Power 3/6

The Multi-protocol Power System

Manual

Uhlenbrock digital

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Part Number 60 560

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1. General Description

1.1 Description

Power 3 and Power 6 are short circuit proof multi-protocol boosters with 3Amp and 6Amp power output respectively. Both have a separately selectable automated reversing loop and can be switched to NMRA compatible DCC braking generator.

All outputs have short circuit protection.

Both devices are compatible with Uhlenbrock, Lenz, Arnold and Märklin control centers.

!!! WARNING!!! WARNING!!! WARNING!!! WARNING!!!

Power 6 must not be installed in layouts using Z, N, TT or HO scales. Operating in such layouts can result in short circuits which can eventually damage both tracks and rolling stock.

1.2 Technical Specification

Maximum Input Voltage

18V AC

Maximum Load from the Layout

3A for Power 3

6A for Power 6

Dimensions

180 x 136 x 80 mm

Transformer power output requirements

Power 3: 52 - 64 VA (e.g. Uhlenbrock 20 070)

Power 6: 150 VA (e.g. Uhlenbrock 20 150)

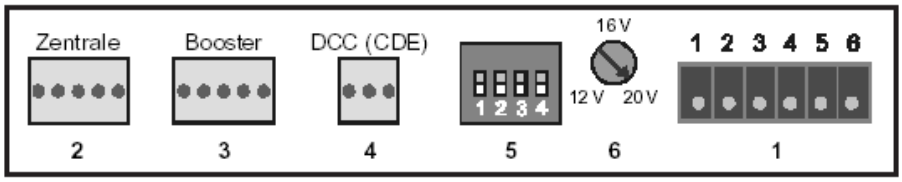
2. Installation

The following section describes the connections to the Power 3 and Power 6 and things to note and be aware of when connecting to individual devices.

2.1 Item on the back of the device

Image 2.11

Connections on the back of the Booster

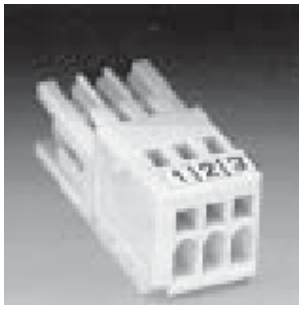


1 6 pole connector: transformer, track, reversing loop
2 5 pole connector: connection to next booster or controller
3 5 pole connector: connection to next booster or controller
4 3 pole connector: connection to DCC-controller
5 4 way DIP switch: Operating mode selection
6 Rotary Potentiometer: setting of max. Output Voltage

2.2 Connecting to the Connectors

Image 2.21

Individual connections of one of the plugs



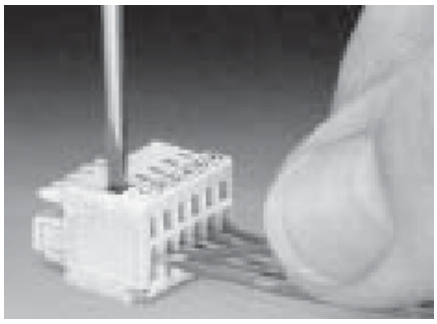
To connect the transformer, track, reversing loop and DCC-control centre to the booster, two connectors are used.

The connecting cables are made from 0.5mm^2 cross-sectional wire with approx. 6mm of the insulation removed from the end, and tinned with solder.

On the 3 pole connector, insert a small screwdriver (2mm) through the holes in the top and gently press down to open the cable clamp. Insert the non-insulated end of the wire into the front of the plug.

Image 2.22

Fitting the cable to the connector



By releasing the screwdriver the cable will be clamped into position to make a reliable connection.

The 6 pole plug to connect the transformer, track and reversing loop is a normal connector with screws to hold the cables.

Image 2.23

Labelling of the individual connections of screw connector

2.3 Connecting transformer, track and reversing loop

The transformer, track and reversing loop are connected to the 6 pole connector and inserted in socket 1.

The connections are as follows:

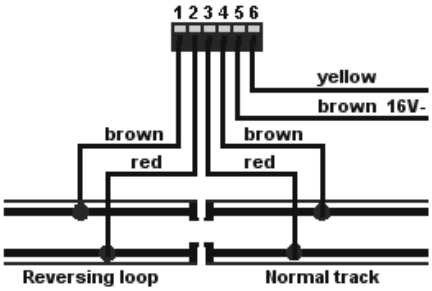


Image 2.31
Connection of 6 pole connector

1 Reversing loop
2 Reversing loop
3 Digital track power (Märklin red)
4 Digital track power Earth (Märklin brown)
5 16V AC input Earth (Märklin brown)
6 16V AC (Märklin yellow)

Transformer

For trouble-free operation the Power 3 requires a min. of 52VA and 16V AC. For full power output we recommend a transformer with 70VA e.g. Uhlenbrock 20070. For operation of the Power 6 a 150VA transformer should be used e.g. Uhlenbrock 20150. It should not have higher output than 18V~.

The transformer is connected to pin 5 (brown) and 6 (yellow) of the 6 pole plug for socket 1.

2-rail track

2-rail track is connected to pins 3 and 4 of the plug for socket 1.

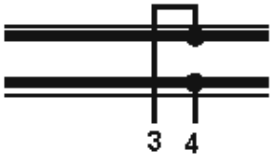


Image 2.32
Connection of 2-rail track

3-rail track

3-rail track (Märklin) the brown wire is connected to pin 4 and the red wire to pin 4.

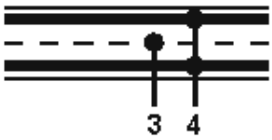
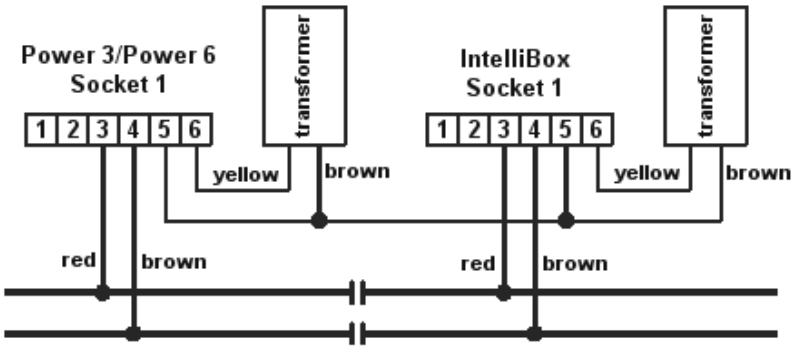


Image 2.33
Connection of 3-rail track

SAFETY ADVICE

When using a Power 3 or Power 6 with an Intellibox or Märklin Center, the 'output earth' of the transformers, booster and controller must be connected together for safety.



Otherwise the booster output of the Intellibox can be destroyed, if the track sections, which are fed by Intellibox and booster, have a potential difference when a train crosses the isotation gap.

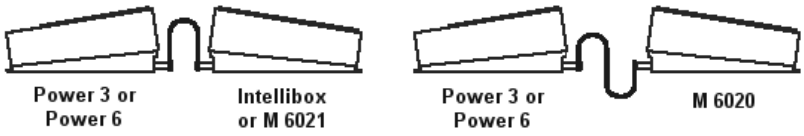
2.4 Connecting to the Control center

You can use either an Intellibox or the Märklin Center as your controller. A flat ribbon cable is supplied for the connection.

Socket 2 from the booster is connected to socket 5 of the Intellibox or to the booster outlet of the Märklin Center.

Image 2.41

Connections of the flat ribbon cable and the various controllers



The plugs must be inserted so the cable goes to the top on Uhlenbrock devices and Märklin center 6021 and to the bottom on the Märklin center 6020.

2.5 Connection of a DCC central controller

DCC controllers are connected to socket 4 of the device. It is possible to use the booster to a Lenz LZ100 controller or an Arnold controller 86200.

Image 2.51

Connections of the 3 pole connector

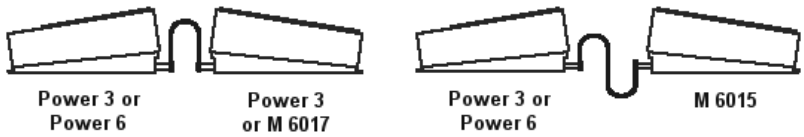
1 C = Signal +
2 D = Signal -
3 E = Short Circuit Indication

2.6 Connection of further boosters

A further Power 3, Power 6, Märklin booster 6015 and 6017 can be connected via socket 3 of the device.

Image 2.61

Connections of the flat ribbon cable between Power3/6 and other boosters



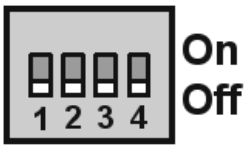
The plugs must be inserted so the cable goes to the top on Uhlenbrock devices and Märklin center 6017 and to the bottom on the Märklin center 6015.

2.7 Selection of operating mode

DIP switch 5 is used to select the device's operating mode.

Image 2.71

DIP switch on the back of the device



1 Switch between Intellibox/Märklin and DCC input
2 Brake generator operation
3 Automatic reversing loop
4 Output limiting

Image 2.72

DIP switch setting

DIP switch	1	2	3	4
Motorola Input	Off			
DCC input	On			
Booster without reversing loop		Off	Off	
Booster with reversing loop		Off	On	
Braking generator operation		On	Off	
Fixed output Voltage of 20V				Off
Variable output of 12-20V				On

3. Booster

3.1 Description

Power 3 has a 3A power output and Power 6 a 6A power output. The outputs of both devices have short circuit protection.

The devices can be connected to various digital control stations. In conjunction with the Intellibox they pass Motorola, DCC and Selectrix protocols to the track.

Together with controllers from Märklin, Lenz or Arnold they pass the protocols of those controllers.

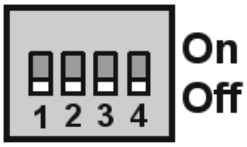
For technical reasons operating together with a Selectrix controller is not possible.

3.2 Selecting the socket for the control signal

Power 3 and Power 6 can accept control signals Motorola or DCC controllers. The input socket used depends on the control signal format used. The DIP switch on the back of the device must have the correct setting.

Image 3.21

DIP switch on the back of the device



Switch 1 OFF – if the device is connected to an Intellibox or Märklin center via socket 2

Switch 1 ON – if the device is connected to a DCC controller (Lenz LZ100, Arnold 86200) via socket 4.

3.3 Variable output voltage

Power 3 and Power 6 output voltage is dependant on the transformer used and the load presented by the layout. If a normal 16V model railway transformer is used, the maximum track voltage without load is 20V. Power 3 and Power 6 are factory set to a fixed 20V output.

If DIP switch 4 is switched to ON, with the aide of a small screwdriver, the rotary potentiometer beside the DIP switch can be used to set Power 3 and Power 6 output voltage in the 12V – 20V range.

Switch 4 OFF – fixed output voltage of 20V

Switch 4 ON – variable output voltage of 12V – 20V

3.4 DCC input without feedback to the controller

In the event that a track section is connected to a booster that doesn't report short circuits back to the controller, the DCC input must be connected back to the controller. In this case only the C- and D- connections are made (see Connection of a DCC central controller).

In the event of a short circuit the booster turns the track power off. After approx. 10 seconds the track power is switched back on. If the short circuit is still present it will switch off for a further 10 seconds.

NOTE If this method of operation is used with an Intellibox it will not be possible to run Selectrix locomotives on the booster's circuit.

4. Automatic reversing loop

4.1 Description

Just as in analog, when installing a reversing loop in a 2-rail digital layout, you are presented with a short circuit. The booster switches off. The short circuit is avoided by having an insulated section within the loop and operating it via a specialized module. Then the vehicle can travel around the loop without interruption.

Power 3 and Power 6 have such a reversing loop module for 2-rail operation (DCC, Märklin gauge 1, Selectrix) with separate outputs. It is possible to connect a number of loops of which only one is used at a time.

4.2 Activating the reversing loop module

To operate the Power 3 and Power 6 boosters with a reversing loop the DIP switch on the back of the device must be changed.

Switch 3 ON – to active the reversing loop

Switch 4 OFF – to turn off the braking module

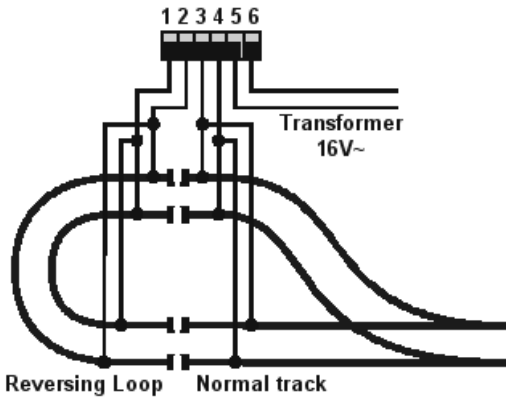
To operate a reversing loop with a Power 3 or Power 6 the braking module must be switched off.

4.2 Wiring

Image 4.21

Connection of a reversing loop

Wire the reversing loop using the 6 pole connector in socket 1 of the device. As shown in the sketch, the loop is wired to pins 1 and 2 and the normal track to pins 3(red) and 4 (brown).



VERY IMPORTANT The reversing loop must be isolated at both ends.

IMPORTANT The track that joins (but is insulated from) the reversing loop at its ends must be powered from the same booster as the reversing loop.

Because the reversing loop automation is activated by locomotives crossing the insulation gaps, the power connection to both the reversing loop and normal track should be close to the isolation gap.

5. Brake generator

5.1 Description

The brake generator is used so that locomotives with DCC decoders can have the decoder controlled to brake before a red signal.

To achieve this, a special braking signal is used. Furthermore, you must ensure that you can't get a short circuit when the isolation gaps between normal and braking sections are crossed.

The braking generator monitors every individual braking section. As soon as a train has fully entered the section the drive power is switched from the normal booster to the braking generator.

5.2 Socket selection for the control signal

Power 3 and Power 6 can receive its control signal from Motorola or DCC controllers. The socket used to connect the controller depends on the format being used. Besides this the DIP switch must be set to the correct selection.

Switch 1 OFF – if the device is to be connected to an Intellibox or Märklin center via socket 2

Switch 1 ON – if the device is connected to a DCC controller (Lenz LZ100, Arnold 86200) via socket 4.

5.3 Mode selection

To operate a Power 3 or Power 6 as a braking generator the DIP switch on the back of the device must be changed.

Switch 2 ON – to turn the braking generator on

Switch 3 OFF – to turn the braking generator off

5.4 Wiring

Install a 'drive' and 'holding' section in the approach to every signal. These are switched over by the relay as soon as a train which is stopped in the holding section is released.

To avoid short circuits the drive section before the holding section must be at least as long as the longest trains to drive that track.

The length of the holding section must be long enough for the locomotives to be able to stop within the section using the chosen brake settings.

As the relay with train control you can use e.g. track occupation detector with relay (GBM 43400).

The power control can be done with a further Power 3 (65600), Power 6 (65650) or Märklin booster (6015 or 6017).

Switch S1 must be normally open. It can be a switch from a signal or a relay contact.

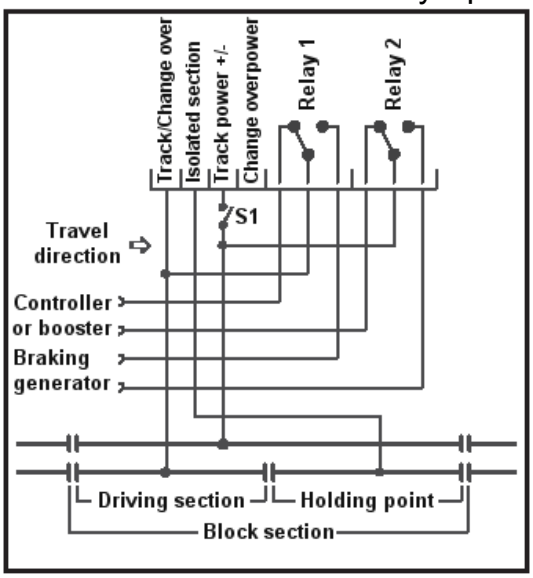


Image 5.41

This is how a braking section approaching a signal can be implemented with a GBM

When the signal is "green" the switch must be open so that the track occupancy detector is idle.

In this case the digital power to the entire section is provided by the Intellibox or the booster.

When the signal is "red" switch S1 must be closed so that the occupancy detector (e.g. GBM 43400) can monitor the holding section.

If a train is detected in the holding section, the occupancy detector switches the power for the entire block section to the control of the braking generator.

5.5 Brake generator without connection to the controller

If the booster is to be used as a brake generator without short circuit reporting and without shutdown capability from the central controller, it must be set to Brake generator mode and Märklin signal format. In this case the connecting cable to the central controller can be removed.

In the event of a short circuit on the braking section, the booster will shutdown for approx. 10 seconds. After this it will automatically turn back on. If the short circuit is still present it will shutdown for a further 10 seconds. The braking section can not be switched off from the control center.

6. Error Indication

Power 3 and Power 6 error indication is by different blinking combinations of the red and green LEDs

Green LED on – red LED off

"go" key pressed

Track power is switched on (normal operation)

Red LED on – green LED off

"stop" key pressed

Track power is switched off by the controller

Green LED on – red LED blinking

Short circuit on the track

LEDs blinking alternately 1 x red – 1 x green

Over heating, track power is switched off

LEDs blinking alternately 1 x red – 2 x green

No input signal from the Intellibox or Märklin Center

LEDs blinking alternately 1 x red – 3 x green

A foreign potential is on the track output at power on