# Please read this sheet before running your locomotive

## Introduction
Thank you for your choice of this Bachmann DCC Onboard locomotive.

## Features
► 2 function outputs to control functions (where fitted) on the locomotive (eg lighting)
► NMRA DCC with 14, 28, 128 speed steps
► 2-digit and 4-digit addresses
► operable on DC controlled layouts
► advanced consisting
► programming on the main
► configurable acceleration and deceleration rates

## Technical specification

| Current carrying capacity: | |
|---|---|
| Motor Output | 500mA |
| Function outputs | 100mA each |
| Speed steps | 14,28,128 |
| Addresses | 1-9999 |
| Dimensions | 25 x 10 x 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.

## Functions

| F0 | Locomotive directional lighting |
|---|---|

## Decoder harness colour coding

| Pin | Purpose | Wire colour |
|---|---|---|
| 1 | motor right | orange |
| 2 | rear light | yellow |
| 3 | not used | |
| 4 | left rail pickup | black |
| 5 | motor left | grey |
| 6 | front light | white |
| 7 | function common positive | blue |
| 8 | right rail pickup | red |

## Aligning decoder
Plug the decoder into the socket aligning the pins with 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.

## 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 where an electronic high frequency track cleaner is connected

## 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 | | | Range | Default | | |
|---|---|---|---|---|---|---|
| 1 | Locomotive Address | | 1-99 | 3 | | |
| 2 | Starting voltage | Sets minimum speed | 0-31 | 10 | | |
| 3 | Acceleration momentum | | 1-255 | 1 | | |
| 4 | Deceleration momentum | | 1-255 | 1 | | |
| 7 | Version number | | | 46 | | |
| 8 | Manufacturer ID | | | 101 | | |
| 17 | Extended address – high byte | only active when the feature is selected in CV29 | 128-9999 | 0 | | |
| 18 | Extended address – low byte | | | 0 | | |
| 19 | Consist address | | 1-99 | 0 | | |
| | | | | | Effect when Bit value 0 | Effect when Bit value 1 |
| 29 | Decoder configuration byte 1 | | | 6 | | |
| | Bit 0 | Direction of operation | | 0 | **Normal** | Reverse |
| | Bit 1 | Speed steps | | 1 | 14 | **28/128** |
| | Bit 2 | Loco operates on DC | | 1 | Digital operation only | **Digital and analogue operation** |
| | Bit 3 | Not used | | | | |
| | Bit 4 | Not used | | | | |
| | Bit 5 | Selection of engine address | | 0 | **Short (CV 1)** | Long (CV 17/18) |
| | Bit 6 | | | | | |
| | Bit 7 | | | | | |
| 50 | Decoder configuration byte 2 | | | 4 | | |
| | Bits 0 and 1 | Not used | | | | |
| | Bit 2 | Brake section effect | | 1 | Does not operate if DC on track when CV29 is set for DCC only | **Slows with brake momentum (set in CV 4) if DC on track when CV29 is set for DCC only** |
| | Bits 3 to 7 | Not used | | | | |
| 51 | The bit selected sets the function button (F1 to F8) that dims the output. If set to 0, the output can be turned on/off with F0. | | | 0 | | |
| 52 | Brightness of function output when dimmed | | | 64 | | |
| | Dark | 0 | | | | |
| | Max brightness | 255 | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Decoder reset**
The values can be reset to the defaults as above by writing value 33 to CV 8.

**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).

Bachmann Europe plc
Moat Way, Barwell, Leicestershire, LE9 8EY
01455 841756
www.bachmann.co.uk