



# Dehumidifiers

# TESTED

Keeping dampness at bay from boat interiors is an ongoing battle: Alex Bell assesses nine dehumidifiers for efficiency, power consumption and portability

**W**ith the end-of-season lay-up approaching, it's a good time to consider how best to keep the interior of a yacht free from damp and consequent mould over the winter months.

I have used a dehumidifier on my boat for many years, but last winter I loaned it to someone whose boat had mould problems caused by an en suite shower.

## THE PBO TEST TEAM



Ex-merchant navy officer **Alex Bell** sails a Bénéteau First 305 and lectures in maths and engineering at Southampton Solent University.



**Oksana Razina** works at Southampton Solent University and is a club racer of yachts in the Solent in the role of navigator.

With no dehumidifier to deploy, it was me who ended up with mould on my boat headlining for the first time in years!

Mould will grow in damp conditions where the relative humidity is greater than 68%. Similarly, iron will rust with humidity above 50% and steel above 80%, so engines and tools become vulnerable to the moist air.

Chandlers and product websites recommend dehumidifiers suitable for boats and caravans. What they all have in common is that they are compact machines and don't come with castors. They require mains electricity, so they can only be used where a suitable shore supply is available. If, like me, you lay your boat up on a cradle, consideration has to be given to carrying the dehumidifier up a ladder. In this situation, light weight and a good handle are important factors.

## What's available?

There are two types of dehumidifier to choose from: compressor or desiccant.

**The compressor type** works in the same way as a refrigerator or air conditioner. Gas (the refrigerant) is compressed, then cooled to a liquid state at high pressure in a condenser. It then passes through a constriction (the expansion valve) into a low-pressure region (the evaporator), where it converts back into a gas. During this process heat is required, and this cools the gas and its surroundings. Air drawn through the dehumidifier passes through this cold region, and moisture in the air condenses on the exterior of the heat exchanger plates and runs downwards, through gravity, to a collection point.

Compressor models use less electricity than desiccant dehumidifiers. But: ■ In cold weather the moisture in the air freezes on the cold plates and the dehumidifier shuts down. Compressor dehumidifiers work really well in hot weather, so they are ideal for your Caribbean lay-up!

■ They are heavy, because they consist of an electric motor to drive the compressor, a condenser and evaporator, refrigerant piping and an additional motor to drive the air circulation fan.

**Desiccant dehumidifiers** work in a totally different way. Air is drawn in through a filter and passes over a slowly rotating wheel that is coated with a material called zeolite, which absorbs water from the air. The wheel becomes saturated and requires drying. A heater and a second fan dry the wheel as it passes into the drying sector of its rotation. This moist hot air is then cooled by the incoming air in a condenser; the water extracted gravitates to the bottom and is collected in the same way as the compressor models.

The dry air leaving the dehumidifier is thus much warmer (by around 10°C) than the air entering.

So, desiccator models thrive on cold air temperature and

also heat the space from which they are removing the moisture. This will warm the boat's interior and help to prevent the domestic fresh water pipes freezing up.

Desiccant dehumidifiers are also much lighter in weight than compressor models. However:

- They use more current than compressor models.
- They require operation in air free from solvents. Solvents (from resin or varnish) can affect the desiccant.

### What to look for

You can buy basic or sophisticated models of dehumidifier. Basic models will have a humidistat: this will switch the machine off when the humidity drops to a pre-set percentage. Though variable, you don't really know what value this is. On sophisticated models you can set it, although they switch off anyway when the humidity is reduced to around 50%.

All models collect the water in a container (the bucket). For some this is a translucent tank which enables you to see how much water has been collected.

All have a cut-off switch that shuts the machine down when the tank is full, and a 'full tank' warning light.

Also, they can all be put in continuous drain mode, which bypasses the collection bucket and involves fitting a piece of tubing onto a spigot and directing the water into, for example, a sink drain.

All dehumidifiers will have an inlet air filter. These vary in quality,



The testing ground: Solent University's Ship Model Tow Tank Laboratory

and some can be enhanced with carbon to neutralise odours or a biological element such as silver ion to kill microbes. The simple mesh filters can be cleaned using a vacuum cleaner soft brush attachment.

Some carry handles can be folded out, while others are fixed recesses in the machine's body. These fixed indents are not so handy if the unit needs two hands to lift it.

Some machines have a laundry mode which puts them on optimum performance, and in some cases enables the warm outlet air to be directed towards damp hanging clothes, assisting their drying.

A timer may be present that will allow you to set how long you want the machine to work.

Another 'extra' is an ioniser. This delivers negative ions into the air that attach themselves to positive ions – fine dust particles, for example – making them heavy, so they fall to the floor where they

can be vacuumed up.

Sophisticated machines will switch off when the humidity has reached a pre-set point and then periodically sample the air by switching on the circulation fan. This way power consumption is reduced, but a check is still made on the level of humidity.

Basic machines have a 'continuous' position which overrides the humidistat to keep the machine running regardless of the ambient humidity.

A variable fan speed feature means you may be able to select a slower speed to quieten the machine down if you are in the room or cabin with it running.

Good quality extension leads and surge protectors are recommended for any electrical device left unattended on a boat. This will guard against low voltage and high amperage of the incoming supply which could, in theory, cause a spark on a dehumidifier's control panel.

**Simple mesh filters can be cleaned using a vacuum cleaner soft brush attachment**

## 6 Top tips for using a dehumidifier

- 1 When running your dehumidifier in a boat, keep the external ventilation to a minimum. This means you won't be drying incoming outside air: you'll give the machine less work to do and keep power consumption down to a minimum.
- 2 Make sure the bilges are dry. Fix any leaks that allow water into the boat.
- 3 Open all internal doors to cabins, cupboards and wardrobes. You can also open the engine hatch and lift a few sole boards.
- 4 Rinse off tools that may have been exposed to salt water, spray them with WD40 and leave the tool box lid open.
- 5 Periodically check the air filter to make sure it's clean.
- 6 Don't run the dehumidifier, especially if it is a desiccant model, when carrying out sanding or varnishing activities in the accommodation space.

# Desiccant dehumidifiers on test

## Meaco DD8L and DD8L Junior

Contact: [www.meaco.com](http://www.meaco.com)

There are two Meaco desiccant models available: the DD8L and the DD8L Junior. Both look the same, the difference being the Junior doesn't have an ioniser or anti-bacterial coating on the filter which makes it cheaper to buy.

Common controls include an on/off switch, a three-speed fan control, a three-stage humidity control (maximum 40%, normal 50% and minimum 60%), a laundry mode (35%) and a timer which turns the machine off after 1, 2, 4 or 8 hours.

The DD8L also has an ion button to turn the ioniser on/off. In the three modes controlled

by the relative humidity stat, when the target humidity is reached, the dehumidifier will stop drying the air and run the fan for 10 minutes. The fan then goes to sleep for 30 minutes, then switches back on and samples the air, so it knows when to start dehumidifying again.

The carry handle has a recessed grip at the back, and because the machine is light in weight (6.4kg) this works fine when carrying with one hand.

An LED lights up when the bucket is full. The collection bucket comprises a rectangular

translucent tray with a lid contained behind a door (which has a front viewing window). The rear panel also has a window, so you can view the amount of water collected from front or rear. Both models come supplied with a continuous drainage hose.

The filter is a fine plastic net on a removable panel.

**ON TEST** the two Meaco models collected more water than the others, with the exception of the Mitsubishi. As with all desiccant dehumidifiers, they consume a lot more power than compressor models.



# Compressor dehumidifiers on test

## How we tested them

**W**e set up the dehumidifiers in Solent University's Ship Model Tow Tank Laboratory. This houses a tank 60m long by 3.7m wide and 1.8m deep. Humidity was around 80% – pretty high – giving the machines plenty of moist air to work on.

We set the machines on

maximum output, and then measured how much water they'd collected over a four-hour period.

We measured the power they consumed under maximum load and on standby.

We also measured the outlet air temperature and humidity, using a combined hydrometer/thermometer.



The dehumidifiers were put through their paces on maximum output

## Mitsubishi MJ-E16VX

Contact: [www.mitsubishidehumidifiers.co.uk](http://www.mitsubishidehumidifiers.co.uk)

Arguably in a class of its own, this compressor dehumidifier comes with features including an LED display of the air's incoming humidity, full laundry mode and an electrically-controlled swivelling air outlet louvre on the top.

The controls comprise a button to select 'easy' dehumidifying or 'intelligent laundry' mode, humidity and mode selection with child lock, an LED display giving various items of information, a swing louvre to control how it operates, a timer button, power on/off, a 'bucket full' LED, a drying inside button/LED and an air purifier button/LED for just filtering air. Easy dehumidifying mode operates the unit periodically as conditions demand.

A door hinges to reveal a rectangular translucent water



Features include an LED display of the air's incoming humidity



A see-through panel in the door gives a view of the water collected

collection box with lid. The door also has a see-through panel to give a view of the water collected. The silver-ion-coated antibacterial filter is accessed by removing a panel above the bucket door. The carry handle neatly parks by dropping vertically down into the top. A very comprehensive handbook is provided.

**ON TEST** it collected the most water, but drew more current than the other compressor models. It is also fairly heavy at 11.7kg.

## Ebac 3850e

Contact: [www.ebacdirect.com](http://www.ebacdirect.com)

Ebac's most advanced compressor dehumidifier comes with all the top functions, including an LED display and laundry mode. Controls are an on/standby/off button, a mode button which cycles between max (continuous running) and smart (which turns the unit on and off as required). A button cycles between two fan speeds and a laundry drying function. A timer can be set to run the unit for 2, 4 or 8 hours.

Purifying mode stops extracting moisture and just filters the circulating air. A smart control continuously monitors and learns about the environmental factors, so it knows when it needs to work or not. The filter, a single skin of coarse black foam, is contained at the rear of the machine. The opaque collection bucket is located behind a front-opening door and, like its Amazon 15 cousin, holds 3.5lt of water.



The collection bucket is located behind a front-opening door

Accessories include a drainage kit, replacement standard filters, a fragrance filter, and an activated carbon filter with Bactiguard. No carry handle is fitted: there are two shallow slots in the casing on each side, making it a two-handed job to lift and not suitable for taking up a ladder single-handed.

**ON TEST** Water collection and current consumption was average for the compressor models. It weighs a fairly heavy 13kg.

## Ebac Amazon 15

Contact: [www.ebacdirect.com](http://www.ebacdirect.com)

This basic compressor model of the Ebac range has a body manufactured from ABS polymer and features two controls: one for the two-speed fan, the other for an electronic humidistat.

A running light turns to red when the water container is full. An 'intelligent' defrost system predicts when the heat exchanger coils in the dehumidifiers are about to freeze and suspends the refrigeration process: this then allows the coils to defrost.

The opaque water container is positioned behind a front-opening door and collects 3.5lt of water, making it one of the largest 'buckets' on test.



One switch controls the fan, the other is for an electronic humidistat



The Amazon 15 has one of the largest water containers on test

The standard filter is two-layer, including carbon.

Accessory options include a permanent drainage kit and Bactiguard filters.

The handle amounts to a large horizontal recess at the back, making it possible to carry with one hand.

**ON TEST** the Amazon 15 collected slightly less water than average and consumed average current for the compressor models. Weighing 13kg, it's on the heavy side.

## Dehumidifiers at a glance

\* Fan only. All models had a humidistat.

Make	Model	Measured power (W)		Weight (kg)	Height (mm)	Width (mm)	Depth (mm)	Extraction (ml/h)	Bucket capacity	Fan speeds	Auto-defrost	Auto restart	Timer	Operating temp (°C)	Bacterial filter	Warranty
		Standby*	Max													
Ebac	Amazon 15	20.0	188	13	540	340	250	191.9	3.5lit	2	yes	yes	no	2-35	option	1
Ebac	3850e	15.0	180	13	502	325	275	274.4	3.5lit	2	yes	no	yes	2-35	option	2
Meaco	DD8L	29.0	655	6.4	500	351	188	295.3	2.0lit	3	N/A	yes	yes	1-40	yes	1
Meaco	DD8L Junior	29.0	655	6.4	500	351	188	302.3	2.0lit	3	N/A	yes	yes	1-40	no	1
Meaco	12L	17.0	165	9.5	485	325	248	310.6	2.5lit	1	yes	yes	yes	5-35	opt HEPA	2
Mitsubishi	MJ-E16VX	24.0	222	11.7	570	384	187	476.7	3.8lit	2 variable	yes	yes	yes	1-35	yes	2
Seago	YL-2007	30.0	157	8.5	580	410	320	274.4	2.6lit	1	yes	yes	no	5-35	no	1
Waveline	WL-2110BP	20.0	131	8.75	483	296	186	272.1	2.0lit	1	yes	no	no	5-35	no	2
XM	Pro-Dry	31.0	230	10.5	543	310	250	180.2	3.0lit	1	yes	yes	no	not stated	no	1

### PBO verdict

**I**t was a hot day when we carried out the test – not quite like you'd expect it to be on your boat in the depths of winter unless there's a freak warm spell.

The test conditions therefore favoured the compressor models, but from experience gained in a past PBO test undertaken in much cooler conditions, the amount of water collected by the desiccant models outstripped the compressor types by a factor of two. There is no doubt about the efficacy of the desiccant models in cold weather, but the compressor

models do the job for just a third of the power consumption – though they'll be much less efficient in low temperatures and may also have to keep stopping to defrost.

All the models tested worked well. The Mitsubishi performed best – but then it costs twice as much as the other models.

The Ebac and Meaco compressor models both perform well, but provide no view of how much water has been collected – not an issue, of course, if they're set up to drain into a sink.

Of the basic models (Seago, Waveline, XM), the XM has the best carry handle, but the Waveline is the most compact

### RESULTS

	RESULTS		Air at outlet		Noise levels	
	ml collected	ml/hr	Air temp	% humidity	min	max
Ebac Amazon	825	191.9	30.8	29	53.1	56.8
Ebac 3850e	1180	274.4	31.5	29	55.1	58.5
Meaco DD8L	1300	302.3	36.9	17	49.4	62.8
Meaco 12L	1320	310.6	29.5	31	57.4	59.5
Mitsubishi	2050	476.7	28.0	42	52.9	59.9
Seago	1180	274.4	30.0	28	63.5	63.5
Waveline	1170	272.1	31.1	27	54.8	54.8
XM	775	180.2	31.1	31	63.5	63.5

and lightest compressor model and is the best Budget Buy.

The Meaco desiccant models are the lightest in weight and will perform the best on a boat in winter. Their ability to shut down and periodically sample air

should help keep their otherwise high running costs down.

The Meaco DD8L Junior model is around the same price as the basic compressor models and wins our Best On Test award for use on a boat in winter.



# Bedre Inn klima AS

- vi hjelper deg gjerne!

Tlf. 33 47 01 00