Zen Buddha

OWNERS MANUAL

DCCconcepts — Thinking outside the square

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2. Overview: Zen Decoders

The name we chose says it all… *Zen Buddha*.

In development we ignored convention, looking across problems not at them, looking at user needs carefully… and we have really enjoyed doing it. We hope you like the result!

Zen Buddha is a tough, reliable and relatively compact large scale high-power decoder with excellent power handling and performance.

It has 6 lighting or accessory functions and is complete with stay-alive…. it is easy to understand, easy to wire & has built-in 3-way protection.

Zen Buddha is assembled in a sophisticated and almost fully automated production facility. PCBs are created within hours of assembly so that board preparation is still fresh and all surfaces are 100% free of defects and contamination at the time of assembly.

Assembly is by computerised machinery with superb accuracy. Critical things such as fluxes and solders are replaced well before they reach aging limits so defect-free assembly can be guaranteed. Processors are individually programmed to guarantee performance, and each decoder is tested at least 3 times before packing for sale.

Because of this *Zen Buddha* is incredibly reliable. However, we are also aware that perfection is impossible, so we offer a simple, generous warranty to the original purchaser of any Zen decoder.

Warranty terms: *(There is no time limit, however, at our discretion we may request that you provide evidence of your original purchase)*

(1) If at any time your *Zen Buddha* fails to operate properly and there is no obvious sign of burning or other destructive evidence on the decoder, we will repair or replace it free of charge.

(2) If your locomotive has faulted or you have made an honest error in installation that has resulted in clearly evident damage to components, we will be understanding and offer you a replacement decoder at 50% of the original purchase price listed on our website.

Please read all of this manual before you install your *Zen* decoder. It contains some detailed information you'll need to get the best result.

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3. Zen Decoders: Most commonly used CVs and default settings
(There are many more - see our website for full details)

CV	Description of CV purpose	Default	Range
Reset	To reset, please set CV8 to 8	n/a	n/a
1	Short address	3	3
2	Start volts (1step = appx 0.06 volts)	9	0~255
3	Acceleration momentum	6	0~255
4	Deceleration momentum	6	0~255
5	Mid volts (Default = linear acceleration)	0	0~255
6	Top volts (Default = maximum possible)	0	0~255
7	Manufacturer version	varies	varies
8	Manufacturer ID (DCCconcepts)	36	fixed
15	Decoder lock (locked if CV15 = CV16)	0	0
16	Decoder unlock (variable 1~20)	1	1
17	Long Address (upper byte)	0	normally set by controller
18	Long Address (lower byte)	0	normally set by controller
19	Consist address (advanced consist)	0	normally set by controller
29	Compound configuration (detail online)	6	normally set by controller

Zen Decoders are designed to use the full range of approved CV's and they have been carefully configured to comply with all DCC standards

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4. Zen Decoder General Specifications

Model Number	Peak Power	Continuous Power	Functions	Size (mm)	Connector
ZN8D	1.1 amp	750mA	4x 100mA	15x7.5x5	8-pin direct
ZN8H	1.1 amp	750mA	2x 100mA	15x7.5 x2.7	8-pin wired
ZN6D	1.1 amp	750mA	2x 100mA	13.5x8.5x3	6-pin direct
ZN68	1.1amp	750mA	2x 100mA	13.5x8.5x3	6 and 8 pin
Z360	1.1amp	750mA	4x 100mA	14.2x12.5x3.5	8-pin direct
Z218	1.1amp	750mA	4x 100mA	22x16x4	21 & 8-pin
ZBHP (Buddha)	5 amps	3 amps	6x 250mA	40x25x10	12 screw terminals

All of the above specifications are conservative. All DCCconcepts *Zen* decoders are suitable for use in ready to run and most kit-built OO, HO or N scale locomotives. Zen Buddha is suitable for O and large scale.

An important message about re-setting & addressing Zen decoders
* Re-setting of *Zen* decoders is done by setting CV8 to 8. (main or pgm track)
* Setting short address is ONLY possible on the program track to prevent accidental errors. Long address can be set on the main or program track.

Zen Buddha decoders are carefully designed, tested and made with very close attention to DCC standards & will always work equally well with all brands of control systems that properly comply with NMRA DCC standards.

This manual contains all core information needed for installation and set-up of *Zen Buddha*, however for those who wish to experiment more or to undertake more complex adjustments and setup operations, a full CV listing is available and extended instructions are being prepared for our website.

Zen Decoders, "Stay Alive"™ and Decoder Accessories are designed and created by:
DCCconcepts Pty Ltd.
Sales@DCCconcepts.com
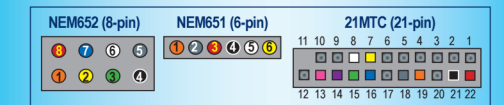www.DCCconcepts.com

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5. Installation tips and wiring colour codes

Basic colour codes and connector information:

One of the most helpful parts of the DCC standards has been a specific set of colour codes for all decoder wiring and a related standardisation of the connectors that are used. DCCconcepts always follow standards and we have chosen three of the approved connectors to use with *Zen* decoders.

These are the colours used in harnesses and their intended purposes:

- **Red** — Red is a track power wire. (It is usually the right rail)
- **Black** — Black is a track power wire. (It is usually the left rail)
- **Orange** — Orange is a motor power wire.
- **Grey** — Grey is a motor power wire.
- **Blue** — This is the positive wire for all light functions
- **White** — This is the negative / control wire for front lights (FL)
- **Yellow** — This is the negative / control wire for rear lights (RL) (front/rear lights are controlled by f0 or light button)
- **Green button)** — This is the negative / control wire for function 3 (f1
- **Purple button)** — This is the negative / control wire for function 4 (f2

Zen buddha also has two more functions. The colours for these additional functions are specified as follows:

Most *Zen* Decoders will also have two more wires for the Stay Alive™: Stay Alive™ wires are also blue and black. They are always positioned to exit at the opposite end to any harness wires so their purpose is clearly separated.

NEM652 (8-pin)	NEM651 (6-pin)	21MTC (21-pin)
8 7 6 5 / 1 2 3 4	1 2 3 4 5 6	11 10 9 8 7 6 5 4 3 2 1 / 12 13 14 15 16 17 18 19 20 21 22

These are the DCC sockets that are most commonly used in ready-to-run locomotives. They are shown "as viewed" when installed in the locomotive.

Locomotives may have suppression parts fitted for DC running when bought. These contain capacitors that can often prevent best possible running with DCC, so it's always best to remove these capacitors when installing decoders.

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6. Zen Decoders have many added features... We mention just a couple here.

Back EMF: *Zen Buddha* has self-adjusting BEMF and works really well with most locomotives straight out of the box. There is no need for complex adjustment. You can however control BEMF interactively, either by allocating its control to a function button or by setting the speed step range assisted by BEMF.

3-way Protection: *Zen Buddha* has 3-way protection. We have added protection into both hardware and software. Your Zen Buddha is protected from short circuits, from excess current draw and thermal overload.

Adjustable "Random flicker": Most often used for "Flickering firebox" we have also added the ability to control the rate of flicker so you can simulate other things like steam era locomotive oil lamps quite realistically. To do this first set the light function you wish to display a random flicker by setting the appropriate control CV to 33. Once that is done, adjust CV135 up or down from its default of 16 to increase the flicker rate until it is only just noticeable.
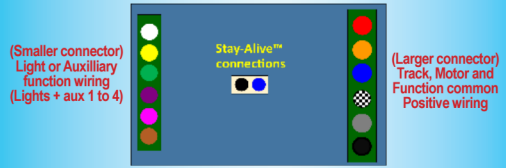
Selectable "Fluorescent flicker": Many prototype EMU and DMU sets and passenger coaches have fluorescent lighting. This initially flickers when turned on & we've made it easy to do this with *Zen Buddha*. There are 3 options.

A simple setting using CV47 gives you 3 options.

CV47 = 0 - Fluorescent flicker is turned off
CV47 = 1 - Front and rear lamps stay directional/normal, Aux1 to 4 flicker
CV47 = 2 - All SIX lighting functions flicker when turned on.

DCCconcepts *Zen Buddha* "Stay Alive":

Every *Zen Buddha* is supplied with an easy to install "Stay Alive"™. Incorporating low profile ceramic capacitors keeps it thin and compact, allowing it to fit where no other device will. The Stay-Alive provided has 8x the power of our previous "Stay Alive"™ and because it has really effective power management at turn-on, you can if needed connect three in parallel to help reluctant locomotives!

Wiring "Stay Alive"™ is simple. Plug it into the socket provided on the decoder!

(Smaller connector) Light or Auxilliary function wiring (Lights + aux 1 to 4)

Stay-Alive™ connections

(Larger connector) Track, Motor and Function common Positive wiring

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7. Before installing a Zen Buddha Decoder.

Test run the locomotive please. Most "installation related" decoder failures are caused by faulty drive-trains adding huge current draw or bad wiring and soldering at locomotive assembly that bridges DCC socket terminals and causes a fatal short circuit.

Make sure the locomotive runs smoothly in both directions.

Poor power pickup is a major cause of disappointment, so please check all electrical pickups and adjust them carefully so that, no matter where the wheel is when moved left and right, the pickup still touches it in the right place so it can deliver power properly.

This large scale decoder will usually be used on no-DCC-ready locomotives, so your first step would be to examine the wiring and clearly identify track power pickups and motor drive wires.

disconnect both motor wires from the motor. Set your multimeter to Ω or resistance. put the chassis on a piece of track and then place one meter probe onto one rail... touching each motor brush in turn with the other. There should be NO reaction at the meter. Repeat after moving the probe from one rail to the other. Again there should be no reaction.

These tests prove that the motor terminals are both properly isolated from the locomotive frame and from any source of direct track contact, and the installation can now proceed.

Now we are ready for the installation.

Please use the coloured dots on the decoder terminal strips to guide your connections. (see page 7)

These dots match the correct standards colour coding for wiring of a locomotive for DCC operation.

We suggest that you establish the position of the decoder before you start wiring as this will let you pre-cut wires to an ideal length and so it will result in a much tidier installation.

(You can hold the decoder in place with 3M double sided foam tape)

Dress any excess wire neatly and tidily so that the wires will not be crushed or strained when replacing the loco body. Before we put the body back though, let's take your newly DCC'd loco to the programming track to test it safely on DCC. (Please - always do this BEFORE you put a loco on the main track as it gives one last chance if there are faults!)

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8. Initial program track evaluation and setup.

The program track output on your DCC system will be "current limited" and delivers only enough power to enable programming.

"Program track" mode is also semi-intelligent in that it looks for basic feedback from the decoder when acting, and because of this, it can identify a fault and let you know without causing damage.... making the program track a "safe place" for the all important initial setup of your *Zen Buddha* decoder.

Here is how to do those first steps:

(1) Clean the programming track.
(2) Put the DCC system into program track mode. Don't select any options yet.
(3) Place the loco on the active programming track.

Now, you will be offered some choices. Standard, set CVs and Address are all commonly available as program track options. Choose Standard or whatever option does a general decoder read with your control system.

* The system will first read the manufacturer #: This will be 36 for DCCconcepts.

(IF there is a problem reading the decoder you'll get an error message. If this happens, it may indicate a problem with the installation OR just mean the program track needs cleaning! Always fix the problem before going further.)

* The system will now read the software version. This is a reference number specific to DCCconcepts *Zen* and it will change from time to time.
* The system will now read address status or addresses. It will probably give you an option to change the address. Choose if you will use a short or 1-byte address (0~127) or a long 2-byte address (128 to 9999).
* When you enter the address, do NOT use any leading Zeros. Address 6 is just 6, not 06, 006 or 0006! Address 635 is just 635, not 0635.
* Once you have entered the address and pressed "enter" or its equivalent to confirm your choice, the system may ask whether you want to make this the active address. Select Yes.

Now we have confirmed that the installation is OK and the address has been set, we should test-drive the locomotive before making other changes.

Note: Please carefully read & understand your controller instructions for setting an address, using a program track & basic decoder settings... However please do also understand that all decoders are quite individual in other areas, so you should use only our *Zen* instructions when you are setting more complex CVs or functions.