

OWNERS MANUAL

The name we chose says it all... **Zen**.
DCCconcepts Zen decoders do not accept space limits or installation difficulty. They offer problem-free solutions to your installation needs.

In developing this range, we've ignored convention, looking across problems not at them. We've listened to you carefully and we've really thought outside the box to make them special. We hope you like the result as much as we do.

Zen decoders are the highest quality available. They are 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 final 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 each individually programmed to guarantee performance, and each decoder is tested at least 3 times before packing for sale. Reliability will be well above industry average.

Because of this no-compromise approach to manufacture, our DCCconcepts Zen decoders are incredibly consistent. 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)

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

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

Back EMF: Zen decoders have self-adjusting BEMF and work 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 that is assisted by BEMF. This can be useful if you are considering several locos together or you would like BEMF to help loco start-up but want to assume full motor control once the loco approaches running speeds. Back EMF can also be disabled if you wish.

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 really easy to do this with a Zen decoder. 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 lights stay directional/normal, Aux1 and 2 flicker
- CV47 = 2 - All four lighting functions flicker when turned on.

DCCconcepts Zen "Stay Alive"

Every Zen decoder pack includes a slim, easily installed "Stay Alive". Incorporating low profile ceramic capacitors keeps it thin and compact, allowing it to fit in places where no other device will.

Despite its low profile it has four times the power of our previous "Stay Alive" and because it has really effective power management at turn-on, you can if needed connect three "Stay Alive" in parallel to really help reluctant locomotives!

Wiring is "Stay Alive" is simple!

Just match the blue/black wire colours and connect!

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.

Before installing your Zen 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.

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 is very important for best running quality.

Finally, remove the blanking plug from the socket and test the connections as follows. (locomotive should be off the track).

Set your multimeter to Ω or resistance. For an 8-pin decoder, touch the probes to the 2 terminals at one end. There should be NO reaction. Repeat this test at the other end. Again there should be no reaction.

For a 6 pin decoder, do the same but check the socket between pin 1 and pin 3 then pin 2 and pin 4. If there is no reaction we can proceed.

For a 21 pin decoder, these tests will usually not be needed as 21 pin loco boards are generally machine made. However, for those who do wish to do it, test between pins 22 and 19, then between 21 and 18.

These tests prove that the motor terminals are no longer shorted. (to run on DC the blanking plug links 2 key pairs of terminals, so a problem here will not be seen until the blanking plug is released)

Now we are ready for the installation.

Identify pin #1 on the loco socket. This is usually identified by a star, a dot or the number 1. That is the place for the #1pin (marked as per the socket or with the orange wire on 8 or 6 pin decoders). DP decoders will be marked on heatshrink or similarly. For 21 pin decoders, look for the blanking position (it is pin #11). Orient the decoder with the component side up relative to the loco socket, press it firmly and evenly into place.

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!)

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 decoder.

Here is how to do those first steps:

- Clean the programming track.
- Put the DCC system into program track mode. Don't select any options yet.
- 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, please fix the problem before going further. * The system will now read the software version. This is a reference number specific to DCCconcepts and 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.

Zen: 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 Decoder General Specifications

Model Number	Peak Power	Continuous Power	Functions	Size (mm)	Connector
ZN8D	1.0 amp	750mA	4x 100mA	15x7.5x5	8-pin direct
ZN8H	1.0 amp	750mA	2x 100mA	15x7.5 x2.7	8-pin wired
ZN6D	1.0 amp	750mA	2x 100mA	13.5x8.5x3	6-pin direct
ZN68	1.0 amp	750mA	2x 100mA	13.5x8.5x3	6 and 8 pin
Z360	1.0 amp	750mA	4x 100mA	14.2x12.5x3.5	8-pin direct
Z218	1.0 amp	750mA	4x 100mA	22x16x4	21 & 8-pin
ZBHP (Buddha)	5.0 amps	3.0 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 Zen decoders is done by setting CV8 to 8. (main orgm 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**

DCCconcepts Zen 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 decoders, 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

Zen Decoders are designed to meet all DCC standards and will work well with any control system also built to work to the DCC standards.

Wiring of Zen Decoders

Installation tips and wiring colour codes
Basic colour codes and connector information:

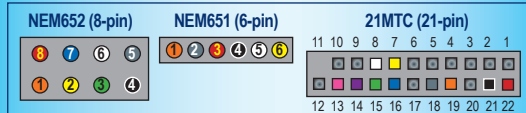
One of the most helpful parts of the DCC standards has been a specific set of colour codes for all decoder wiring and a related standardisation of the connectors that are used. DCCconcepts always follow standards and we have chosen three of the approved connectors to use with Zen decoders.

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) (front/rear lights are controlled by f0 or light button)
 - Yellow This is the negative / control wire for rear lights (RL)
 - Green This is the negative / control wire for function 3 (f1 button)
 - Purple This is the negative / control wire for function 4 (f2 button)
- Zen Buddha** also has two more functions. The colours for these additional functions are specified as follows:
- Pink This is the negative / control wire for function 5 (f3 button)
 - Brown This is the negative / control wire for function 6 (f4 button)

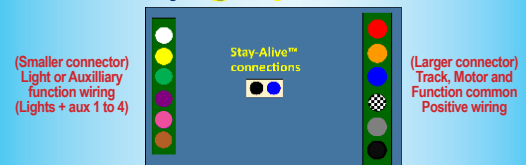
Most Zen Decoders will also have two more wires for the Stay Alive™:

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.



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.

Wiring for Zen Buddha Decoders



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

Small things should always come first

Zen NANO direct

Zen nano direct is the worlds smallest direct plug 8-pin decoder. It is significantly smaller than every other DP decoder ever made and much, much smaller than the 8-pin PCB in most locomotives...

Yet it's still more than powerful enough for all your locos and it comes complete with a ready-to-connect stay-alive and FOUR selectable light functions!

Zen nano direct - 4x100mA light functions.... and it is wired ready for the Stay-Alive™ included with every Zen decoder.

Zen nano direct really is unbelievably small. So small in fact that its dimensions are even less than the blanking plug that you'll need to remove to install it!

Model number ZN8D.

Only 15x7x5mm and has a 750mA (1a) motor drive.

Nothing is impossible any more!

Why should we restrict possibilities?

Zen nano 8-pin wired

Small things can still be very versatile **Zen nano** with wires proves it!

We started off with the world's smallest, 8-pin direct decoder and carefully shrunk it in thickness by nearly 50% to create a super-small go-anywhere and "fit any loco" wired 8-pin decoder.

Zen nano has great features too. Two 100mA light functions.... and of course it is pre-wired and ready for the low profile Stay-Alive™ provided.

Model number ZN8H.

A super-small 15x7x2.7mm with a 750mA (1a) motor drive.

The worlds smallest, made even thinner!

Modern N scale locomotives draw around 75mA, HO/OO less than 150mA and even older locomotives rarely draw over 400mA. So - as you can see, all **Zen** decoders will be very comfortable in all of your ready-to-run locomotives.

The simplest way for N scale installation

Zen 6-pin direct

Carefully created to NEM651 6-pin standards the ZN6D fits beautifully into any loco with a direct plug interface.

ZN6D has two 100mA light functions... and like all ZEN decoders it is wired ready for our all new super slim Stay-Alive™ that is provided in the pack.

Zen 6-pin direct is an easy-to-install and of course almost wiring-free Direct plug NEM651 type decoder. made super-small... for a very easy no-fuss installation

Model number ZN6D.

Only 13.5x8.5x 3mm with a 750mA (1a) motor drive.

Superb motor drive and easy installation

Let's make it possible to install it anywhere!

Zen 6-pin universal

Take an NEM651 6-pin decoder with beautifully smooth motor drive and excellent installability and add some real installation versatility!

The ZN68 really does go anywhere, because we have added both an NEM650 6-pin & NEM652 8-pin harness giving you total choice. It also has 2x100mA light functions and is pre-wired ready for the "Stay-Alive™" in the pack.

Model number ZN68.

Zen 6-pin direct is an easy-to-install almost wiring-free NEM651 type decoder.

Designed for a guaranteed no-fuss installation.

Only 13.5x8.5x 3mm with a 750mA (1a) motor drive.

The "anywhere and everything: decoder!"

An important note about Decoder drive power:

Most brands rate their decoders at their limits, but do not also tell you how long they will last at that level. Do not be fooled - its "for a second or two", no more! With **Zen** we have taken a "high end" approach that is much more honest. We give you two power ratings - both continuous draw and short-term peak.

Modern N scale locomotives draw around 75mA, HO/OO less than 150mA and even older locomotives rarely draw over 400mA. So - as you can see, all **Zen** decoders will be very comfortable in all of your ready-to-run locomotives.

Any way round, it just fits...

Zen 360 direct

Zen 360 Direct works every way...

Some HO & OO locos are long and narrow, some are wide but tight in space.

With an 8-pin interface built into the decoder... the ZN360 is a more conventional size but it has a smaller footprint so it fits every time, irrespective of socket orientation...and while most Direct decoders only have three light functions, the ZN360 has FOUR of them...

Like all **Zen** decoders it is also pre-wired and ready for the super slim Stay-Alive™ that is provided in the pack.

Model number Z360.

Only 14.2x12.5x3.5mm with a 750mA (1a) motor drive.

Clever design makes installation simpler!

21mtc and 8-pin in one decoder...

Zen 218

Why do loco makers make it so hard!

If you model UK prototype, and buy RTR from any of the major brands, then there is a fairly good chance that you'll probably end up buying both 21mtc and 8 pin NEM652 locomotives.

The problem is that they are not always consistent in their approach to DCC-ready, so you will often not know what's inside until you choose the loco and take it home!

Zen 218 is the safe choice for decoders as it takes away the gamble by having 21pin and 8-pin in one decoder.

Our **Zen 218** also has four 100mA light functions.... and of course it's also wired ready for easy attachment of the super-slim Stay-Alive™ that's provided in the pack.

Model number Z218.

It's only 22x16x4.5mm with a 750mA (1a) motor drive.

The perfect decoder for most current RTR

Modern N scale locomotives draw around 75mA, HO/OO less than 150mA and even older locomotives rarely draw over 400mA. So - as you can see, all **Zen** decoders will be very comfortable in all of your ready-to-run locomotives.

The name just seemed to suit it...

Zen buddha

As the name suggests...

Buddha is a cheerfully large decoder that's as tough as nails... but even with its huge power ability it is still small enough to get into the heart of any suitable locomotive...

Designed for O and larger scales, we have also kept it small enough to fit larger articulated and two-motor HO, OO or S scale loco's such as Beyer Garratts.

Buddha is really tough!

It has a powerful 3 amp continuous motor drive that also handles short-term peaks of 5 amps.

Buddha is also protected!

It has overload and thermal as well as direct short circuit protection built-in.

Virtually un-killable... **Buddha won't hesitate either...**

It has built-in brown-out protection for the microprocessor and can be also connected to almost ANY form of power protection including our DCC concepts "Stay-Alive™" (Which is of course included in the pack)

Normal decoder wire just won't cope. Big power needs bigger wire, so **Buddha** has twelve easy and convenient screw connectors, nicely arranged with all functions at one end, all power connections at the other...

Buddha also has SIX 250mA light functions....

Of course, like all of our **Zen** decoders it is wired and ready for the slim Stay-Alive™ that's provided in the pack.

Model number ZBHP.

Buddha is 40x25x10mm with a 3amp motor drive.

Buddha: Smooth, smart, safe & beautiful!



Images Actual Size

Images Actual Size

Images Actual Size

Image Actual Size

Images Actual Size

Images Actual Size

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