



Please read this sheet before running your locomotive

Introduction

Thank you for your choice of this Bachmann DCC Onboard locomotive. The locomotive has a high quality DCC decoder incorporating back EMF monitoring for fine control of the motor at low speed. 'Back EMF' is the electromotive force that is generated by the rotation of the motor, against the supply of power to the motor.

Features

- ▶ High frequency 31.25Khz pulse power for quiet operation
- ▶ User configurable Back EMF control
- ▶ 3 function outputs to control functions (where fitted) on the locomotive (eg lighting)
- ▶ Function button controlled reduced shunting speed
- ▶ Function button selectable inertia
- ▶ NMRA DCC with 14, 28, 128 speed steps
- ▶ 2-digit addresses (1 to 127)
- ▶ Overload protection on outputs
- ▶ Accepts all programming methods
- ▶ Operable on DC controlled layouts
- ▶ Supports Lenz® brake sections

Technical specification

| | |
|----------------------------|--------------------------|
| Current carrying capacity: | |
| Motor Output | 700mA |
| Function outputs | 180mA each – total 350mA |
| Speed steps | 14,28,128 |
| Addresses | 1-127 |
| Dimensions | 25.5 x 15.5 x 4.5 mm |

Important default values

Address 03, 28 speed steps

Important:

- The decoder is designed for use in model railways only
- Avoid mechanical force and impact on the decoder
- Do not expose to wet and humid conditions
- Do not remove the heat shrink sleeve around the decoder
- Never wrap the decoder in insulation tape, since this may cause overheating
- Make sure that no wires are squeezed or cut when reassembling the locomotive.

Aligning decoder

Plug the decoder into the socket aligning pin 1 (orange) to the mark on the loco PCB. The plug is arranged so that there will be no damage if plugged in reversed, although the loco will run backwards and the lights will not work.

Functions

| | |
|----|------------------------------------|
| F0 | Locomotive directional lighting |
| F1 | 180mA auxiliary output |
| F3 | Shunting speed reduction selection |
| F4 | Inertia on/off |

Use of the model on DC

The default setting for this locomotive will allow it to run on DC. The use of Feedback/PWM controllers with this model is not recommended. Do not use on a layout when an electronic high frequency track cleaner is connected

Decoder harness colour coding

| Pin | Purpose | Wire colour |
|-----|--------------------------|-------------|
| 1 | motor right | orange |
| 2 | rear light | Yellow |
| 3 | function F1 | Green |
| 4 | left rail pickup | Black |
| 5 | motor left | Grey |
| 6 | front light | white |
| 7 | function common positive | blue |
| 8 | right rail pickup | red |

IMPORTANT – Back EMF motor control

The back EMF control used on this decoder will give superb results at slow speed when correctly set. The default CV values are suitable for many motors. However, there may be instability in motor performance when the back EMF control is not matched to the requirements of the motor. If this is found to be the case CVs 53 to 55 should be adjusted to alter the back EMF to suit the motor.

This model has had its decoder CV values tailored to suit its requirements. In case of difficulty please contact your retailer or Bachmann Europe Plc for more advice.

Guarantee

This product is guaranteed for 12 months from the date of purchase against faulty materials or workmanship. During this period it will be repaired or have parts replaced free of charge provided that:-

1 the product is returned to Bachmann Europe plc with evidence of purchase date in accordance with the claims procedure outlined below;

2 this product has not been misused or handled carelessly or used on a voltage supply other than that stamped on the product; and

3 repairs have not been attempted other than by our service staff
Claims procedure:-

Any claim made under this guarantee should be made directly to the manufacturer. The claim itself should be made in a letter setting out the date and place of purchase, and giving a brief explanation of the problem which has led to the claim. This letter should then be sent, together with the product itself and proof of the purchase date (preferably a receipt) to the address below:
PLEASE NOTE that it is essential that the letter of claim reaches the above address on the last day of this Guarantee at the latest. Late claims will not be considered.

This Guarantee applies to all goods purchased from an authorised retailer of Bachmann Europe plc within the United Kingdom of Great Britain and Northern Ireland. This Guarantee does not confer any rights other than those expressly set out above and does not cover any claims for consequential loss or damage. This Guarantee is offered as an extra benefit and does not affect your statutory rights as a consumer

CV Programming

The *Configuration Variables* - CVs - hold values within the processor of the decoder which control its performance characteristics. They can be changed as many times as required using an appropriate DCC command unit or standalone programmer. The table below shows the purpose of and the default value for each CV that is available on this decoder and the range of values each may hold. Some CVs can contain a value from a range (eg start voltage) whilst others use the individual 'bits' of the CV to act as on/off switches for features (eg direction of operation). **Inappropriate CV values may cause the**



decoder to operate incorrectly: if in doubt please take advice from your retailer or Bachmann Europe plc.

Table of CV Values

| CV | Description | | Range | Default | | |
|----|----------------------------|---|-------|---------|-------------------------|-------------------------|
| 1 | Primary Address | | 1-127 | 3 | | |
| 2 | Start voltage | | 1-63 | 3 | | |
| 3 | Acceleration rate | | 0-63 | 8 | | |
| 4 | Deceleration rate | | 0-63 | 6 | | |
| 5 | Max voltage | | 0-63 | 63 | | |
| 7 | Version number | | 0 | 0 | | |
| 8 | Manufacturer ID | ESU | | 151 | | |
| | | | | | Effect when Bit value 0 | Effect when Bit value 1 |
| 29 | Decoder configuration data | | | 6 | | |
| | Bit 0 | Direction of operation | | 0 | Normal | Reversed |
| | Bit 1 | Speed steps | | 1 | 14 | 28/128 |
| | Bit 2 | Loco operates on DC | | 1 | Disabled | Enabled |
| | Bits 3 to 7 | Not used | | | | |
| 49 | Back EMF Selector | | | 1 | | |
| | Bit 0 | | | 1 | Disabled | Enabled |
| | Bits 1 to 7 | | | | | |
| 51 | DC Brake Control | | | 1 | | |
| | Bit 0 | Lenz DC brake mode | | 1 | Disabled | Enabled |
| | Bits 1 to 7 | Not used | | | | |
| 53 | Feedback reference | Determines the back EMF that the motor should supply at maximum speed. The more efficient the motor, the higher this value may be. Reduce this value if the engine does not reach its designed maximum speed. | 0-63 | 42 | | |
| 54 | Feedback Parameter K | Determines the load control effect. The higher the value, the stronger the impact on the motor. | 0-63 | 32 | | |
| 55 | Feedback parameter I | Determines the momentum of the motor. Motors with large flywheels of large diameter require a smaller value. | 0-63 | 24 | | |
| 63 | Function brightness | Applies to both F0 and F1 | 0-7 | 7 | | |

Decoder reset

The values can be reset to the defaults as above by writing value 08 to CV 8. Please note that for best performance the loco may have been shipped with values that are not decoder defaults

Locomotive lights (where fitted)

Your DCC equipment instructions will tell you how to turn the lights on and off – usually F0 (or F10 on EZ Command).

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