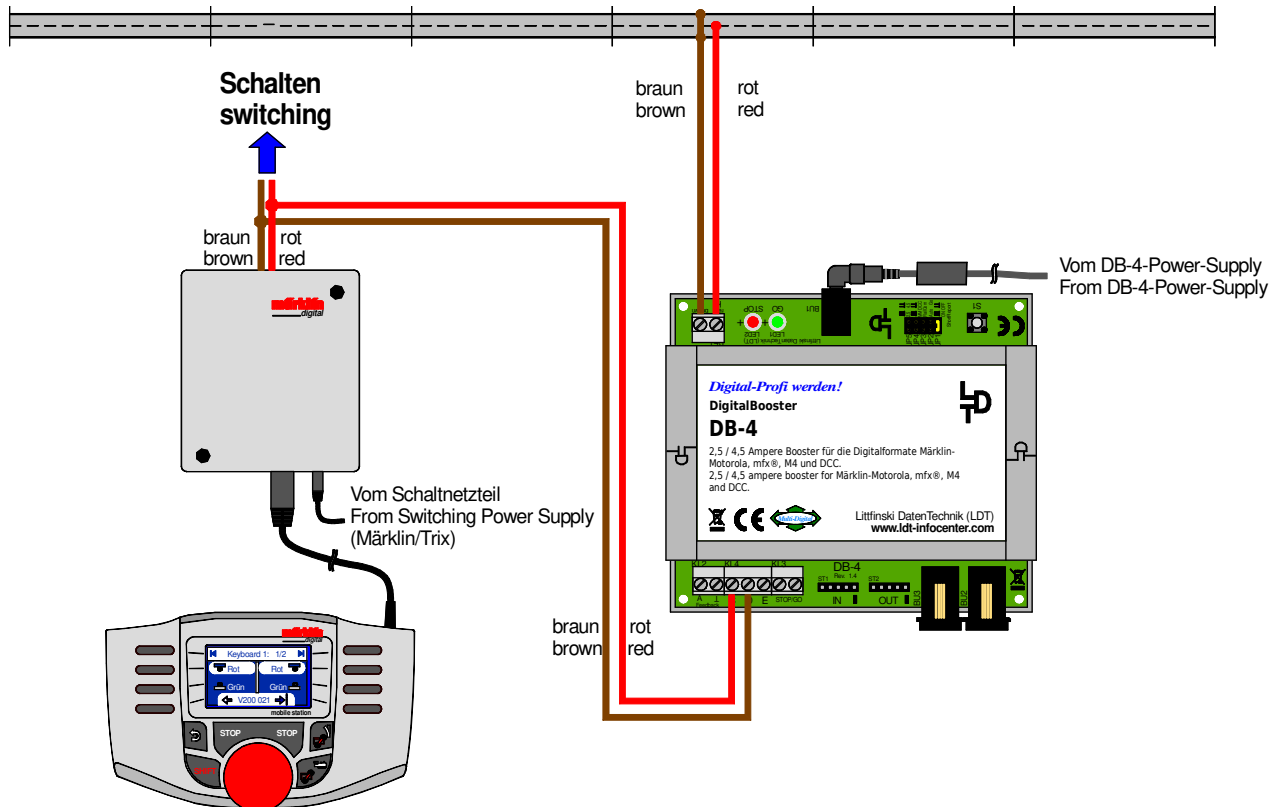
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Connecting the DigitalBooster DB-4 with the Command Station via CDE-Boosterbus and between each other

The DB-4 can get as well the supply directly from the digital output of a digital command station with integrated Booster via the connection C and D in case there is no common booster bus available.



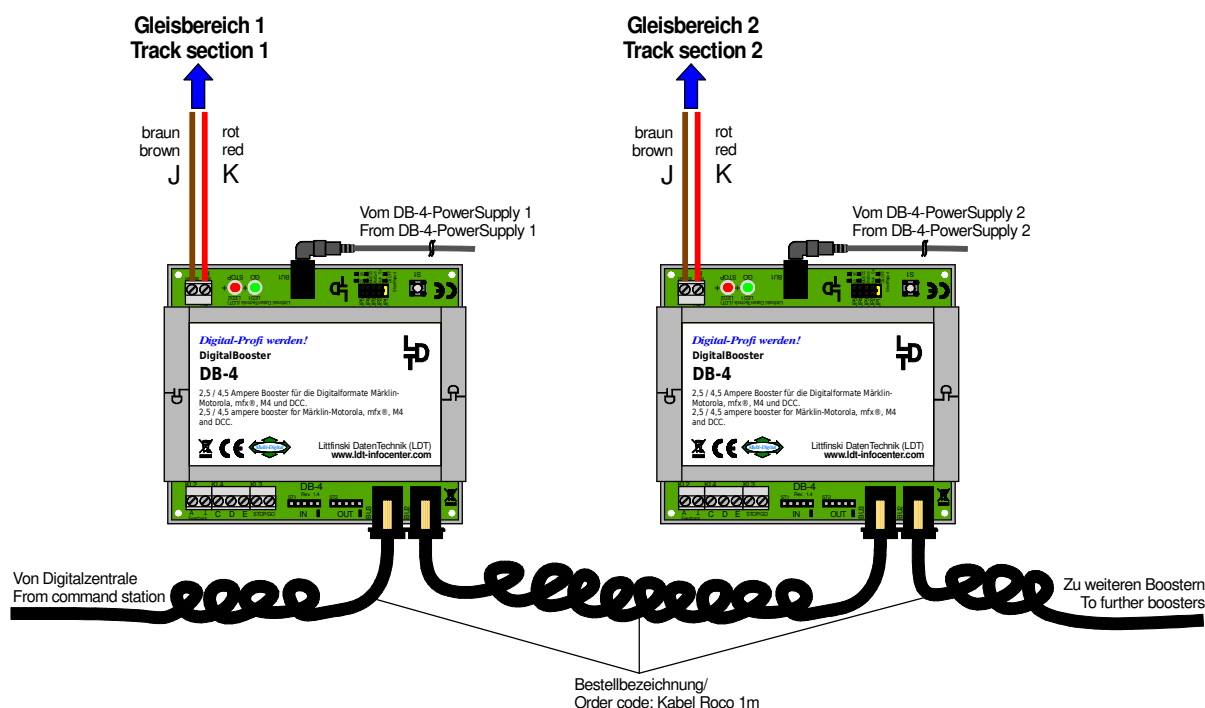
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Connection of the DigitalBooster DB-4 via the connection C and D with the Mobile Station 2 and the track-box.

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2.3. DB-4 connection via the Roco-Boosterbus:

With the **Roco Boosterbus-Cable** (Order Code: Kabel Roco 1m, Part-No.: 000136), is it possible to connect the **DigitalBooster DB-4** with the **multiMAUS**, **multiZENTRALEpro**, **z21** and **Z21** or **Digikeijs DR5000** command stations according to the table or to connect the DB-4 to a **Roco Booster**. The first booster has to be connected always to the command station by using a Roco Boosterbus-Cable. The second booster has to be connected to the first one etc.



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Connect the DigitalBooster DB-4 via the Roco-Boosterbus to the digital command station and between each other

3. DB-4 connection to the Switched Mode Mains Power Supply DB-4-PowerSupply:

The **DigitalBooster DB-4** shall not get the power supply over the **socket BU1** from a classical model railway transformer but from the **Switched Mode Mains Power Supply DB-4-PowerSupply**.



The **DigitalBooster DB-4** has been matched to the **Switched Mode Mains Power Supply DB-4-PowerSupply** and should be operated only together with this particular unit.

At first adjust the **voltage selection switch** of the **DB-4-PowerSupply** to a voltage between **15 and 24 Volt**. This voltage is corresponding to the **digital voltage** of the **DigitalBooster DB-4** for the **supply to the rails**.

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If there are several **output plugs** supplied with the **Switched Mode Mains Power Supply DB-4-PowerSupply** please select the plug **5.5X2.1**. This plug has an **outside diameter** of **5.5mm** and a **bore diameter** of **2.1mm**. The **outside pole** is **negative** and the **inner pole** is **positive**.

Please attend as well to the **instruction** supplied together with the **DB-4-PowerSupply**.

4. DB-4 connection to an Own Track Section:

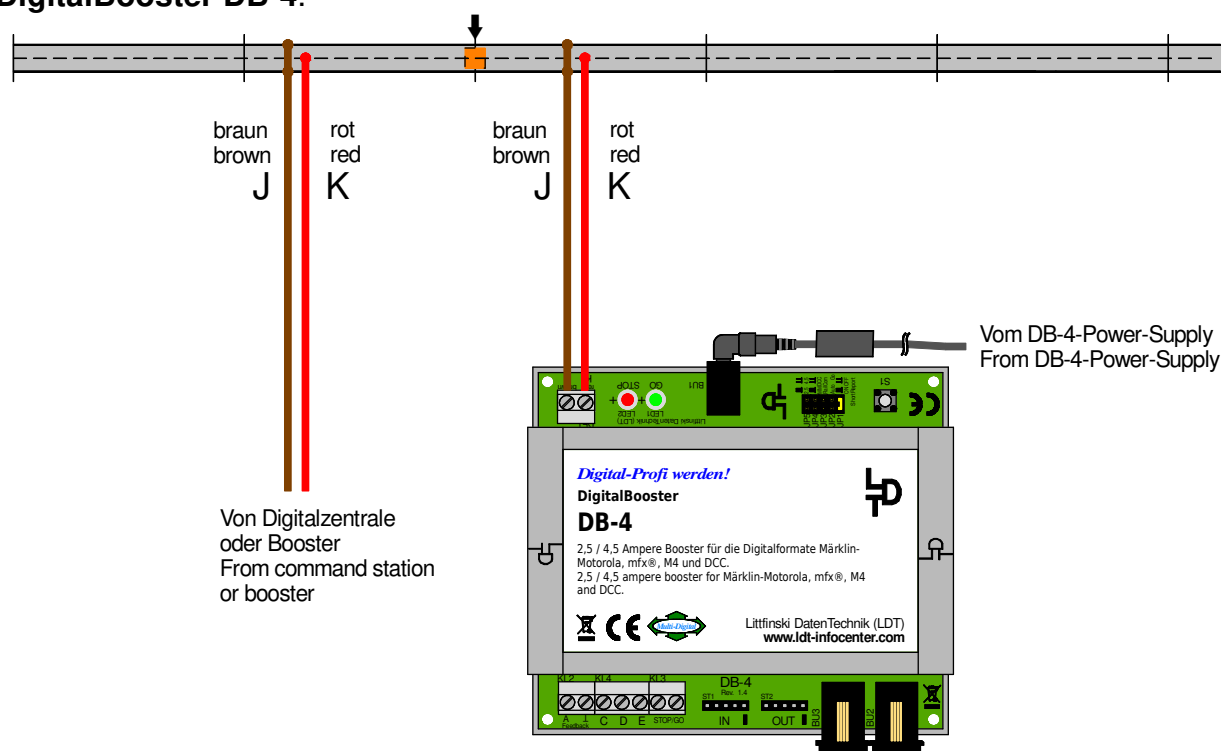
The **DigitalBooster DB-4** is a **power amplifier** for your **digital model railway layout**.

The **digital current** of the **DigitalBooster DB-4** is available at the **clamp KL1** next to the two light emitting diodes.

The DB-4 supplies **digital current** to the **own track section** via this clamp. This section has to be **electrical separated** from the **adjoining track sections** because those receive their **supply** from the **digital command station with integrated booster** or from **further booster**.

4.1. 3-Conductor Track System:

If the manufacturer of your digital command station **permits a common layout ground** (“**brown**”) the **center conductor** of the **3-conductor track** has to be **isolated** at the **cross over joints** from one to the next booster electrical circuit. The **isolated center conductor** gets the supply from the connection “**red**” of the **clamp KL1** of the **DigitalBooster DB-4**.



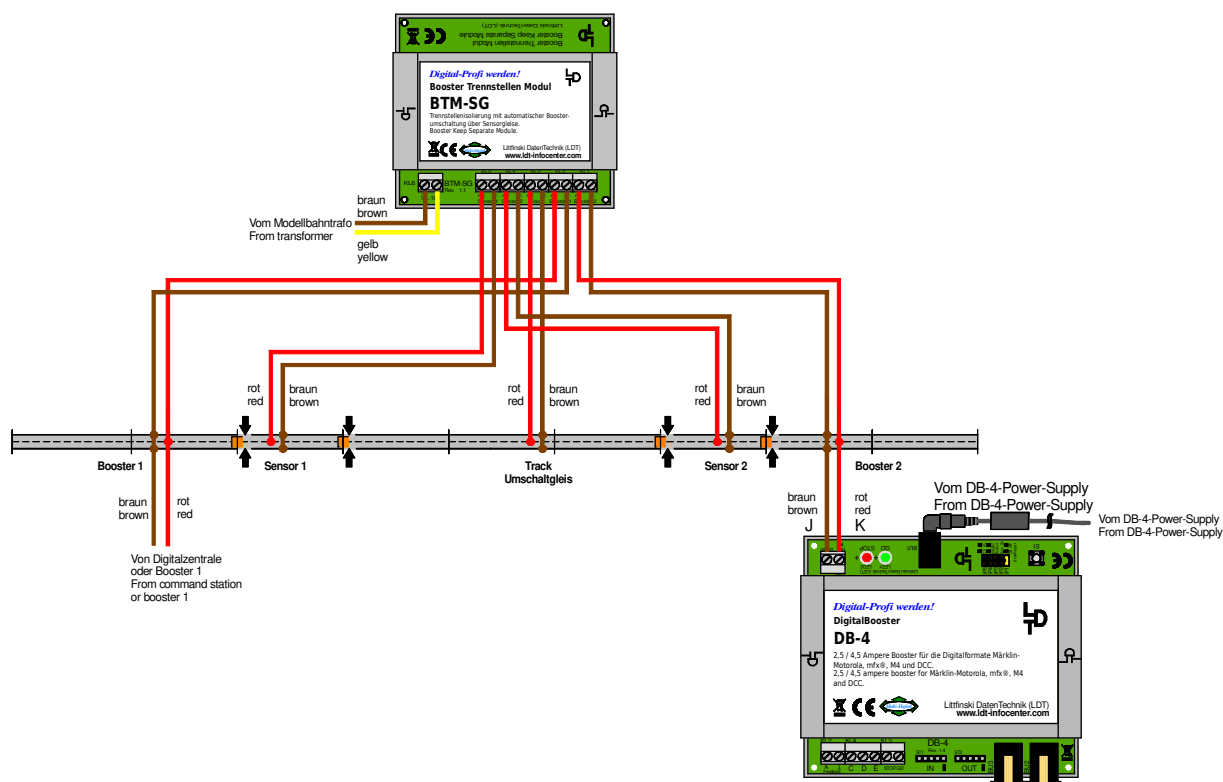
Booster separation by common layout ground with isolated center conductor

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If the manufacturer of the digital command station **does not permit a common layout ground** (“brown”) it is required **additionally to isolate the rails at the cross over joints**.

If the manufacturer of the digital command station **stipulates mandatory** the installation of a **rocker switch** at the **cross sections** of the **center conductor** this switch has to be installed.

Alternative is it possible to use our **Booster Keep Separate Module BTM-SG** for the **cross over joints**. This module separates **electrically definite** the booster sections without rocker switch and provides the possibility to drive at **slow speed** at the **cross over sections**.



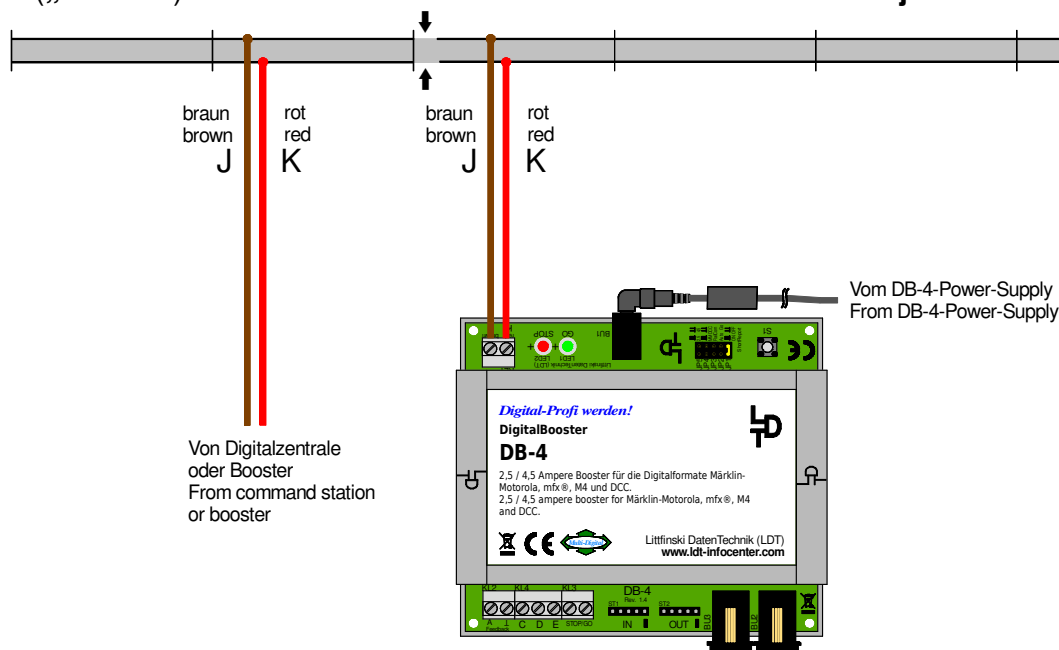
Definite electrical separation of booster sections by implementing the Booster Keep Separate Module BTM-SG.

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4.2. 2-Conductor Track System:

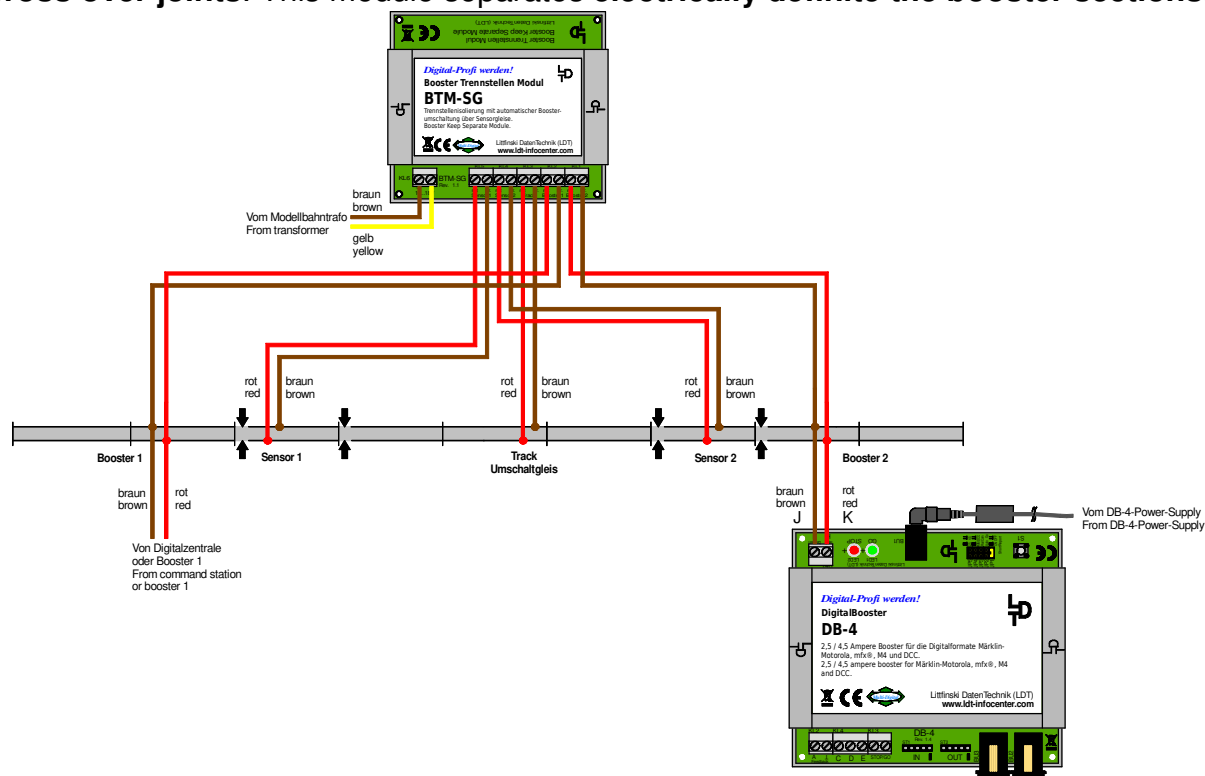
If the manufacturer of your digital command station **permits** a **common layout ground** (“**brown**” or “**J**”) one rail of the **2-conductor track** has to be **isolated** at the **cross over joints** from one to the next booster electrical circuit.

If the manufacturer of your digital command station **does not permit** a **common layout ground** („**brown**“) **both rails** have to be **isolated** at the **cross over joints**.



Booster separation without common layout ground (both rails isolated)

Alternative is it possible to use our **Booster Keep Separate Module BTM-SG** for the **cross over joints**. This module separates **electrically** definite the booster sections.



Definite electrical separation of booster sections by implementing the Booster Keep Separate Module BTM-SG.



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5. Booster in Operation:

All jumpers of the DB-4 are set ex-factory. The DigitalBooster DB-4 can be used immediately at the supplied condition. The factory setting is recommended for the first implementation of the unit.

For selecting different operation modes after the first implementation please attend to the chapter “Adjusting Operation Modes with Jumpers”.

After switching-on the model railway layout at first the red LED of the DigitalBooster DB-4 will glow. If the red and the green LED will alternate flash the supply voltage has not been set correctly at the range of 15 to 24 Volt. Please check and correct the voltage setting at the DB-4-PowerSupply.

If the red LED of the DigitalBooster DB-4 will glow constantly after switching-on the layout the DB-4 is in operation mode and can be switched-on with the key “Go” of the digital command station. After switching-on the green LED of the DB-4 will glow and the unit will supply digital current to the connected track section.

The DigitalBooster DB-4 will be automatically switched-off if a short circuit will occur at the track. The green LED switches off and the red LED will glow constant. The DB-4 will report the short circuit via the employed booster bus to the digital command station. Those will switch to “Stop”.

After removing the short circuit you can switch-on again the digital current to the track with the key “Go”.

If the current exceeds 2.5 Ampere within the track section the DigitalBooster DB-4 will switch-off as well and is reporting this overload to the digital command station which will switch to “Stop”.

6. Adjusting Operation Modes with Jumper:

The various operation modes and functions of the DigitalBooster DB-4 can be adjusted with the jumpers J1 to J5.

6.1. Select the Maximum Digital Current to 2.5 or 4.5 Ampere:

The Jumper J5 has been set ex-factory. The DigitalBooster DB-4 supplies with this setting a maximum output current of 2.5 Ampere to the track.

This limitation is suitable for the gauge N to prevent the excessive overload to tracks, vehicle wheels and current transmittal in case of a short circuit.



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If you use a **larger** and therefore **mechanically** and **electrically** more **rugged gauge** you can **remove the jumper J5**. The **DigitalBooster DB-4** will now **supply a maximum digital current of 4.5 Ampere** to the connected track.

6.2. Select the Data Format for WatchDog- and On-/Off switch function:

The **jumper J4** has been **set ex-factory**.

With this setting can be the **WatchDog-** and **On-/Off switch function** controlled by your model railway software respectively via your digital command station by using the **Märklin-Motorola-Data Format**.

If you want to use the **DCC-Data Format** for the **WatchDog-** and the **On-/Off switch function** please **remove the jumper J4**.

6.3. RailCom^{®*}-cutout Creation or Suppression:

The **RailCom^{®*}-cutout** will be **created** if the **jumper J3** has been set. If the **Jumper J3** has been removed there will be **no RailCom^{®*}-cutout created**.



The selection with **jumper J3** if the **DigitalBooster DB-4** shall create or suppress a **RailCom^{®*}-cutout** is only possible if the **data format** for the **WatchDog-** and **On-/Off switch function** has been **set to DCC (Jumper J4 removed)**.

6.4. Short Circuit Report to the Command Station (Short Report):

If the **Jumper J1 "Short Report"** has been set the **DigitalBooster DB-4** will report a short circuit within the connected track section via the used booster bus to the digital command station. In this case the **digital command station** will **switch-off all boosters**.

If your **model railway software** includes a so called **Booster-Management** this gadget can **prevent** that the digital command station will **switch-off the complete layout** if a short circuit occurs within a booster section.

The trains will therefore stop only inside the booster section where the short circuit has been occurred. All other booster sections will remain in function.

To initiate that the **DigitalBooster DB-4** shall **not report a short circuit** to the **digital command station** please **remove the jumper J1**.

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With the output “**Feedback**” of the **DigitalBoosters DB-4** is it possible to inform your **model railway software** if the tracks receive presently digital current from the **DB-4** or if the tracks are switched voltage-free caused by a short-circuit.

6.5. Automatic Switch-On (Auto Go):

With the **jumper J2 “Auto Go”** is it possible to adjust the **DigitalBooster DB-4** that the unit perform a **continuous** check **every 5 seconds** if the **short-circuit is still present**. The **DigitalBooster DB-4** will **supply** current to the connected **track section automatically** if the **short-circuit** has been **eliminated**. The **jumper J2** has be **set** for this function.

The **automatic switch-on** function is **not activated** if the **jumper J2** has been removed.



For **activating** the **automatic switch-on** function “**Auto Go**” has the **jumper J1 “Short Report”** to be removed and therefore is the **DigitalBooster DB-4** **not reporting** recognized short circuits **to the digital command station**.

7. Addresses for WatchDog- and On-/Off switch function:

The **WatchDog-** and the **On-/Off switch** function of the **DigitalBooster DB-4** will be controlled via **accessory addresses (turnout addresses)** which are used as well for the **switching** of **turnouts** or **signals**.

Accessory addresses are combined at **groups of four**. The **addresses 1 to 4** are forming the **first group** the **addresses 5 to 8** the **second group** etc. The **highest valid four-fold address group** for the **programming** of the **DigitalBooster DB-4** is for **Märklin-Motorola data format** the **group 313 to 316** and for the **DCC-data format** the **group 1021 to 1024**.

From our **Web-Site** you can **download** at the **section “Downloads”** the file “**Four-Fold-Address Blocks**” for listing all **valid four-fold address groups**.

The **WatchDog-** and the **On-/Off switch-function** can be **assigned** to an **own** or as well to a **common four-fold address group**. **Separated address sections** for the **WatchDog-** and for the **On-/Off switch-function** are recommended if you use **several DigitalBooster DB-4**. Then is it possible to **release** the **WatchDog-Function** of all boosters via one **common address**.

For the **On-/Off switch function** is it possible to **assign** for this case for each **DigitalBooster DB-4** an **individual address** over an own **four-fold address group**.

The **address** for the **WatchDog-Function** is always the **first address (basic address)** of a **four-fold group**. The **address** for the **On-/Off switch-function** is always the **third address (basic address + 2)** of the **programmed four-fold group**.

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The following **programming samples** are **indicating** how to employ **four-fold address groups** with **8 keys** of a **switch board**.

The **address** has been indicated **between** the **respective pair of keys**.

The two keys **red** and **green** for **each address** are the **two possible switch directions** of this address with reference to the turnout direction **round** and **straight**.

If you use a **remote control LH100** of **company Lenz Elektronik** there will be **red** the **minus-** and **green** the **plus key**.

round / red / -	round / red / -	round / red / -	round / red / -
1	2	3	4
straight / green / +	straight / green / +	straight / green / +	straight / green / +

7.1. Common Address Section:

If there will be a **common four-fold address block** programmed for the **WatchDog-** and the **On-/Off switch function** the **DigitalBooster DB-4** will occupy **4 accessory- or turnout addresses**.

WatchDog inactivated	not used	On-/Off sw. Funktion Stop	not used
round / red / -	round / red / -	round / red / -	round / red / -
1	2	3	4
straight / green / +	straight / green / +	straight / green / +	straight / green / +
activated WatchDog	not used	Go On-/Off sw. Funktion	not used

With the **above table** has been the **DigitalBooster DB-4** programmed for the **WatchDog-** and the **On-/Off switch function** for a **common address section** of **1 to 4**. With the **basic address 1** of the **four-fold address block** will be the **WatchDog-Function** controlled. With the **basic address + 2** and the **address 3** as per sample will be the **On-/Off switch function** controlled.

The **addresses 2 and 4** will **not be used**.

7.2. Own Address Sections:

If there will be **own four-fold address groups** programmed for the **WatchDog-** and **On-/Off switch function** there will be **8 accessory- or turnout addresses** assigned by the **DigitalBooster DB-4**.

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At the following sample the **On-/Off switch function** assign the **four-fold address block 1 to 4** and the **WatchDog-Function** the addresses **5 to 8**.

The **On-/Off switch function** will be controlled by the **address 3** and the **WatchDog-Function** with the **address 5**.

not used		not used		On-/Off sw. Function		not used	
round / red / -	1	round / red / -	2	round / red / -	3	round / red / -	4
straight / green / +	not used	straight / green / +	not used	straight / green / +	Go	straight / green / +	not used
				On-/ Off sw. Function			
<hr/>							
WatchDog		not used		not used		not used	
inactive	5	round / red / -	6	round / red / -	7	round / red / -	8
active	WatchDog	straight / green / +	not used	straight / green / +	not used	straight / green / +	not used
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7.3. Address Section Programming:

1. **Switch-on** your digital layout incl. **DigitalBooster DB-4** (the **green LED** of the **DB-4** will glow).
Depress 1x short the key **S1** next to the jumpers of the **DB-4**. Now the **green LED** flashes. This indicates that the **DB-4** is in the **programming mode** for the **address-section** of the **On-/Off switch-function**. During the **programming process** is the track section which is **connected** to the **DB-4** switched voltage free.
2. **Switch** now **one turnout** from the **group of four** which has been selected for the **address section** of the **On-/Off switch function** via the **keyboard** of the **digital command station** or the **remote control**. For **programming the address section** you can send as well a **turnout signal** via your **model railway software**. The **transmitted data format (DCC or Märklin-Motorola)** has to **match** the **data format** you have selected with the **jumper J4**.

Remarks: It does not matter which of the **four addresses** from a **group** you will use for **programming**.

If the **DigitalBooster DB-4** understands the **address** the **DB-4** will confirm the assignment by **flashing the green LED a little faster**. Following the **green LED** will **flash slower** again.



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The **programming** for the **on-/off switch function** is now **completed** but can be repeated at any time.

3. **Depress** now again the **key S1** to come into the **programming mode** for the **address section** of the **WatchDog-Function**. The **red LED** flashes.
4. **Switch** now **one turnout** from the **group of four** which has been selected for the **address section** of the **WatchDog-Function** via the **keyboard** of the **digital command station** or the **remote control**. For **programming the address section** you can **send** as well a **turnout signal** via your **model railway software**.

Remarks: It is possible to **select** for the **WatchDog-Function** the **same address section** as you used already for programming the **On-/Off switch function**. But you can select as well an **own four-fold address block** for the **WatchDog-Function**.

If the **DigitalBooster DB-4** understands the **address** the **DB-4** will **confirm** the assignment by **flashing the red LED a little faster**. **Following** the **red LED** will **flash slower** again. The **programming** for the **On-/Off switch function** is now **completed** but can be repeated at any time.

Leave now the **programming mode** of the **DB-4** by depressing again the **programming key S1**. The **programmed addresses** are now **permanently stored** but can be **changed** at any time by **repeating** the **programming process**. Now the **green LED** will **glow** and the **track section** which is **connected** to the **DB-4** will get **supply of digital voltage**.

8. WatchDog: Communication with the Model Railway Software:

If your **model railway software** supports the **WatchDog-Function** of the **DB-4** respectively our **WatchDog-Decoder WD-DEC** please register in your **model railway software** your selected address for the **WatchDog-Function**. It is always the **first address (basic address)** of the selected **group of four**.

Function:

After switching-on the **DigitalBooster DB-4** is the **WatchDog-Function** not activated to enable the **operation** of the **model railway layout** eventually **without PC-control** via the **digital command station**.

The **model railway software** can **activate** the **WatchDog-Function** with the **command basic address "straight"** and has to **confirm** always **within 5 seconds** with a **new command basic address "straight"**. If there is **no confirmation within 5 seconds** the **model railway software** has **lost control** over the **model railway layout**. The **Digital Booster DB-4** will switch the **track voltage free** and **all trains will stop immediately**. The **red LED** of the **DB-4** will **flash** and **indicates** therefore the **switch-off situation**.



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After a **new start** of the **digital command station, PC** and **model railway software** the **DigitalBooster DB-4** will react immediately to the **received commands** and will **supply** again **digital current to the tracks**.

If the **model railway software** will be **finalized** the software will **deactivate** at first the **WatchDog-Function** with the command **basic address “round”** and the **layout** can now **operate without PC** via the **digital command station**.

9. DB-4 switching On and Off via Accessory Address:

The **DigitalBooster DB-4** can be **switched On and Off** via an **accessory address** (**turnout command**). Address **programming** explained in **chapter 6**.

The **DigitalBooster DB-4** can be **switched Off** via the **basic address + 2 “round”** of the **address block programmed** for the **On/Off-switch function**. The **DigitalBooster DB-4** can be **switched On** via the **basic address + 2 “straight”**.

WatchDog or inactive	not used	On-/Off sw. Function Stop	not used
round / red / -	round / red / -	round / red / -	round / red / -
1	2	3	4
straight / green / +	straight / green / +	straight / green / +	straight / green / +
WatchDog or inactive	not used	Go	not used
		On-/ Off sw. Funktion	

The **On-/Off switch function** via **Accessory- or Turnout Address** has no function if the **Jumper J1 “Short Report”** has been **set**.

Jumper J1 "Short Report"	via command station		via accessory address	
	Stop	Go	Stop	Go
set	X	X	-	-
removed	X	X	X	X

“X” indicates switching possible
“-“ indicates switching not possible

10. DB-4 switching On and Off via external push button:

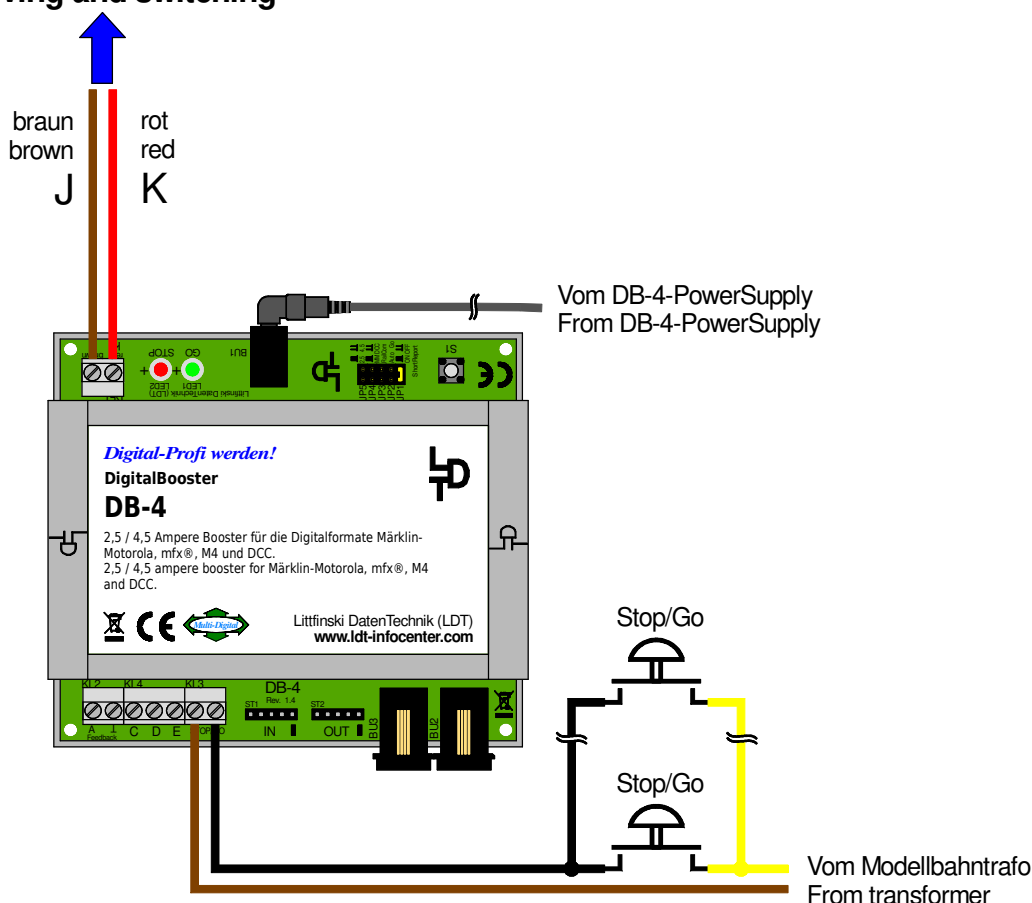
The **DigitalBooster DB-4** can be **switched on and off** with the **external Stop/Go Keys**. These keys can be installed at the **layout rim** and used as **emergency switch-off keys**.

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The external **Stop/Go keys** are only **emergency shut-down keys** if the **jumper J1 “Short Report”** has been set. In this function can be **all boosters** (as well as eventually integrated booster of the digital command station) all together **switched-off**. The **switching-on** of **all boosters** can be done only with the **Go-Key** of the **digital command station**.

If the **jumper J1 “Short Report”** has been **removed** is it possible to **switch** the **DigitalBooster DB-4** which is **connected to the external Stop/Go keys individually On and Off**.

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External Stop/Go-Key connection

Jumper J1 "Short Report"	via command station		via ext. Stop/Go-Key	
	Stop	Go	Stop	Go
set	X	X	X	-
removed	X	X	X	X

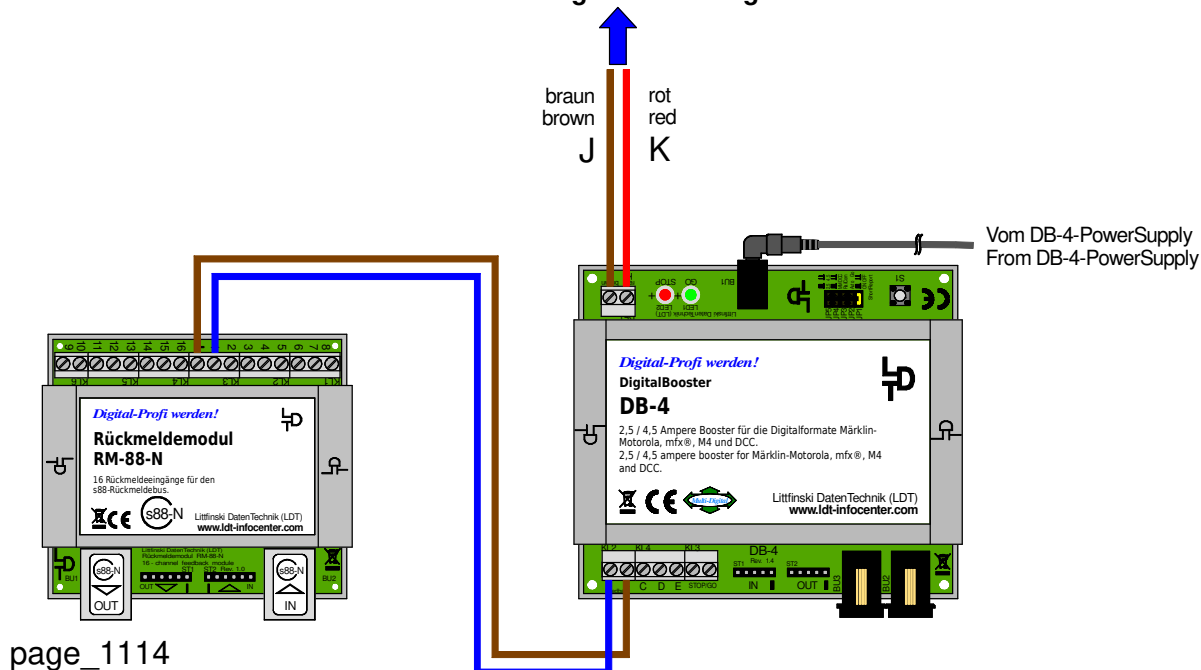
“X” indicates switching possible
“-” indicates switching not possible

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11. Feedback Report for Booster-Management:

The **DigitalBooster DB-4** contains a **Feedback Output** for the information to the **model railway software** if the tracks receive digital current from the **DB-4** or if this has been temporarily interrupted caused e.g. by a **short circuit** or by an **emergency shutdown**.

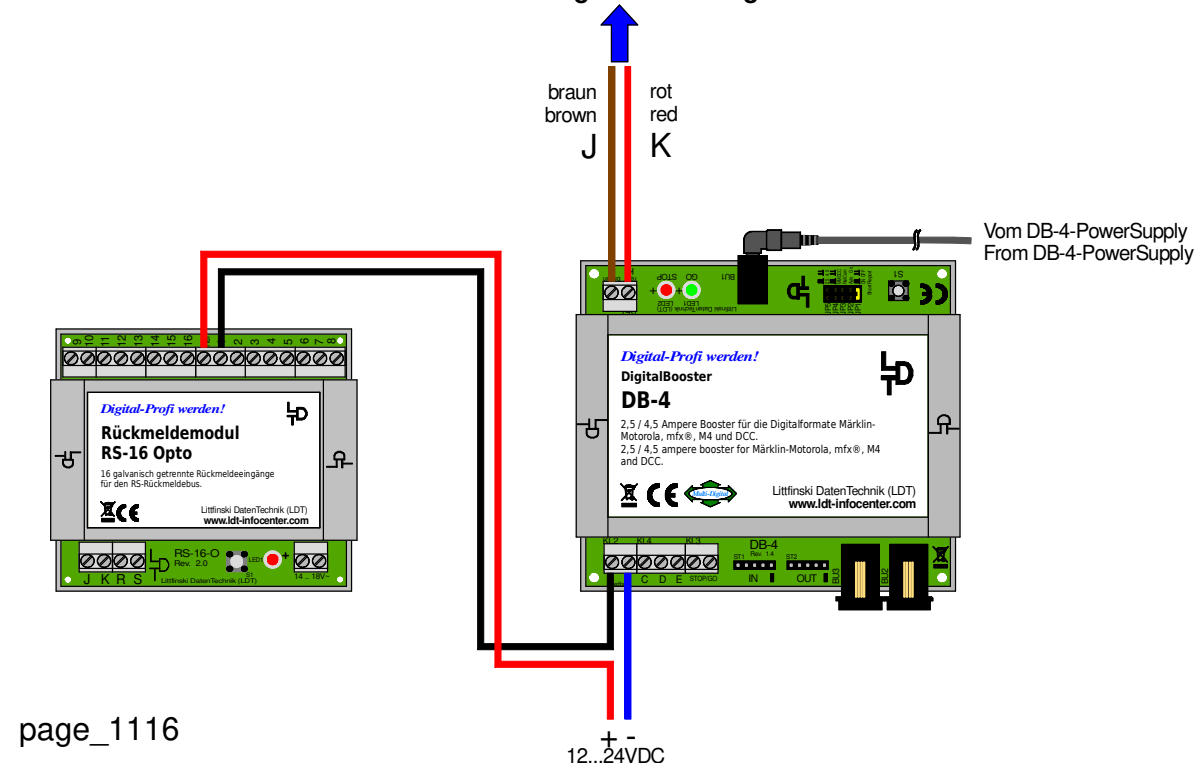
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Feedback report for Booster-Management via RM-88-N (s88-feedback bus)

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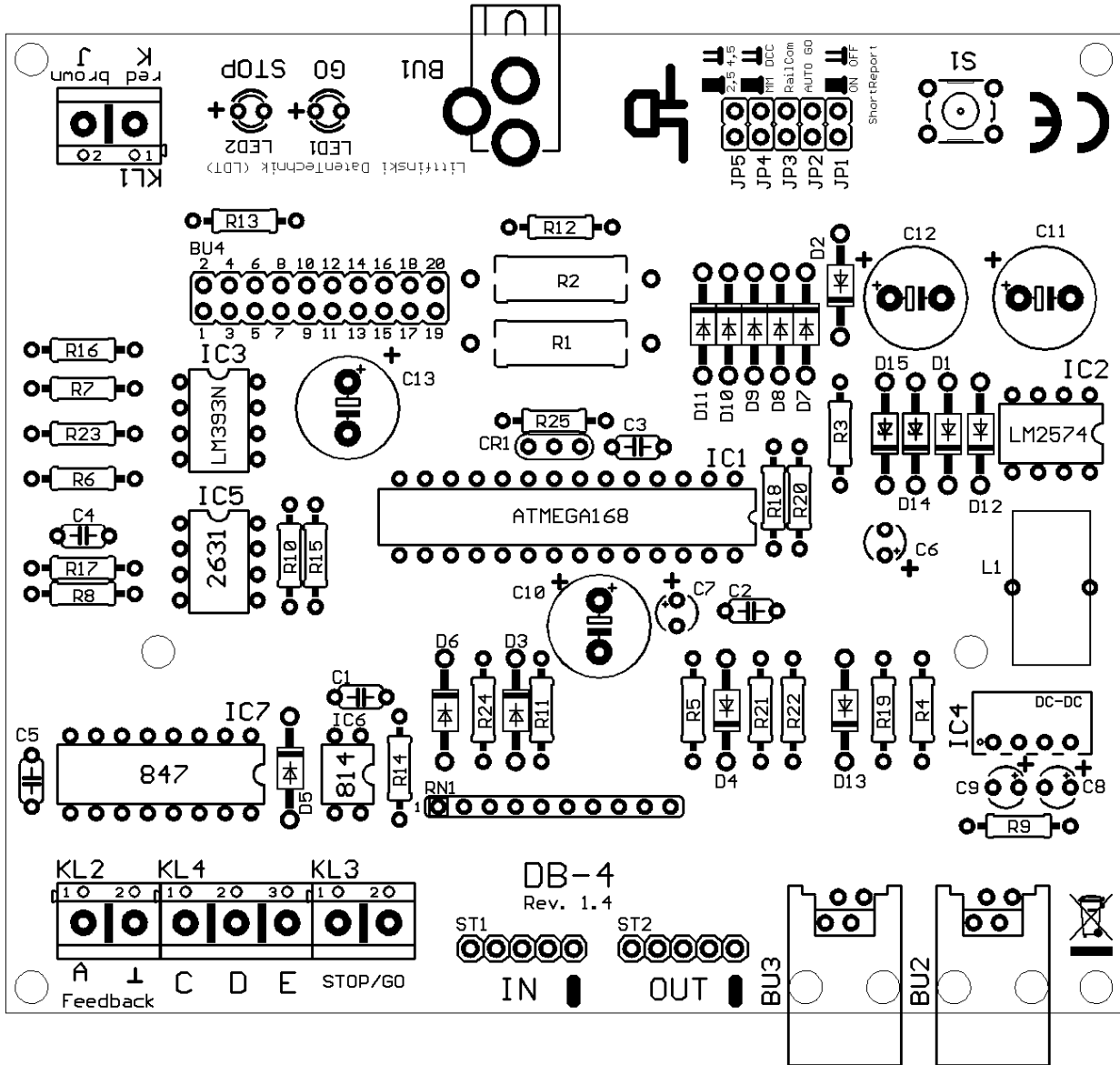
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Feedback report for Booster-Management via RS-16-O (RS-feedback bus)



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12. Assembly Plan of the Basic PC-board:



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