

Dirt Maker DM37 Owner's Manual

- Safety 1**
- Selecting a Location for the Frame..... 1**
- Assembly 2**
- Setup 12**
 - Making the bedding 12
 - Choosing the right type of worm 13
 - Adding the worms to the bedding 13
 - Training your worms to stay 13
- Operation 14**
 - Feeding the worms 14
 - Watering the worms 15
 - Temperature control 15
 - Keeping the worm bin cool 16
 - Keeping the worm bin warm 16
 - Removing vermicompost 16
 - Leaving your worms home alone 18
- Warranty..... 18**
- Return Policy 19**
- Technical Support 19**

Safety

When releasing the ratchet lever of a winch that is under tension, take care so the handle does not spin backwards. Hold the handle firmly, and turn it just enough tighter to allow the lever to release. Keep a tight hold on the handle while slowly releasing the tension.

To eliminate the hazard of an accidental release of the ratchet lever, and because the winch handles can get in the way, the handles should be removed after setting up the bin, and after each time they are used to pull the cutting bar.

Never allow children to play near this machine.

Any part of the machine past the ends of the box could be a trip hazard. Make sure other people are aware of this.

Make sure everyone's hands are clear of the screen while winching. The best way to do this is to make sure everyone is standing back.

When inspecting underneath the machine, it is a good idea to wear eye protection. Small particles occasionally fall from the screen.



Selecting a Location for the Frame

This machine must be used on a concrete or asphalt surface. The worm bin will be 18' 6" long and 5' 3" wide after it is assembled. Make sure you have 3' past the end of the machine on each end. There should be 5' of room along one of the long sides for feeding and scraping vermicompost from underneath. The other long side can go up against a wall after assembly, but it would be better to have a couple feet of space behind it just in case there is ever a reason to get back there. If space is limited, you could cheat a few inches at the ends, and a foot on the working side. Ideally though, it is best to have lots of room on the working side since putting a long handle on a concrete rake is the most comfortable way to scrape vermicompost out from underneath.

Assembly



On all bolted connections (with the exception of attaching the winches), a washer is not needed against the bolt head. Use a lock washer against the nut, and a flat washer behind the lock washer. To protect the powder coating, put the smooth side of the flat washer against the coating, and the rough side against the lock washer.



Stand up one of the end upright sections, and have a friend keep it from falling over.



Attach one of the side panels to the upright section with 5/16 x 1" bolts, only hand tightening for now.



Attach the center upright to the other end of the side panel with 5/16 x 1" bolts, only hand tightening.



One of the sides of the screen assembly is a 1/4" longer than the opposite side, and must sit on the beam at the end of the frame (the right side of the photo). It is a little awkward to insert the screen assembly. The corner where the two plastic panels meet needs to be held lower than the other three corners, and go in first. It helps to have two people holding the end of the screen section at the top of the photo.



Attach the next side panel with 5/16 x 1" bolts, only hand tightening.



Attach the other end upright section with 5/16 x 1" bolts, only hand tightening.



Insert the last screen assembly in the same manner as the first. Remember to place the longer side on the beam at the end of the bin, and to slip the corner in the top left of the photo in first.



Attach another side panel using 5/16 x 1" bolts, only hand tightening.



Attach the last side panel using 5/16 x 1" bolts, only hand tightening. Starting with the loosest connections, go around the worm bin, and tighten all the connections enough to just barely snug them up. Then securely tighten all the connections.

If the worm bin needs to be moved, now is the time. Make sure the bin is fairly square, and that the two panels making up each long side are in line with each other.



Due to the unevenness of the floor, one or two uprights might not contact the floor. 1/8" and 1/4" shims are supplied to take up this space. Use a shim just thick enough that the foot makes contact with it. Lift the leg up a little if needed to get the shim in.



Remove the bottom bolts from the outer cutting bar stops. Reinsert them after positioning the A-shaped section of the winch support assembly in place. Only hand tighten the bolts for now.



Remove the nuts and washers from bolts that hold the top of the 5' long panels. Slip one end of the C-shaped bars on the bolts, and replace the nuts and washers, only hand tightening for now.



While having a friend hold up the A-shaped section, connect the other end of the C-shaped bars with 5/16 x 1" bolts. Tighten all four bolts.



Connect the end of the winch platform to the A-shaped section with 5/16 x 1" bolts, only hand tightening.



Lift up the winch platform, and finish connecting it with two more 5/16 x 1" bolts. Tighten all four bolts.

Attach the same winch supporting parts to the other end of the worm bin.



Place the cutting bar in the worm bin, and slide up against the stops at one end of the bin.



Attach the winch to the winch platform with 3/8 x 1" bolts. Use flat washers between the bolt heads and the winch, flat washers against the bottom of the platform, and lock washers against the nuts.



Unlock the winch, and pull out enough rope to slip the rope thimble on the cutting bar hook. Fasten the eye bolt to the winch support assembly. There is not room for a lock washer. Just use a flat washer against the nut. Lock the winch, and just barely snug up the rope.

Go to the other end of the worm bin. Use the same procedure to bolt down the winch, connect the rope, and fasten the eye bolt. Tighten the rope just until it is snug. Go back to the other side, and make sure the cutting bar is still within a 1/4 inch of the stops. If the center of the cutting bar is bowed up, release a little tension on the rope so there is less chance of bedding material getting under the cutting bar when it is added. Then remove the handles from both winches.

Setup

Making the bedding.

Cover the screen all the way to the bar stops with newspaper only three sheets thick. Do not use smooth newspaper. The paper will decompose before you need to winch the bar. Crumple sheets of newspaper to block off the ends where the bar comes through. These might not completely decompose, but you will be able to easily pull them out later. The end where the bar is parked only needs to be blocked in the center where the tongue of the bar comes through.

There are many different recipes for bedding. At least half of the bedding should be well aged or partially composted food waste, grasses, or manures. We recommend using a 1:2 mixture of peat moss and well aged manure with some agricultural lime mixed in. Do not use dolomite lime unless you mix it 1:4 with ordinary ag lime. Do not use bagged compost. It probably will not have enough food energy left in it to support a high density of earthworms.

If the aged manure smells much like manure, it might be ok for worm food, but probably is not old enough for the initial bedding. Horse manure has the perfect structure for aging in a pile. If you can find a pile of horse manure that is over six months old, that would work great. Aged separated dairy solids (a mixture of manure and bedding from a manure separator) also have good structure for aging in a pile. Manure from most vegetarian animals will work if it is aged or partially composted. The aging process needs to have taken place where some rain can leach salts from the manure unless it has been leached first or came from a manure separator. Be wary of bagged manure. It might not be aged enough, and could contain high levels of salts. You can substitute homemade compost for the aged manure if you did not go too hot and heavy with your composting. Unless you made a huge amount of steam with your pile, there will be plenty of energy left in it for the worms.

Normally, peat moss is soaked to break it up. But to make this much bedding, it might be easier to break it up manually. Clumps of peat moss will break up easily when rubbed across 1/2" hardware cloth. An easy way to mix the bedding is to put the ingredients in a pile on a concrete surface, and then go around the pile with a flat shovel, scooping and turning. For each batch, use one 5-gallon bucket of peat moss, two 5-gallon buckets of aged manure, and 1/2 cup of lime.

You can use coir instead of peat moss if you want. They will both work equally well. Coir compressed at a greater than 2:1 ratio will have to be soaked to break it up. The main difference in using coir is that it means less mining of bogs. Coir also has certain properties that could make slightly better soil than peat moss.

Check again to make sure the bin is fairly square and straight before adding the bedding. When putting the first couple inches of bedding in the worm bin, it is easier to keep from moving the paper if you use a pail instead of a shovel. Start the worm bin with 10-12 inches of bedding.

Water the bedding slowly and evenly for about 30 seconds. Then wait a minute, and water again for just a few seconds. Repeat slow intermittent even watering until all the paper is wet. Use warm water for this initial watering unless the bin is in a hot summer environment.

Because the worms' food becomes their bedding, we will use the term bedding from now on to refer to the entire contents of the worm bin.

Choosing the right type of worm.

You will need to use composting type earthworms that reach a high population density. They need to have a healthy appetite, live near the surface, and stay in the worm bin. The most commonly used species are *Eisenia fetida* and *Eisenia andrei*. Both of these species are sold as *Eisenia fetida*, and often end up being a mixture of the two. Different species do not always get along, but these two do. Do not pay a premium for your worms for the privilege of selling their offspring back to the company. There is a 100% chance you will be disappointed if you do this. All the information presented in this manual pertains to the species *E. fetida* and *E. andrei*.

Adding the worms to the bedding.

Start the worm bin with 40 lbs of worms. The biomass will max out at 80 lbs in 2-3 months.

If you mail order the worms, they will probably come in bags. Carefully empty these on top of the bedding. Worms are weighed when they are packed, and will shrink considerably during shipment. They will not look like 15 lbs of meat, but will soon recover from their journey. Do not allow any direct sunlight to shine on them. Do not disturb them any more than is necessary. They will crawl in and spread out without any help even if they are all in one big ball.

Worms of a different species are likely to separate from the crowd. If you see a worm with a bluish tint racing around on top, it is a *Perionyx excavatus*. You would definitely want to remove that one. If there are any with a dry brown look instead of a wet reddish-brown look, they do not belong there either. Any worms that refuse to crawl in should be relocated. Feed the worms after they have all crawled into the bedding.

Training your worms to stay.

Completely cover the bedding with carpet or cardboard, or place a lid on the worm bin. Leave a light on all night. Slowly remove the covering or lid in the morning. Leave the light off the next night. Only use the covering or lid that second night if you need to keep the worm bin warm, or need to keep animals out. Check on the worms with a flashlight about an hour after dark. Do not shine it directly on the bedding. Keep in mind it is normal for the worms to be crawling on top of the bedding at night, and even partway up the sides. Check on them again about an hour later, and then again about an hour after that. If no more than one or two have crawled out of the bin, then everything is ok, and the rest will stay. Any worms that crawl out should be relocated. If more than a very few crawl out, give them one more night of training. After the worms settle in, you will not need a light at night.

Never leave a light shining on the bedding all night, not even through holes in a lid. If done long enough, they will mass migrate the first time the light is not on.

A few worms might accidentally fall out the bottom until the bin fills up to about $\frac{3}{4}$ full, but it will not be enough to make a noticeable difference.

Whether or not you need the carpet and/or lid from now on will depend on a variety of circumstances. These are explained in the following section, "Operation."

Operation

Feeding the worms.

A calcium supplement is highly recommended unless there is already huge amounts of calcium in the worms' feedstock. You can use agricultural lime, oyster shells or diatomaceous earth. Do not use dolomite unless you mix it 1:4 with ordinary ag lime. If you use oyster shells, taste them to make sure they are not salty. If they are, they need to be soaked and/or leached. Diatomaceous earth is a little more expensive, but comes in handy for battling some pests such as ants.

In some cases, it is advisable to use uncomposted food to help warm the bedding through microbial action. In other cases, it is advisable to use partially composted food to help keep the bedding from getting too hot. These strategies are presented under the heading "Keeping the worm bin warm" in this section.

The presence of viable seeds in vermicompost does not usually cause too much of a problem unless you are selling the vermicompost. If viable seeds are a concern, you can avoid certain feedstocks and/or pre-compost. Cow and horse manures usually contain a few viable seeds that will survive the vermicomposting process. Fruit and vegetable seeds often remain viable after vermicomposting. Grass clippings and certain types of hay can have a huge amount of seeds. Worm farms usually hot compost their worms' food enough to kill most of the seeds. This usually involves composting several cubic yards of material at a time, but the amount of heat needed can be produced with as little as one cubic yard of material. It is possible to kill the seeds, and still have enough energy left in the feedstock to produce heat in a worm bin. It is also possible to compost to the point of the material not producing much heat in a worm bin, but still having enough energy left to nourish the worms.

It is best to feed your worms a somewhat steady diet so they can get used to their food. Fruits and veggies can be used as a staple, with a few other foods mixed in if you want. A little reject grain can be sprinkled in every now and then, but it would be a good idea to know why it was rejected (hopefully not because of chemical contamination). A little grain will fatten the worms, but do not use too much at one time. It is especially important to not overfeed when using high-protein foods. Coffee grounds are good, as well as tea bags, eggshells, unsalted pasta, almost any plant material. Do not put any hot peppers in the bin. Onions, garlic, and citrus are ok in moderation. Never feed your worms meat or dairy products. Do not feed them any food that has been salted or peppered.

If you are feeding your worms fruit and vegetable waste, mix a 1:3 ratio of "brown" to fresh materials. The best brown material is dry brown leaves. Shredded cardboard is good. Hardwood sawdust or shavings are good. Paper is not the easiest to work with. If you use paper, make sure it is shredded into very narrow strips. Most absorbent high carbon materials will work. Do not use straw unless it has been ground into 1" or shorter lengths. Cutting up the fruits and veggies really helps, but do not puree them. A good method for cutting up a batch of reject produce or pre-consumer restaurant waste is to dump it on the ground, and chop it with a flat shovel. Feed the worms 1½ - 2" of this 1:3 mixture. Sprinkle

¼ cup of lime on top. Then add ½" of brown material. Wait until the worms have eaten about half of the fruit and veggie portion of their last feeding before feeding them again.

Aged manure can be used as a staple. These worms love manure. It can be up to a couple years old, but two or three months is usually enough. Stock piling a couple yards of manure at a time is the easiest way to keep a worm bin fed. Timing when you make the piles can provide well-aged worm food for producing less heat during the summer. Keep the piles wet. Covering them during the winter will, to some extent, help keep them from freezing.

A 50/50 mixture of grass clippings and brown material can be used as a food staple. Make sure insecticide was not recently used on the lawn. If herbicide was applied to the lawn, make sure it was watered before being mowed. This is a good mixture for partial composting to help keep bedding temps down during hot summers. If uncomposted, it will help heat the worm bin during the winter.

If you are feeding your worms aged manure or partially composted food, put 1½ - 2" of food in the bin at a time, sprinkle ½ cup of lime on top, and wait until the worms have eaten most of what they can before feeding them again. You will know they are done eating when this compost does not have any more stickiness left to it. So feed them again when there are just a few small sticky clumps left.

If you are feeding your worms an uncomposted mixture of grass or alfalfa and brown material, feed them 2" at a time, sprinkle ¼ cup of lime on top, and feed them again when they have eaten about a quarter of the grass portion of the last feeding.

If you are feeding the worms uncomposted food, they will mostly be eating their next to last feeding. They should be almost completely done with the feeding below that one. It is a good idea to dig down once in a while with a garden claw to see if they are keeping up. If not, you should slow down on the feeding to let them catch up.

Watering the worms.

The worm bin should be kept at 80-90% moisture. The frequency and amount of watering will depend on many factors. If you are feeding your worms nothing but fresh juicy reject produce in a mild humid environment, you might not need to water them. In some other cases, you might need to water every day.

Water enough and often enough to keep the top and bottom of the bin constantly wet, but not so much that liquid continuously drips from the bottom. If a few drops occasionally drip though, it will not be too wet for the worms. You cannot get a worm bin wet enough to endanger them. If you are trying to heat the bin with bacterial action, water slightly less. Water slowly and evenly. Sometimes warm water is better. Other times cold water is better. These cases are presented in the next three subsections.

Temperature control.

The bedding temperature is slow to change. It will not change much day to night. It usually takes 2 or 3 days for a sudden hot or cold spell to affect the bedding temperature much in a full worm bin of this size. Because of the heat produced by bacteria, the temperature of the bedding could be much warmer than the average day and night temperatures. This will

depend on moisture levels, the temperature of water given to the worms, what they are being fed, and other factors.

It is strongly recommended that you purchase a compost thermometer. When taking the temperature, the end of the stem should be at the center of the bedding, or slightly higher.

If the bin is kept in a building heated to 50° F in the winter, and cooled to 85° in the summer, it will be very easy to keep the bedding temperature within range.

The temperature range of the bedding should be 50-90°. The worms will survive low temperatures until most of their bedding actually freezes for an extended period of time, but they will not be eating or breeding much if their bedding temperature falls below 60°. For optimal production, their bedding needs to be above 70°. Do not let the entire bed get to 95°. When a portion of the bedding gets that hot, the worms relocate to a cooler portion of the bedding. If the whole worm bed gets that hot for very long, it could be upsetting.

Keeping the worm bin cool.

During hot seasons, the worm bin should be fed materials that are at least partially composted or well aged. Even these materials can produce heat, so the bedding should be kept very moist to reduce the amount of bacterial activity. Wait until the worms have eaten all of the sticky portion of this food before feeding them again.

The worm bin should be left uncovered, and the bedding surface constantly wet to provide some evaporative cooling. If the bin is indoors, there should be plenty of ventilation to facilitate evaporative cooling.

The worm bin should be in the shade all day.

Chilled water can be used if it is needed to keep the bedding temperature down. If the bedding temperature gets above 90°, you might want to consider using a bag of crushed ice for the next watering.

Keeping the worm bin warm.

Evaporation will allow heat to escape from the bottom. If used outside, block the wind from getting underneath the worm bin.

Bacterial action is the best heat for a worm bin. Unfortunately though, when the bedding temperature gets below 50°, the bacteria that supply the heat slow down. Then they produce less heat, which allows the bedding to get even colder. Using the procedures below will keep the bedding temperature above this threshold in an environment with average day and night temps of 40°, sometimes colder. Depending on the temperature, you might only need to do one or two of these things.

Use uncomposted feedstock. Grass, alfalfa, and other high nitrogen foods mixed with brown materials will provide slightly more heat than most fruits and veggies mixed with the same brown materials. Manure also heats up good. Make sure it is at least a couple months old though. It will still heat up.

Allow the worms' food to warm up in a warm area before placing it in the worm bin.

Use warm water for watering.

Lay a piece of carpet on top of the bedding. Keep the level in the worm bin just low enough so the carpet is not above the top of the marine board. Cut the piece so it fits fairly tight to the marine board all the way around, and keep it as dry as possible. If you are feeding your worms fruits and veggies, remember to put the layer of brown material on top of the food to help keep the carpet from molding. Using a new carpet remnant instead of an old piece might also help. Do not use a layer of brown material on top of composted or aged feedstocks unless you plan to also place the next feeding below that same layer.

Use two or three layers of carpet if extra insulation is needed.

Use a lid. One layer of carpet and the lid with holes both provide about the same amount of insulation. If you only need one or the other, it will not matter much which one you use.

If the worm bin is outside, locate it where it can receive as much of the winter sun as possible, but still be in the shade during the summer.

Insulate the worm bin. Wrapping polyethylene film around the sides will create an airspace, boosting the insulating value. If outside, using black film will trap solar heat. Greenhouse supply companies have tape that has excellent adhesion to poly film. For even more insulation, polystyrene sheets can be placed between the marine board and the plastic film.

Use an electric heater. Even though bottom heat is more efficient, top heat is better in this case. That is where the worms are, and where you want them to stay. Heating cables can be used. Place them on top just before adding food. Then move them to the top again just before the next feeding. There are various heating mats available that can be laid on top. Infrared heat can be aimed downward toward the top of the bin. If the fixture produces any visible light other than a faint red glow, use a timer so the worms can have a few hours of darkness at night.

An option some people take advantage of is to just take a vacation from the worms for 2 or 3 months in the winter. If the bedding temperature goes low enough, you will not have to feed the worms. You might not even have to water them. They will survive as long as the bedding does not freeze.

Removing vermicompost.

Wait until the worm bin fills up before removing vermicompost. Before winching the cutting bar the first time, remove as much of the paper blocking the ends as you can get a hold of.

Temporarily put the handle on the winch where the cutting bar is parked (only hand tightening the nut) so you can turn it just enough to release the ratchet lever. Then remove it so it does not spin wildly while using the other winch. Put the handle on the other winch, and unlock the ratchet lever so you will not have to hear clattering. Winch the bar across the bin. Use a brush or the back of your hand to brush material off the top of the strap before it gets to the winch. Keep winching until the cutting bar is against the stops and the strap is fairly tight. Lock the winch. Lock the other winch, put the handle on, and snug up the strap. Check to make sure the bar is within ¼" of the stops. Remove the handles when done.

Do not stop turning the winch handle until you have moved the bar the full length of the bin. It is possible that settling bedding could push the bar against the screen if you stop for more than a few seconds.

You will need to pull the bar only once for every one or two feedings. Do not try to winch the bar across the worm bin more than once at a time. It could take a while for the full weight of all the bin contents to settle on the screen. Winching the bar across before that happens could cause it to travel skewed.

Since the vermicompost is spread out in a thin layer when it comes out of the bin, that makes a good place to let it partially dry for a day or two. A push broom or concrete rake works well for pulling the vermicompost out from underneath.

Leaving your worms home alone.

If you are taking a trip, you might not need a caretaker for your worms if you make sure the bedding is completely drenched, and you have given them a little extra food. They will continue to receive nutrition by eating what continues to decompose from previous feedings, and by eating what they have already eaten. If the environmental temperature is within range, and most of the bedding remains moist, they will be ok for a week or two. If you are not sure though that the bin will not get too dry, it might be a good idea to have someone water them. If the worms have traveled down to get to moister bedding, wait until they come back up before winching the bar.

While it is ok to let the worms run out of food like this once in a while, do not do it too often. For the most part, they should be fed proper portions at regular intervals.

Warranty

Dirt Maker warrants the Dirt Maker DM38 Flow Through Worm Bin to function for a period of five years beginning on the date of delivery.

This warranty does not cover cosmetic defects.

The exclusive remedies of this warranty shall be, at Dirt Maker' option:

1. Repair; or
2. Replacement of defective parts; or
3. During the 4th and 5th years of this warranty period, repair or replacement of defective parts, or reimbursement to the customer the depreciated value of the machine based upon a five-year period of use.

Please do not ship any parts unless asked to. In some cases it will not be necessary.

All claims must be submitted prior to the end of the warranty period.

This warranty will not apply in cases of intentional damage or misuse.

Dirt Maker will pay all shipping costs associated with complying with this warranty. However, to the extent permitted by law, this warranty does not cover other incidental costs or consequential damages.

Return Policy

Refunds will be given for returns only in cases where the customer notifies Dirt Maker within 30 days of delivery of intent to return the machine, and makes it available for pickup within 45 days of delivery. Return shipping costs, crating, and protective packaging of parts are the responsibility of customers requesting refunds.

Technical Support

Please do not hesitate to contact me with any questions you may have. We will be glad to do all we can to help. We would also greatly appreciate your comments and suggestions. Our very best regards to you. Thanks. Enjoy!