ldt-infocenter DB-4-G Digital Signal Booster Instruction Manual

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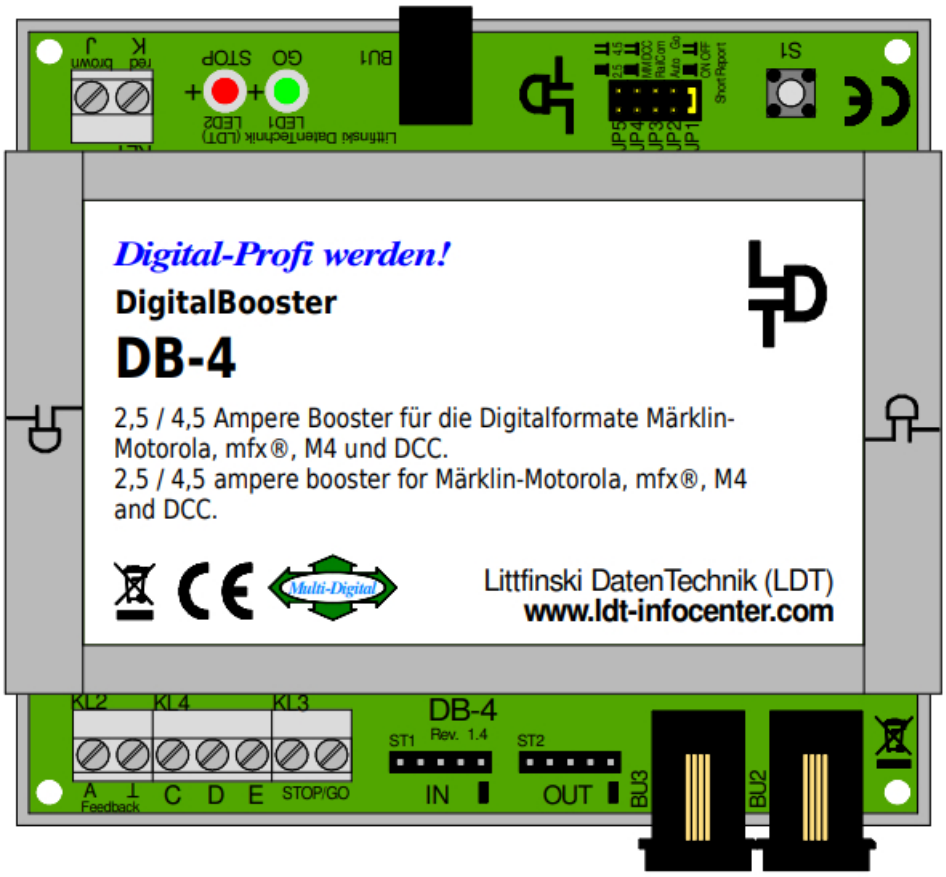
Instruction Manual

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 MärklinMotorola, mfx®, M4 and DCC.



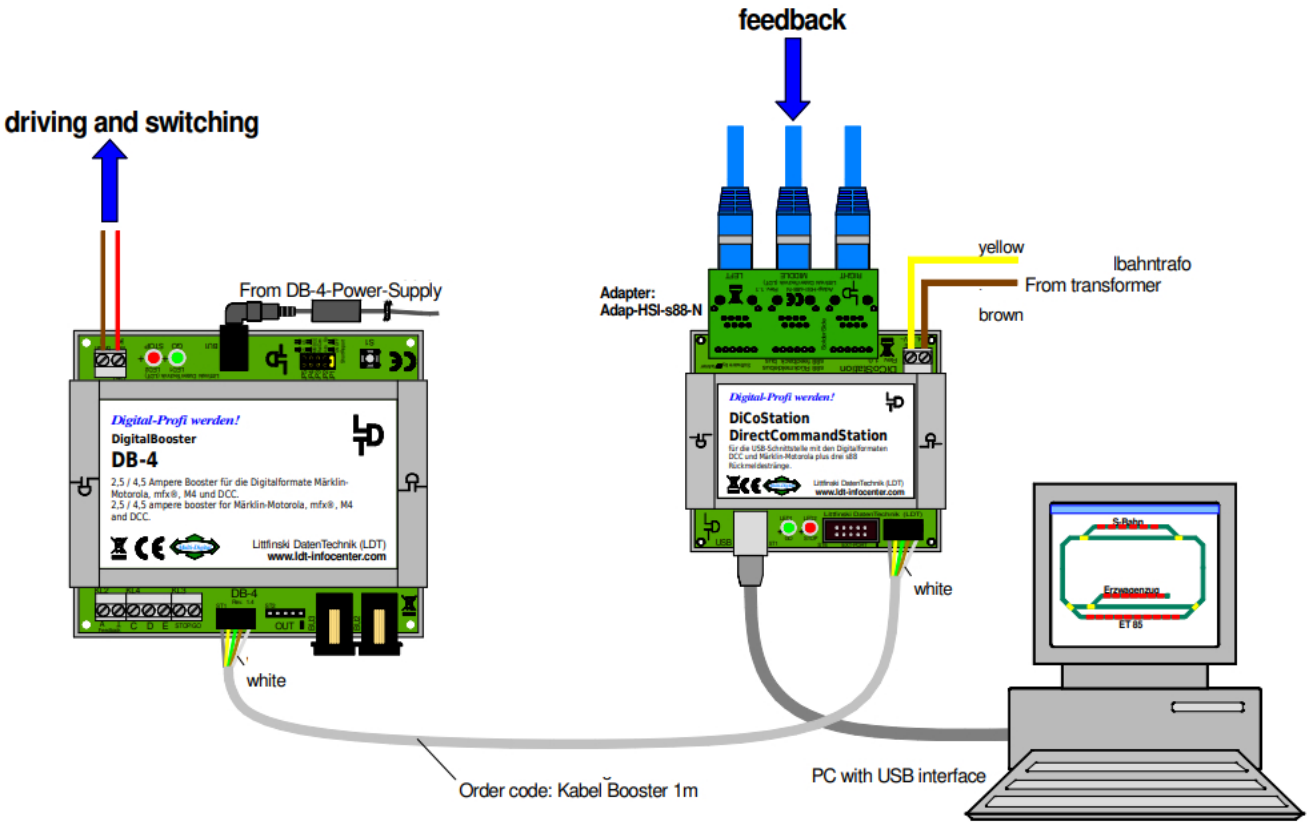
The DigitalBooster DB-4 provides a maximum digital current of 2.5 or 4.5 Ampere and amplifies the digital formats of Märklin-Motorola, mfx®, M4 and DCC.
The DB-4 can operate with several digital command stations by using the 5-poles booster bus, the CDE booster bus or the Roco-booster bus.
The DigitalBooster 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.

Contents

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.ldt-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.



DigitalBooster DB-4 communication with the DiCoStation

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	
I B-Basic		X	
IB-COM		X	
Intellibox 2	X	X	
EasyControl / Red Box	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	

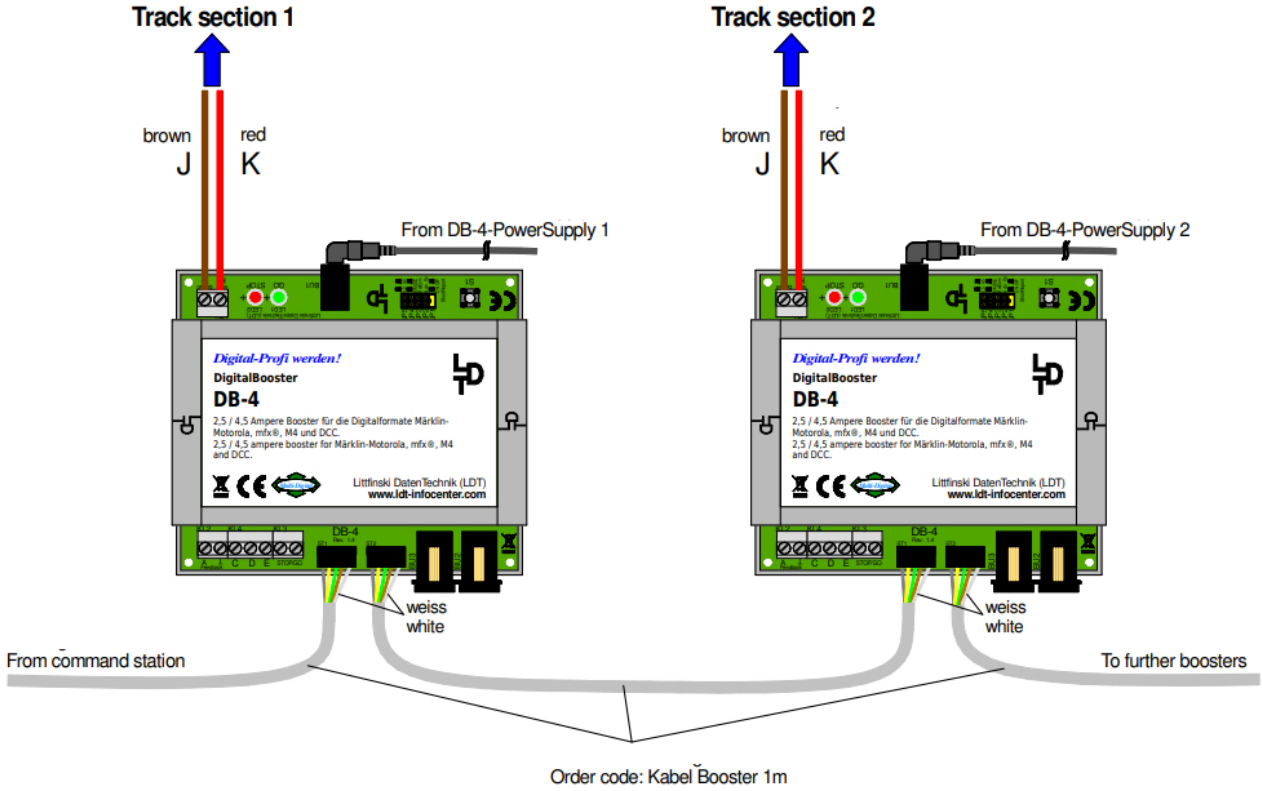
2.1. DB-4 connection via the 5-poles Boosterbus:

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.

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

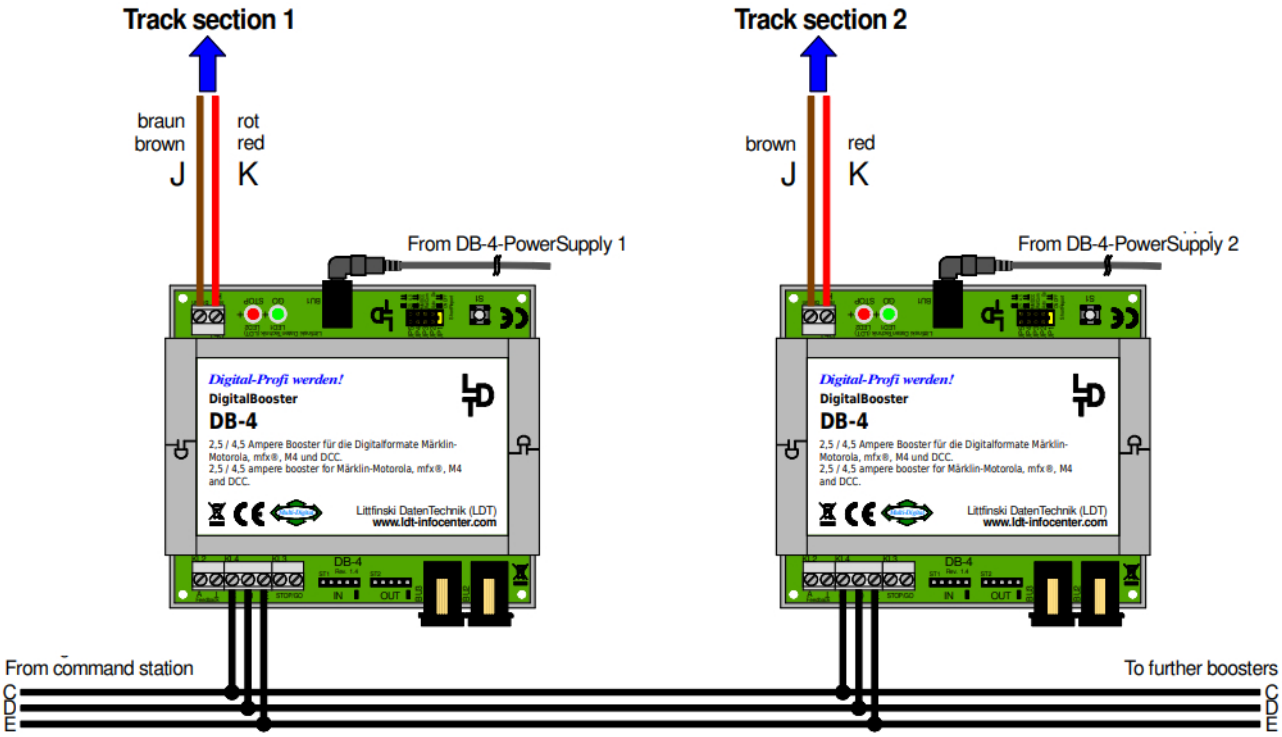
and Power 3 if the direction of the cable shows to the bottom. For the Märklin Booster 6015 is the correct position of the Boosterbus-Cable showing to the top.
The second plug of the boosterbus cable has to be connected at the DigitalBooster DB4 to the pin bar ST1 with the marking “IN”. Please attend 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”).



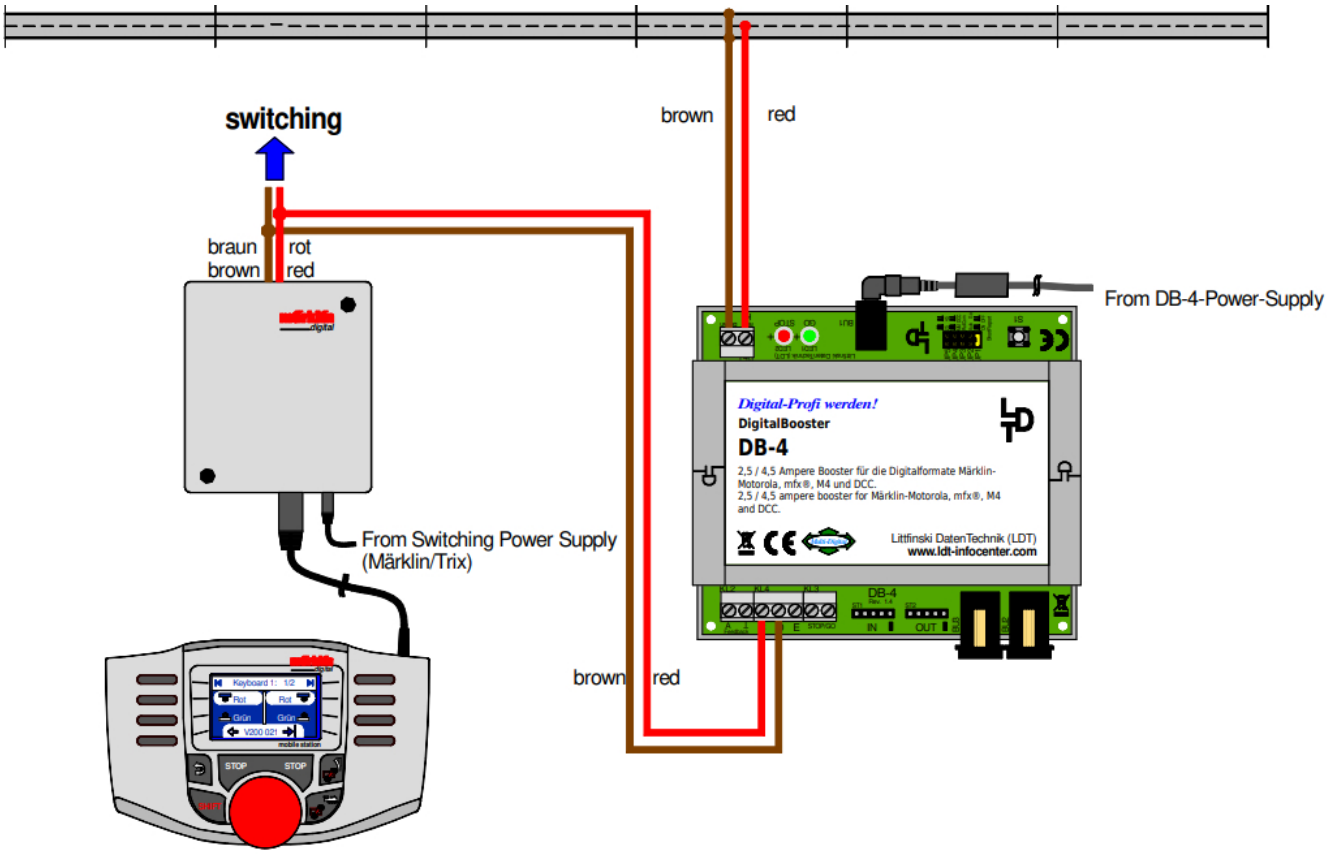
DigitalBooster DB-4 connection to the command station and between each other via the 5-poles boosterbus.

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.



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.

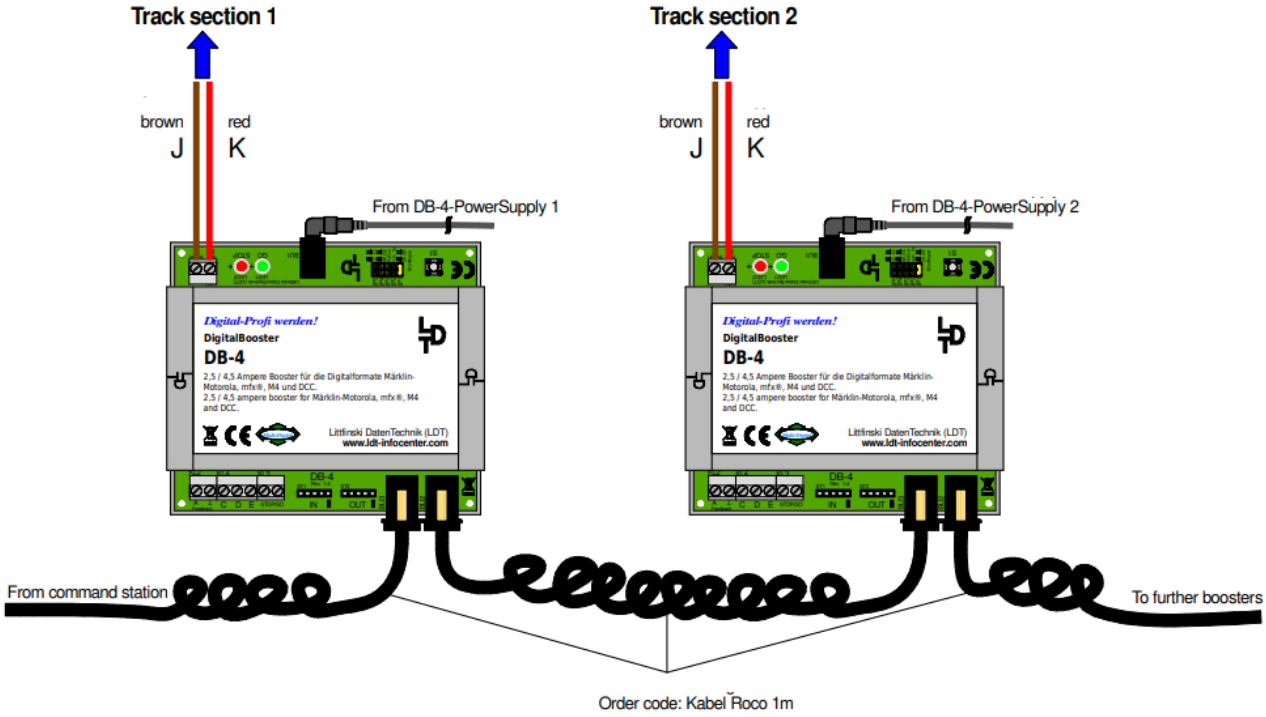


Connection of the DigitalBooster DB-4 via the connection C and D with the Mobile Station 2 and the track-box.

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.



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-4PowerSupply:

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.

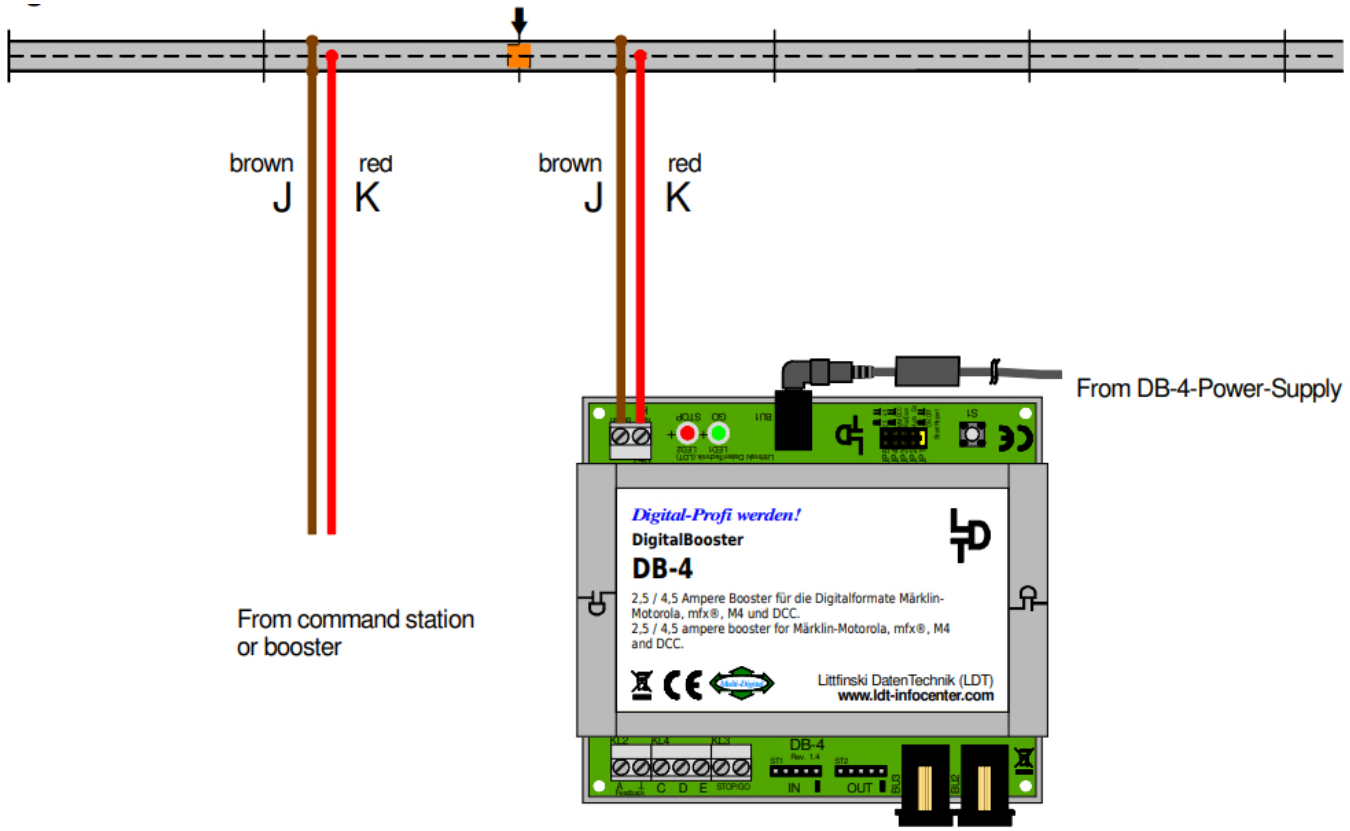
The DigitalBooster DB-4 has been matched to the Switched Mode Mains Power Supply DB-4-PowerSupply and should be operated only together with this particular unit.
At first adjust the voltage selection switch of the DB-4-PowerSupply to a voltage between 15 and 24 Volt. This voltage is corresponding to the digital voltage of the DigitalBooster DB-4 for the supply to the rails.
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.

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.

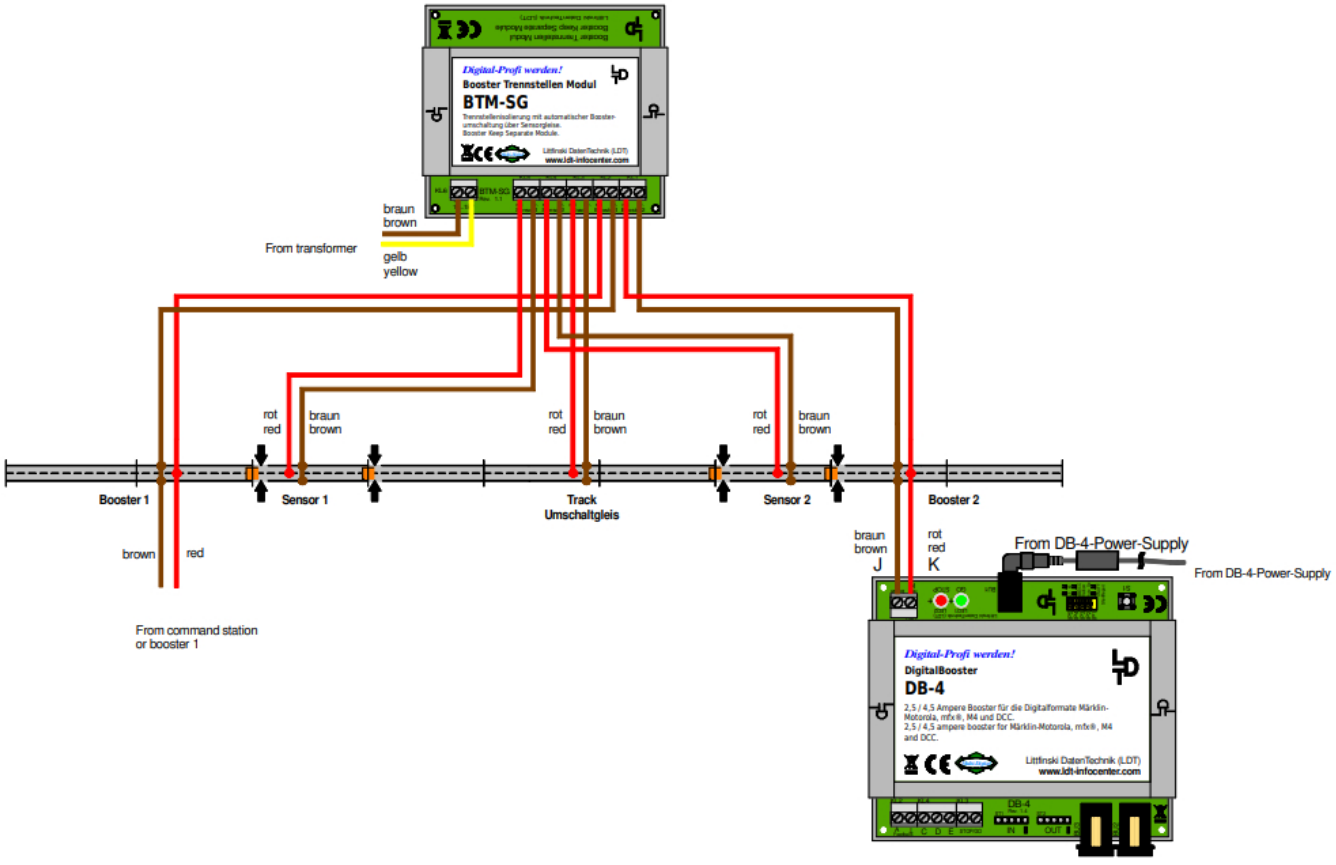
4.1. 3-Conductor Track System:

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

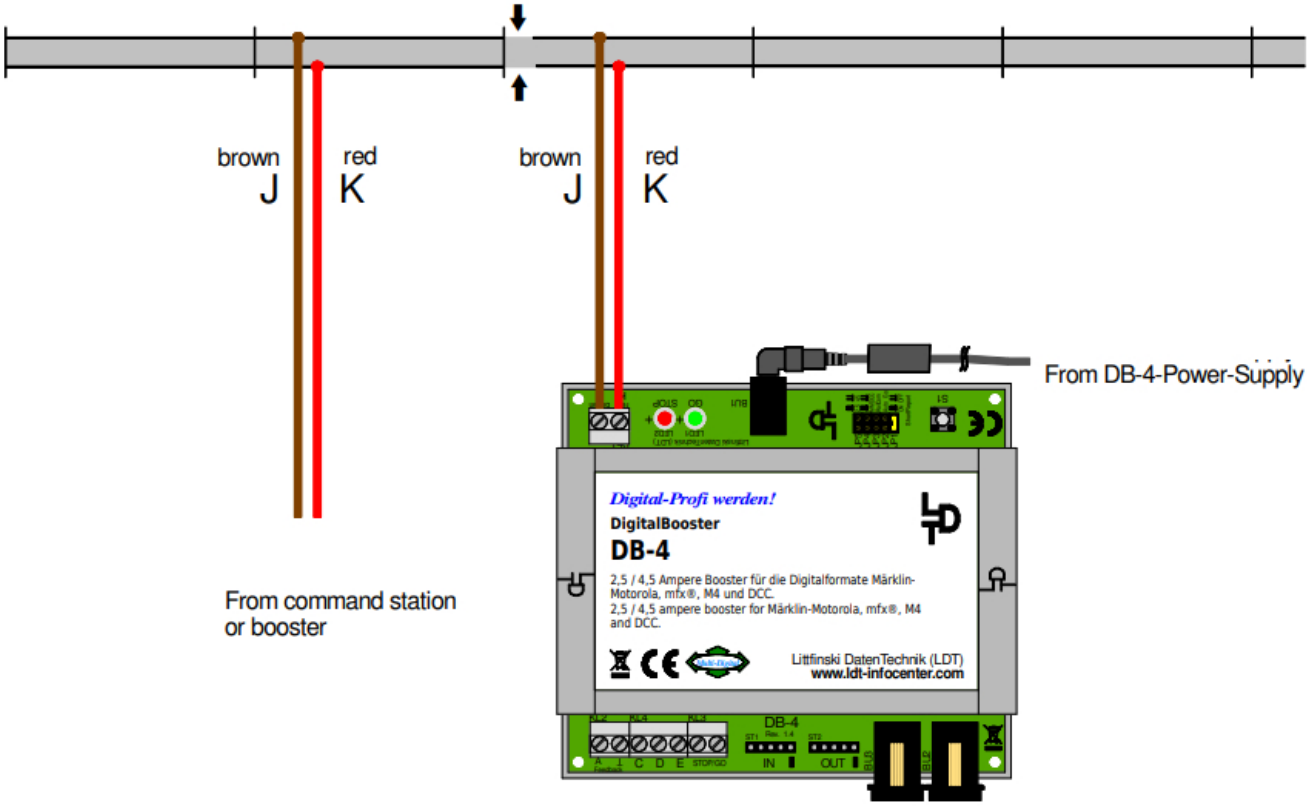
If the manufacturer of the digital command station does not permit a common layout ground (“brown”) it is required additionally to isolate the rails at the cross over joints.
If the manufacturer of the digital command station stipulates mandatory the installation of a rocker switch at the cross sections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



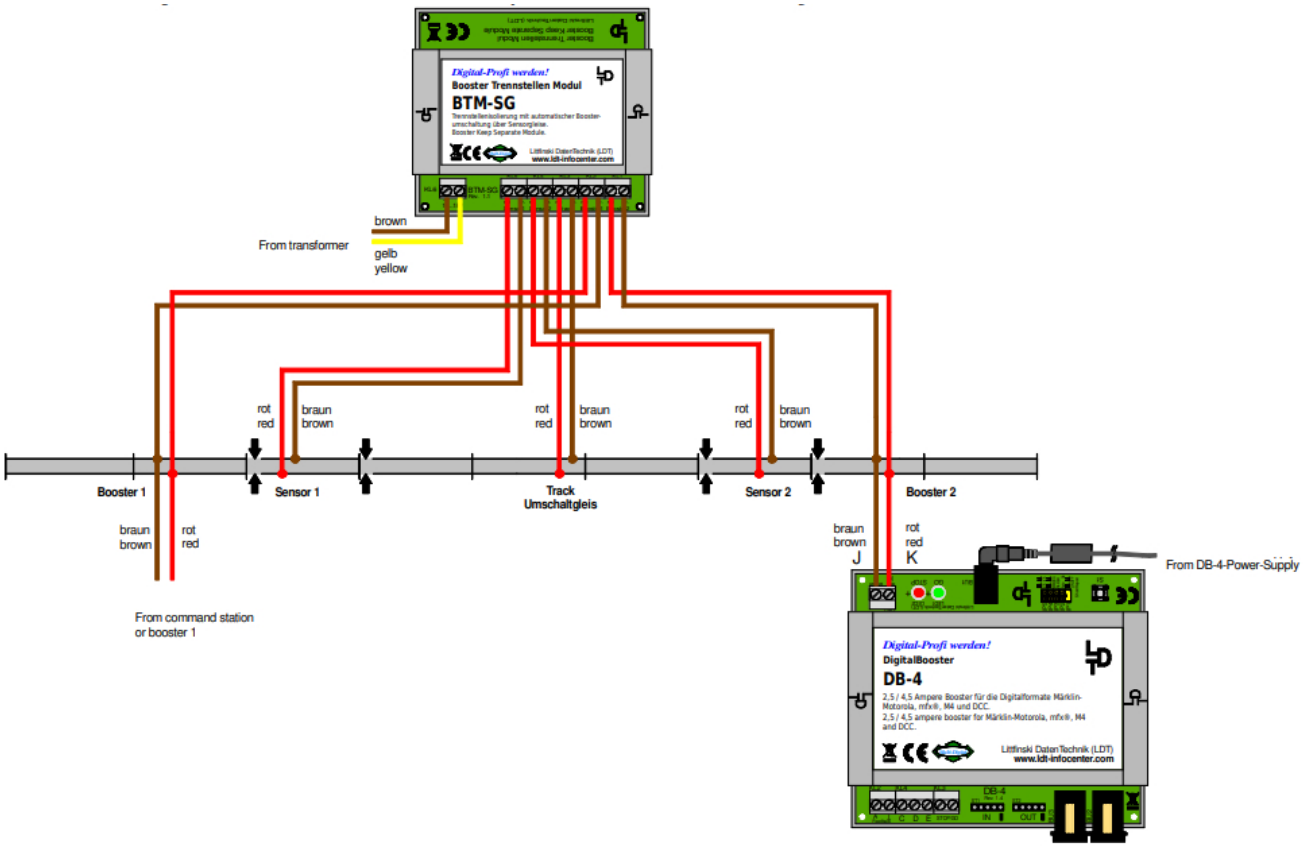
Definite electrical separation of booster sections by implementing the Booster Keep Separate Module BTM-SG.

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.

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”.

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.
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. RailComcutout 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 RailComcutout 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.

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.

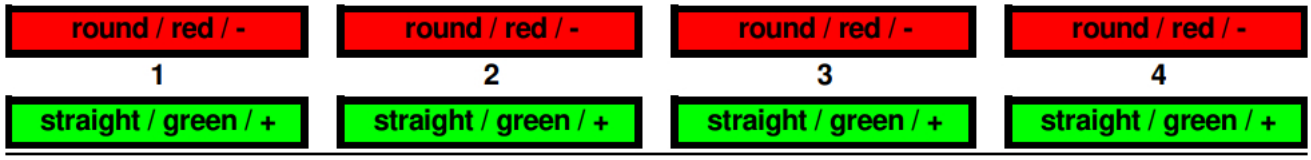
6.5. Automatic Switch-On (Auto Go):
With the jumper J2 “Auto Go” is it possible to adjust the DigitalBooster DB-4 that the unit perform a continuous check every 5 seconds if the short-circuit is still present.
The DigitalBooster DB-4 will supply current to the connected track section automatically if 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.

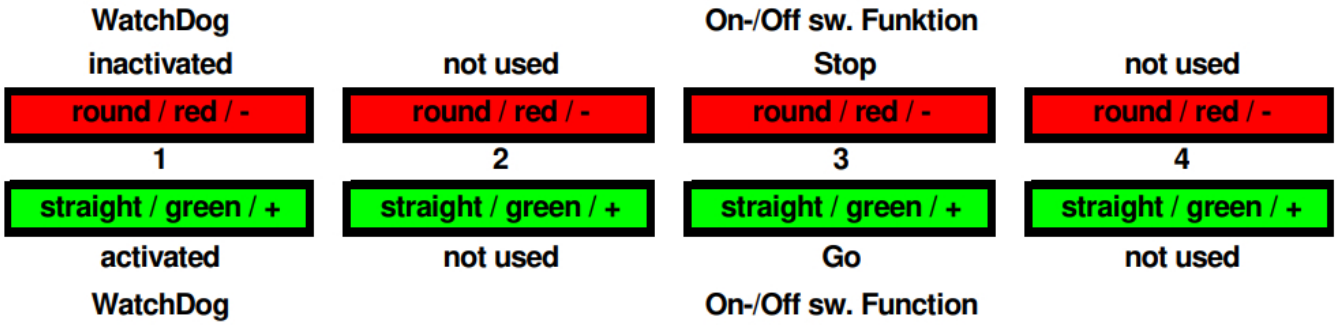
Addresses for WatchDog- and On-/Off switch function:

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-FoldAddress 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.
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.

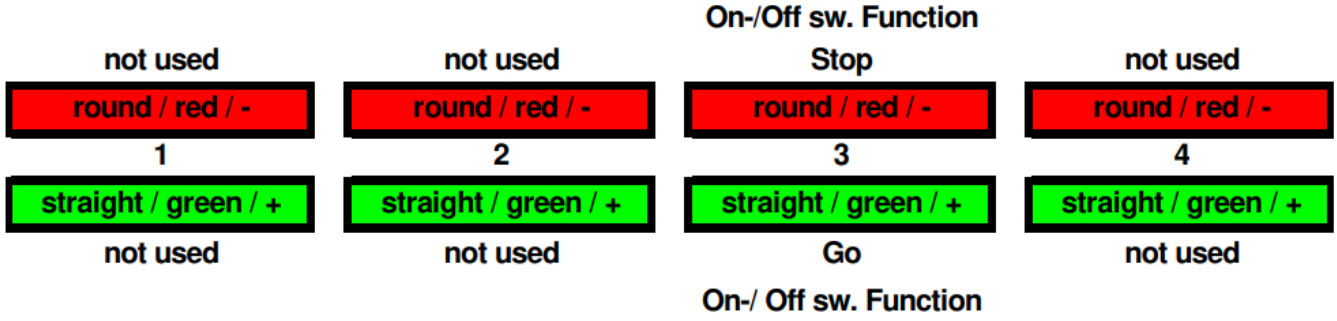


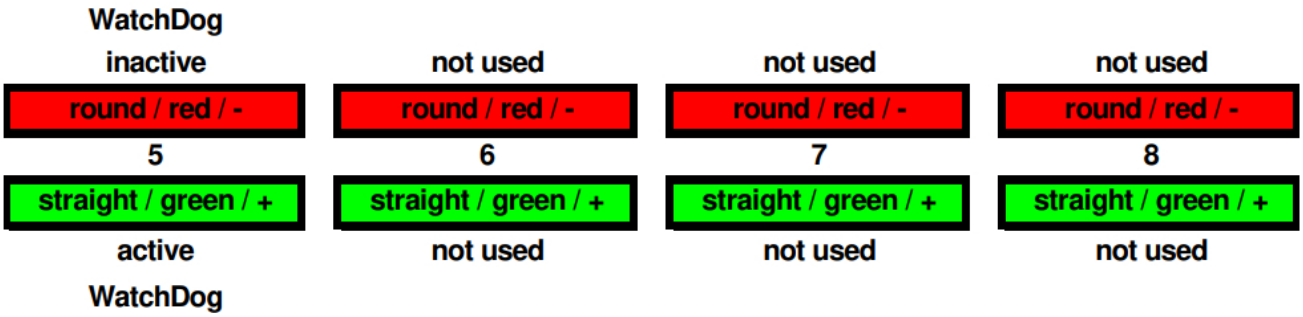
7.1. Common Address Section:
If there will be a common four-fold address block programmed for the WatchDog- and the On-/Off switch function the DigitalBooster DB-4 will occupy 4 accessory- or turnout addresses.



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 WatchDogFunction 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.
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 WatchDogFunction with the address 5.





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.
   The programming for the on-/off switch function is now completed but can 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 WatchDogFunction.
   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.

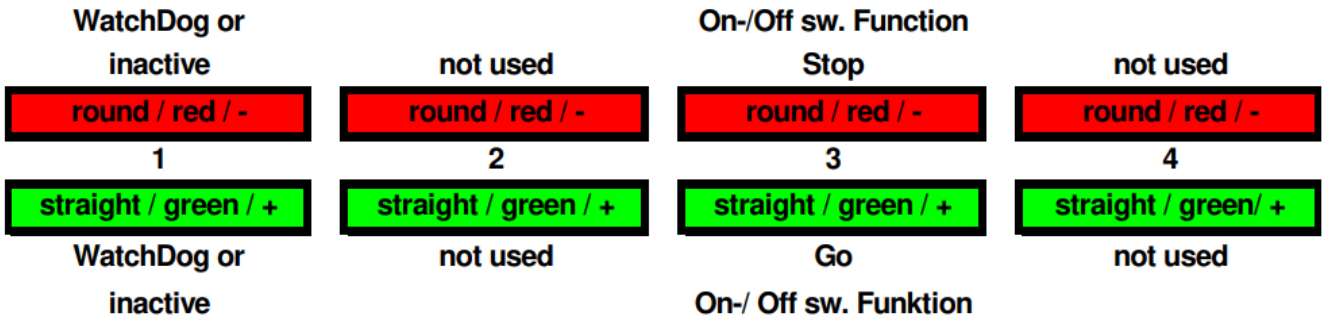
WatchDog: Communication with the Model Railway Software:

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.
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.

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”.



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

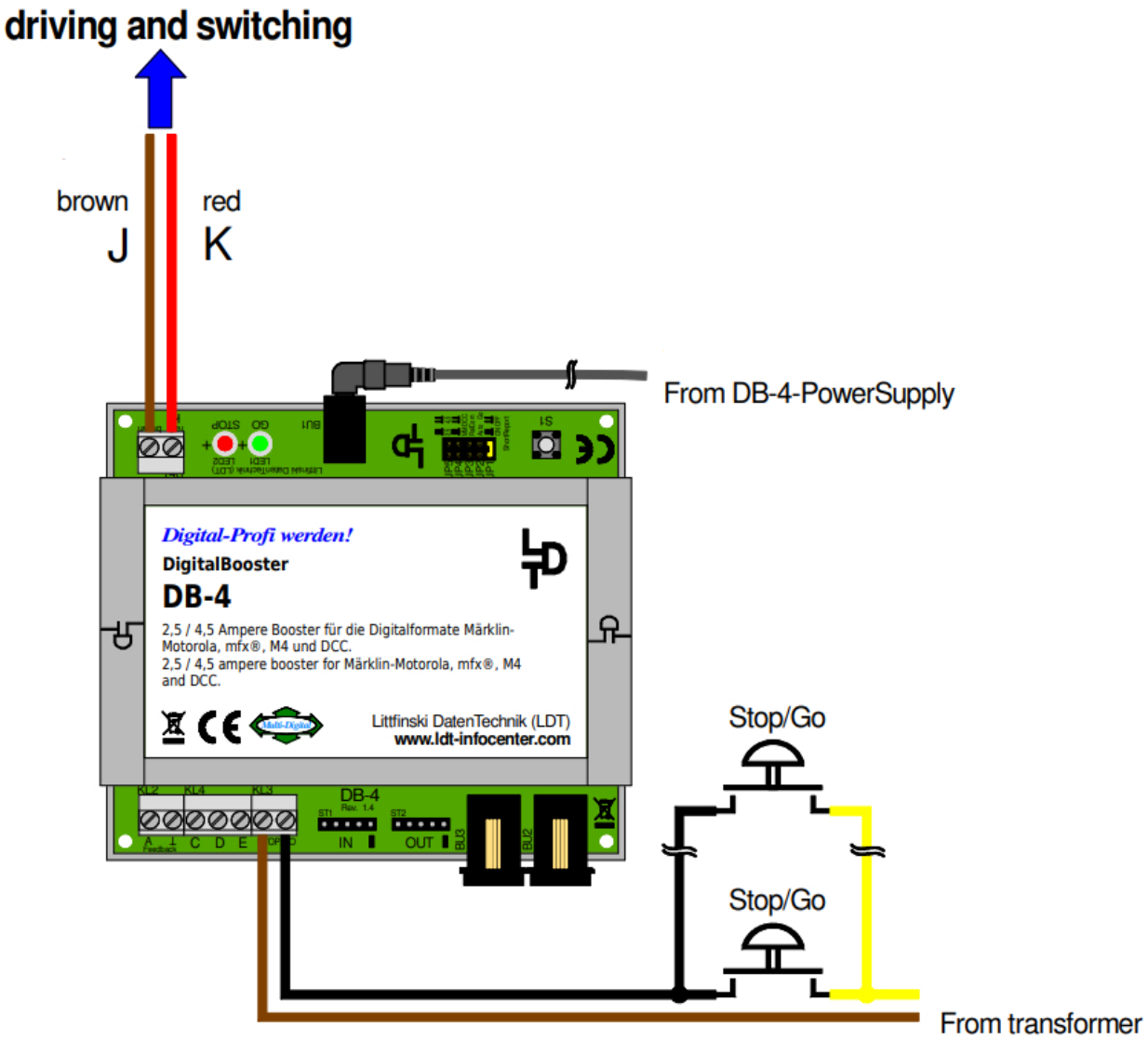
	via command station		via accessory address	
Jumper J1 "Short Report"	Stop	Go	Stop	Go
set	X	X	-	-
removed	X	X	X	X

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

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.

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.

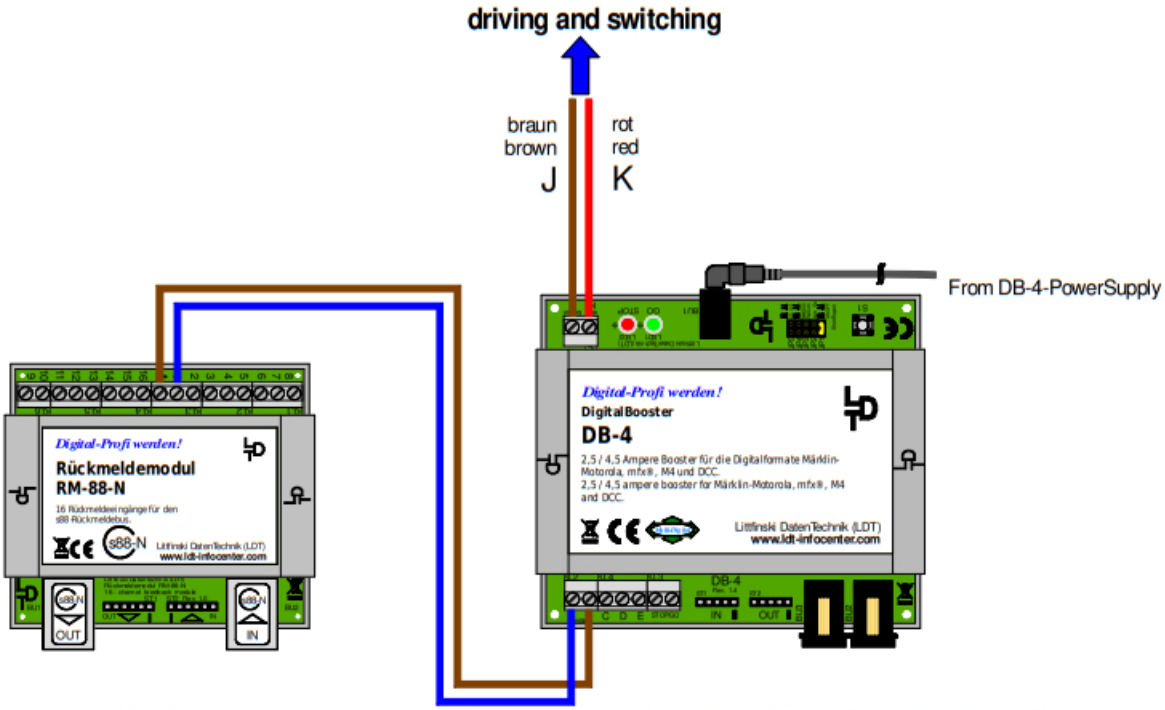


External Stop/Go-Key connection

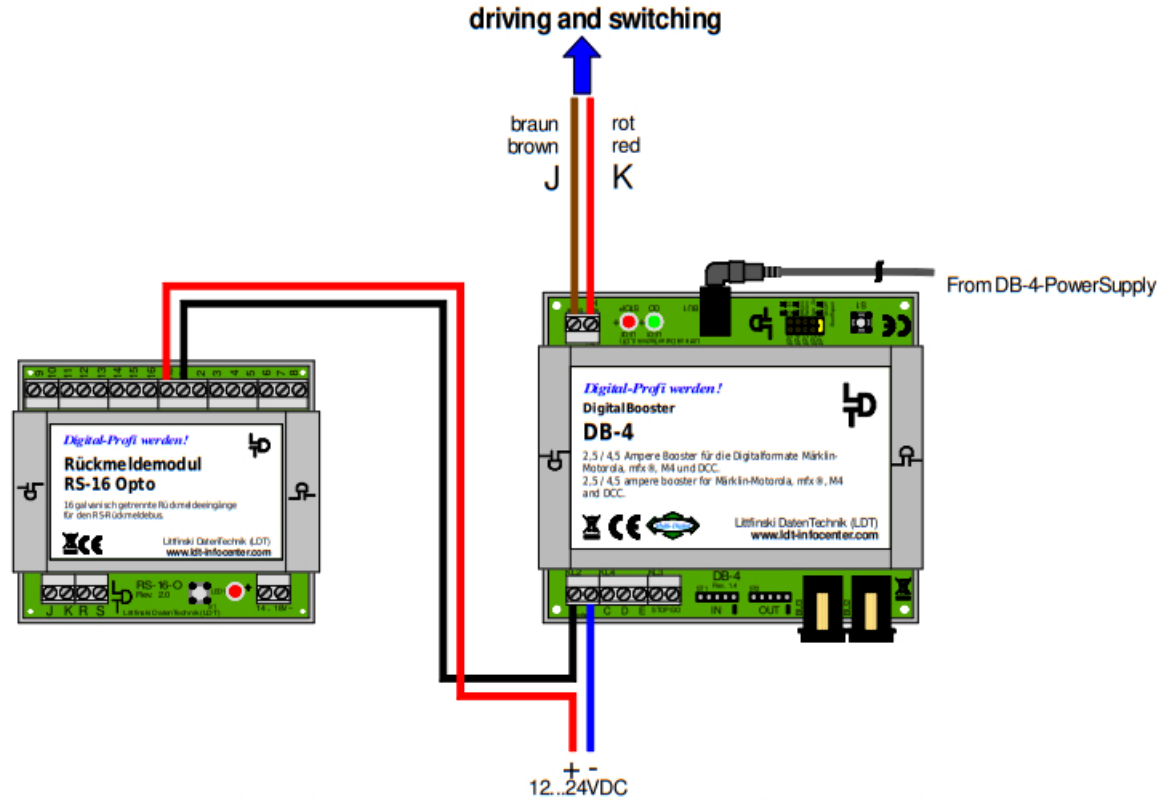
	via command station		via accessory address	
Jumper J1 "Short Report"	Stop	Go	Stop	Go
set	X	X	-	-
removed	X	X	X	X

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.

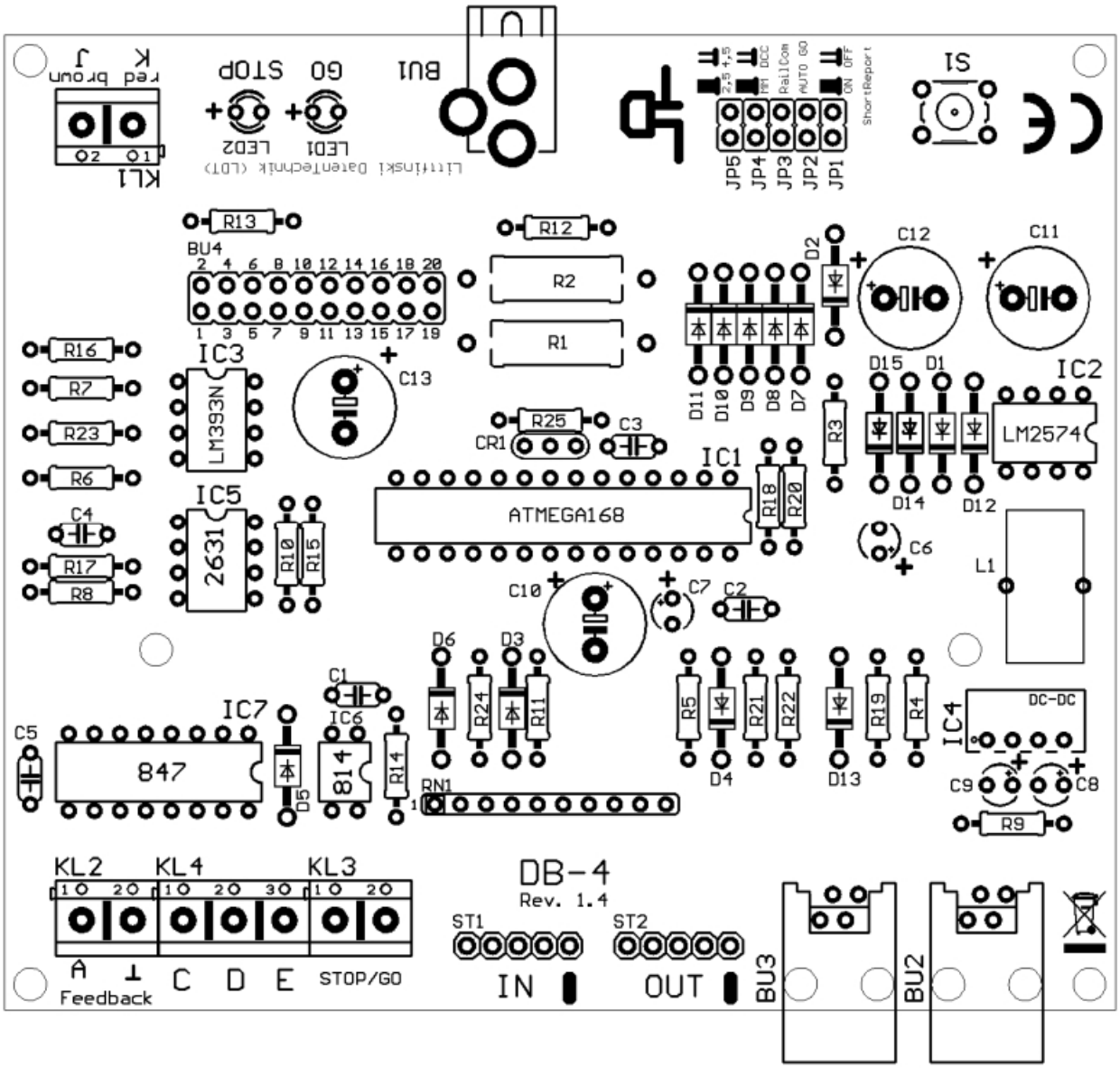


Feedback report for Booster-Management via RM-88-N (s88-feedback bus)



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

Assembly Plan of the Basic PC-board:



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Documents / Resources

	**ldt-infocenter DB-4-G Digital Signal Booster** [pdf] Instruction Manual DB-4-G Digital Signal Booster, Digital Signal Booster, DB-4-G Signal Booster, Signal Booster, Booster, DB-4-G

References

- de:ldt-infocenter [LDT]