



Hatton's MD4 Decoder

Thank you for purchasing Hatton's Decoders.

Our decoder meets all NMRA DCC specifications and will give good performance out of the pack, however by using this manual, you can learn how to get the best from DCC and get the very best possible loco by loco performance. Take your time and enjoy setting up your decoder.

General Specifications for Hattons MD4 decoders:

Size: 18.5mm x 10.5mm x 4.8mm (0.73" x 0.42" x 0.18")

Power Handling:

The Hatton's MD4 is rated at 1.1 amp so it has more than enough power for any N, TT, HO, OO, On30 or similar locomotive. They are also suitable for use in S or O scale models when powered with modern low current draw can type or coreless motor.

The MD4 also has four switchable powered functions for powering lights or other functions such as smoke generators. Each is capable of handling a DCC-compatible Seuthe smoke unit, incandescent grain of wheat bulb or several LEDs with an appropriate resistor.

Addressing:

Your decoder has a default address of 3. MD4 will accept any address between 1 and 9999. If at any time you are unsure of the address that has been set in your Hattons decoder then don't worry - just enter programming track mode with your controller and either "read" the address or reset the decoder to its default address of three by entering 8 into CV8.

Harness:

The MD4 has all wires integrated into a mini-JST plug at the decoder end and an 8 pin NEM652 plug at the locomotive end. If your loco needs to be hard-wired, please take care to follow the wiring colour codes as wrong wiring will damage your decoder.

Please note that the 9th wire (purple) is for function 4 (aux2) and is operated by default using function button 2. If you are not connecting a 4th function, please be sure to isolate the bare end of this wire to prevent accidental short circuits.

Addressing:

You can choose any number between 1 and 9999. If your controller supports "aliasing" you can also allocate a name to your locomotive. Your controller will store that name and associate it with the number you choose automatically. If you use a short address enter only the number itself – you should not add any zeros before a short number, either when you set it or when you enter it into your controller. Short address should be changed on the programming track. Long addresses can be set either on the main or on the programming track.

Adjustment:

All programming with the exception of short addresses can be set either on the main or on the programming track. Many adjustments to decoder settings can even be done while the loco is running on your layout.

Motor Control:

All CVs needed to set-up starting, acceleration characteristics and momentum as well as light control and Speed tables are supported. The range of all general CVs is 0~255. Please note that with Speed related CVs 5 and 6, zero (0) = 255, and is the default setting.

DC Running:

When fitted with a Hatton's decoder, locos will normally still run very well on a DC-powered layout but you will need to turn the knob a little further than with a DC loco to start the locomotive moving. Our decoders retain back EMF support & constant lighting on DC. While we have made sure that DC running is usually very smooth with the average locomotive there can be exceptions and some may not perform as well as others.

Back EMF:

Hatton's decoders have a pre-set back EMF ability that will give smooth low speed control without the need for any adjustment other than CV2. RTR locomotives usually run well at default settings with no need to adjust Back EMF. If you double-head a lot and want to turn back EMF off to maintain balance between locomotives, you can set Back EMF to turn off at a particular speed step or choose to use a function button for direct on-off control.

Silent Drive:

Hatton's decoders have silent drive for quiet running.

Brake on DC:

Hatton's decoders support "Brake on DC". To make it possible to use brake on DC you will need to turn off DC running. This is done by reducing the value already set in CV 29 by 4 (for example, if it is set to 6, make it 2, if it is set to 38, make it 34)

Functions:

Hatton's decoders have 4 functions. Functions 1 (white) and 2 (yellow) are pre-set at the factory for directional front and rear lights. They are turned on and off with F0 or the light function and will automatically turn on and off depending on locomotive direction. Function 3 (also known as Aux 1 in Europe) which uses the Green wire is controlled by default with function button 1. Function 4 (also known as Aux 2) which uses the Purple wire is controlled by default with function button 2.

All 4 functions can be re-set to be directional or always on. They can be set to have different light effects as well. They can also be re-allocated to operate using different buttons if you wish. This is called "function re-mapping"

All functions can also be used for active accessories such as smoke units providing that the accessory you have chosen operates within the power rating of the function. If you wish to use an accessory that might need more power than one function can supply, you should parallel two function wires and re-map their control buttons so they turn on and off at the same time.

Locking:

Each Hatton's decoder can be "locked" once it has been programmed, therefore removing any chance of later accidental re-programming – This is very helpful when you wish to use two or more decoders in for example a single DMU/EMU set, as they can then be set up to respond to different function buttons while sharing a one address, making operation easier.

Consisting:

Hatton's decoders support all forms of consisting or double-heading

Reset:

Should you want to reset your Hatton's decoder after experimentation or if you can't remember the address you can restore all settings to "ex-factory" by setting CV8 to 8. Once this is done, the decoder address will be number 3.

Warranty:

Our decoders are covered by our standard warranty. Please see www.ehattons.com/returns for more details.

Addressing and setting up your decoder:

Once your locomotive has had its decoder installed and you have tested that there are no problems by placing it on the programming track and reading it, it is time to set the address and motor control. All decoders are set to address 3 when you buy them. Put your newly chipped loco on your main line and call up address 3 on the controller. Give it a run... If you did the pre-checks on DC first and it ran well then it should run very well now!

Setting your chosen address:

This should be done on the programming track

- (1) Follow your DCC systems instructions to enter "programming track mode".
- (2) If your DCC system can read CVs, it will first read manufacturer number and then the software number... This is usually followed by an invitation to set the long and short address.
- (3) Your decoder can be set to any number between 1 and 9999 so you have a lot to choose from – however MOST modellers use the locomotive cab-side number so they do not have to remember a list of numbers!

Which number you choose is up to you of however there are a couple of types of address available to you so read on before you do anything please!

Short Address: This is not really a "2-Digit" number! It is in fact a 1 BYTE address in binary terms and it can, depending on your DCC system brand, be either from 1 to 99 or from 1 to 123!

(Hattons decoders will accept any number from 1 to 123 as a short address)

This is important information as that means that any number between 100 and 123 can be interpreted as long or short depending on the DCC system brand. We therefore recommend that you avoid numbers 100~123 unless you will only use the loco at home!

Short addresses:

Regard a short address as 1~99 and ignore 100~123 unless you have a loco with that number.

If you want to set your decoder to a short address, follow your DCC system instructions but even though it may offer you a 4 digit display, do not add or enter any 0's before the number... just key it in as it will be used.

For example, enter 66 as 66, and not 0066

Long Address:

This is the most common choice for DCC modellers as cab-side numbers are easy to remember!

We recommend if you are going to use a long address then short address should just be left at 3.

Setting the long Address: A Long address is really a 2-byte" number which means it can be anywhere between 124 and 9999. Following your DCC system instructions, work through to the instructions for setting a long address and enter your chosen number. Again, do NOT add leading zeros – for example, address 456 should be entered as 456, not 0456.

After entering, confirm you got it right then go back to normal train running mode, select the loco number that you just entered and enjoy giving the locomotive a trial run...

Setting up motor control:

You do not have to do this but if you want the best results for every loco, you should try. If you make a mistake, do not worry, just reset the decoder by changing CV8 to 8 and try again!

This is easy to do and very satisfying when you get it right. All these CVs have a range of 0~255.

CV2. This sets the start voltage. If your loco does not move off on speed step one, you can set CV2 so that it does. Try setting it to say 8, then try. After a running test, reduce or increase it by 1 until your loco moves off at speed step 1

CV3. This is the Acceleration momentum or inertia. Try setting it at say 10 and see how smoothly your loco sets off, acting as if it is really pulling a train. Adjust up or down until you like the result.

CV4. This is the Deceleration momentum or braking speed. As with CV3, try 10 then adjust as you prefer it so be.

CV5 and CV6 CV5 is the top speed CV, and CV6 is mid speed – between them they set the overall driving character of the loco so we will talk about them together. We like to set CV5 to our chosen top speed then change CV6 to be between 1/4 and 1/3 of the CV5 value – this will give a nice smooth start with faster acceleration as the speed increases, just like the real thing.

Once you have set the address plus CV2, 3, 4, 5 and 6, your locos basic setup is done!

Back EMF:

Back-EMF is self-adjusting and can be either on or off. Set CV61 to 1 (default) for on, 0 for off.

If you want Back-EMF to turn off after the locomotive is underway (for example, if consisted locos fight each other, this will make consisting smoother) set CV10 to the speed step at which you want it to turn off. (e.g. CV10 = 15 will make Back-EMF turn off at speed step 15.)

Using and setting up lighting:

The wires that control lighting are Blue – this is the common positive ground and should be connected to ALL lights. White – this is the front headlight wire. Yellow – this is the rear light wire. Green – this is a spare function, often used for drivers cab or a flickering firebox and Purple, which can be used for any other function you choose.

By default, front white and rear yellow light wire are both turned on by function 0 or the “light” or “headlight” function button. Green is usually turned on with function 1 and purple with function 2.

To change WHEN a light function is on (directional or constant)

CV49 controls the White wire (Headlight). Default is 0

Set it to 0 for only on forward, set it to 16 for only on reverse or 32 for always on.

CV50 controls the Yellow wire (Tail or reverse light). Default is 16

Set it to 0 for only on forward, set it to 16 for only on reverse or 32 for always on.

CV51 controls the Green wire (Aux1 or F3). Default is 32

Set it to 0 for only on forward, set it to 16 for only on reverse or 32 for always on.

CV52 controls the Purple wire (Aux2 or F4). Default is 32

Set it to 0 for only on forward, set it to 16 for only on reverse or 32 for always on.

Changing which button will operate a function:

CV33 controls which button operates the white wire (Headlight). Default is 1

CV34 controls which button operates the Yellow wire (Reverse/tail light). Default is 2

CV35 controls which button operates the Green wire (Aux1/F3). Default is 4

CV36 controls which button operates the Purple wire (Aux2/F4). Default is 8

All functions can be controlled by any function button on your controller up to function 6 by using these values and entering them into the CV that controls the chosen wire colour

Function button	F0 (f)	F0 (r)	F1	F2	F3	F4	F5	F6
Set it to this value	1	2	4	8	16	32	64	128

The Green and Purple wire can also be controlled by function 7 to 12 if you use these values

Function button	F7	F8	F9	F10	F11	F12
Set it to this value	4	8	16	32	64	128

Special Light Effects.

Hattons decoders can do several interesting light effects. To change how a light function operates, change its CV as follows. (CVs are White = CV49, Yellow CV50, Green CV51, Purple CV52)

	Forward only	Reverse only	Either direction
Constant light	0	16	32
Firebox flicker	1	17	33
Mars Light	2	18	34
Single flash	3	19	35
Double flash	4	20	36

Decoder Lock.

This helps if you have 2 decoders in one loco or lots of lighting requiring a second decoder for its added functions OR if you want DMU/EMU sets with added light decoders.

This is how to do it so that it works every time.

Your multi-unit set will have 3 decoders in it (you can have up to 5!) All will have the same address but may need individual changes at some point in time.

Step 1: Before making up the set, give each decoder the same address but as you set the address also put a different number in CV16. (Set the lead decoder CV16 to 1 then use 2 and 3 into CV16 for the other two decoders)

Step 2: Program the changes you want to make in each decoder, then change CV15 from its default of zero to a number above the highest CV16 number you used in step 1 (in the case of this example set our highest CV16 is 3, so we should set CV15 in all of them to 4).

This will lock the decoders & prevent accidental changes to all decoders.

Step 3: To adjust any individual decoder later without affecting the others, even though they are all set to the same number, set CV 15 to the same number that you put into CV16 in the one you want to change. (If you forgot it you can read the number in program track mode) By making CV15 = CV16 in that specific decoder you will unlock that specific decoder only.

Step 4: When you've made the change, set CV15 to its original lock number of 4 again.

Troubleshooting:

Every Hatton's decoder was tested before it was packed, so we are sure that they are OK and ready to use when you buy them. Nothing can go too badly wrong if the loco ran well before you added the decoder, the decoder is installed correctly and you pre-checked your installation on the program track as we advised, before putting it on the main line!

(1) Nothing happens:

* Have you selected the address? If it's a new decoder it will be 3. If you did it a while ago & you can't recall its number then reset the decoder (CV8=8). it will now be 3 again.

* If it is not reading or running and you KNOW the address, be sure that it is not suffering from loco failure or a short circuit in the wiring or it will be damaged.

(2) Loco runs reverse when the controller says forward.

* Please remove and reverse the 8 pin plug (or if you hard-wired the loco, change over the orange and gray wires at the motor) Alternately you can add 1 to the value already in CV29.

(2) Light / functions will not work!

* Have you turned the lights ON with Function 0 (zero) and also tried the direction switch - remember white and yellow functions are both always directional by default.

* Have you perhaps wired the LED back to front? (long lead is the LED positive)

* Did you add a resistor? If not you may have blown the LED! (The function will still be OK).

(3) Help - I think I must have made a CV setting mistake. Now it won't work.

Just do a reset (CV8=8) and it will be back to 3 and the settings it had when you bought it.

(4) It has got a big black hole in the heat-shrink!

The only way this can happen is by incorrect wiring, overload or similar. You killed it, sorry!

(It may only be a dead light function - if in Doubt, always try a RESET using CV8=8)