

# 5 Dehumidifiers on test

Keeping your yacht free from mould and mildew over winter is tricky, but a dehumidifier can help. Alex Bell and Tony Green test 5 for performance in a laboratory



Measuring the water collected by each dehumidifier

Used aboard a yacht a dehumidifier would typically be placed to drain into the sink

**O**ver the winter lay up season thoughts invariably turn to how best to preserve your boat when she is out of the water.

Mould is a major enemy, and it loves the moist, stale air found below decks in a yacht shut up for winter. Air can be prevented from going stale by good ventilation (see PBO July 2007 for a test of 10 ventilators), but moisture can need some extra help to keep it at bay. On a damp day the air entering the boat through the ventilators will be moist, and this moisture can then condense on cool surfaces.

A mains-powered dehumidifier is the best solution to keeping the interior dry and therefore preventing the growth of mould. There are two types of dehumidifier available: compression models and those that use a desiccant to dry the air.

## Compressor dehumidifiers

Compressor dehumidifiers work on the same principle as domestic refrigerators. A compressor raises the pressure of the refrigerant when it is in gas form. The gas is then led to a heat exchanger (the condenser), which cools the gas, changing its state to liquid. The liquid is then forced through a small valve into a low-pressure region where it evaporates back to the gas phase. It is this process of evaporation that cools the gas.

To remove moisture a fan draws the surrounding air over the evaporator unit and, as its temperature is lowered, the water held in the air reaches its dew point and condenses onto the evaporator surface. This water then runs off to be collected in a small reservoir or is led away through a flexible pipe.

The cold, dry air is then directed over the

condenser coil where it assists in the condensing process. This warms the air, which then exits the dehumidifier.

## Desiccant dehumidifiers

Desiccant dehumidifiers use a desiccant material, typically Zeolite, which absorbs water vapour in much the same way as silica gel. A fan draws air into the dehumidifier and passes it through a section of a slowly rotating wheel which holds the desiccant. This dries the air.

The clever bit is then to extract the moisture from the desiccant. This is achieved by heating the portion of the wheel not being used to dry the air. This evaporates the water back into vapour, which is then passed over a cold plate to cool the mixture and cause the water to condense. It is then collected in a reservoir as with the compressor type.

## Pros and cons

Compressor dehumidifiers work best at higher temperatures and humidities and are generally rated at a temperature of 30°C and relative humidity of 80%.

Desiccant types, however, actually work better at the low temperatures more likely to be found in boat yards in the UK winter.

In fact, if the temperature drops too low (typically below around 12°C) the evaporator plates of a compressor dehumidifier are likely to ice up. Different units solve this in different ways: some simply switch off, while others switch off the compressor but continue to run the fan, passing ambient air over the plates until they thaw. The more advanced models have a reverse hot gas cycle which quickly heats up the frozen plates and melts the ice.

While compressor dehumidifiers do warm the exit air slightly, the desiccant models warm it a lot. In winter this could be an advantage, helping reduce the chill and preventing your boat's domestic water system freezing up. The down side is that they use more energy – more than twice that used by the compressor type.

## Use on board

For use on a boat there are three requirements: the machines should automatically restart if the power supply is interrupted, they should have a continuous drain facility to remove the water rather than needing you to empty a tank every few days, and for the compressor models an automatic hot gas defrost is preferable.



All units tested had a continuous drain facility

All the models we tested would restart if the power supply was interrupted, and all had a continuous drain facility, allowing you to connect a flexible tube to the dehumidifier and drain the water by gravity into the sink.

## How we tested them

We ran the dehumidifiers for 16½ hours overnight in the wet lab at Southampton Solent University. This contains a large water tank used for testing yacht design models and tends to have high humidity. We then measured the amount of water collected by each dehumidifier.

Because the desiccant model has a small collecting tank we set it to drain through a pipe, while the others drained into their built-in tanks, which proved adequate for this period.

At the start of the test the room temperature was 22.8°C, with a relative humidity (measured with a digital hygrometer) of 57%. At the end of the test the humidity had fallen to 50%, and the temperature had fallen by a degree to 21.8°.

The drop in ambient temperature is probably due to cooler overnight temperatures, as all the dehumidifiers tested have a heating effect.

## Ebac Amazon 15

PRICE: RRP £135.99

www.ebacdirect.com



**T**he newest addition to the Ebac range, this entry-level model features two simple controls: an electronic humidistat and a two-speed fan. There are lights to indicate when the power is on or the water container is full.

The reservoir is opaque, making it impossible to see the level of the water collected. Emptying it is fairly easy, requiring opening a hinged door and vertically lifting a black plastic can out of its collecting position.

The unit comes with a built-in cable tidy and optional permanent drain kit. The inlet air dust filter is fitted externally on the back.

We liked that the bung, which is removed to fit the pipe for continuous drainage, comes with a tether so it doesn't get lost, but were less keen on the carry handle. The handle is formed from a recess in the top of the casing: it certainly makes a sturdy handhold, but could not take a safety line for lifting up a ladder.

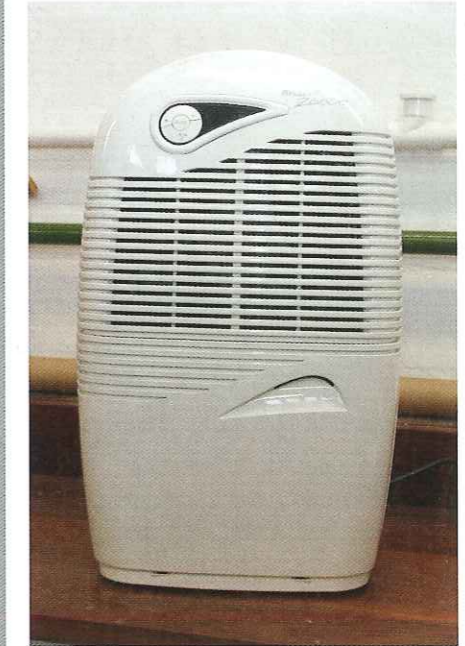


A sturdy carry handle is moulded into the casing above the removable dust filter

## Ebac 2650e

PRICE: RRP £169.99

www.ebacdirect.com



**S**haring all the basic features of the Ebac Amazon 15, the 2650e model has a higher specification which includes a patented intelligent Smart Control System to automatically adjust the unit's running pattern according to changes in the weather. This is claimed to lower running costs.

The electronic controls proved easy to use, and include an eight-hour boost control, which is ideal for drying out when things are particularly damp, or even for drying laundry aboard. There is also an antibacterial filter.

An economy mode is available which reduces the time the dehumidifier operates each day, and the fan has four speed settings.

We felt that this model was worth the extra cost over the entry-level Ebac because the extra settings allow you to customise it more to your boat rather than the domestic environment for which it was designed. However, when not in continuous drain mode both models suffer from not being able to see the water level in the tank.



The opaque tank is concealed behind a hinged door in the front of the unit

## Mitsubishi MJE16VX

PRICE: RRP £352.00

www.meaco.com



The most expensive of the dehumidifiers tested, this was also the most complex. The clear digital display includes a reading of current humidity so you can monitor the ambient conditions, and the control panel offers numerous settings including laundry and mildew guard. A washable deodorising filter claims to remove 90% of all pollens to help allergy sufferers.

This was the only model to feature a hot gas defrost system, and the unit runs a programme to dry out its internal parts once switched off, so it's a good idea to use the unit's own switch rather than unplug the power.

The water is emptied by opening a door, lifting out the transparent reservoir and removing a lid before pouring the water away. A window provides a visual indicator to show the level of water in the tank, and a drop down carry handle offers a sturdy grip when lifting the machine – ideal for looping a rope around to haul it up the side of your boat when ashore.

The continuous drain involves removing a blank and pressing a tube onto a spigot. This diverts the water flow from the collection tank. An excellent instruction manual is provided.



Emptying is a three-stage process of opening a door, removing the tank and lifting the lid

## XM Pro-Dry

PRICE: RRP £159.99

www.xm-yachting.co.uk



The simple controls of the XM Pro Dry comprise a humidistat knob which also acts as the on/off switch. Three indicator lights inform you when the machine is on, the collection tank is full and when it is on defrost mode. There is a single speed fan, and a dust filter situated at the front is easy to remove for cleaning. There is a cable tidy and a place for the plug.

The water collection tank is transparent and fully visible for excellent indication of the level of water collected. This proved easy to empty, making it a test favourite. The permanent drain facility requires a bung to be removed at the back of the unit, which must then be inserted above the collection tank to prevent the tank from filling while also retaining the plug. A 10mm pipe then leads the water away.

A carry handle is built in, with a full grip which was the testers' favourite and especially good for carrying up ladders or making fast a line to swing it on deck.

The auto-defrost facility on the XM does not use a hot gas system, but providing the outside temperature is warm enough will switch off until the condenser plates have thawed out before switching back on automatically.



The water level is clearly shown thanks to the transparent tank, which is easily emptied

## Meaco DD122FW

PRICE: RRP £149.99

www.meaco.com



The only desiccant dehumidifier tested, this is immediately distinguishable by its light weight, compact size, and higher temperature of the exhaust air – a bonus in cold weather, but not welcome in a hot climate.

Desiccant models will work right down to freezing temperatures, the downside being the higher power consumption (although this should be offset by shorter running times).

Electronic controls and digital symbols indicate the operation selected, which include laundry mode, a built in ioniser, electronic louvre, and an eight-hour timer.

The transparent collection reservoir has a small capacity of just two litres, and is removed by sliding the tank out and taking off a lid before the water is poured away. On the model tested the casing had a circular hole which gives a visual indication of the water level.

The permanent drain function requires a blank to be removed. The tube (provided) is then inserted onto a plastic spigot, diverting the water from the collection tank.

The carry handle was a lift-up full grip type, but care was needed not to initially grab the swing louvres.



For the most efficient unit on test, the collection tank proved a little small



The five dehumidifiers were tested in identical lab conditions

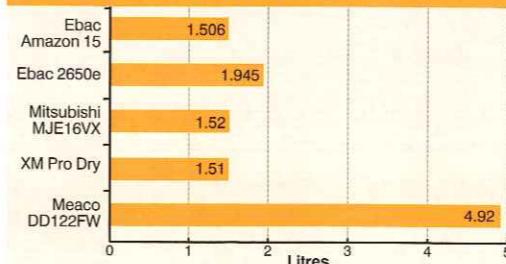
### DEHUMIDIFIERS SPECIFICATION

Make	Model	Type	Power (Watts)	Weight (kg)	Height (mm)	Width (mm)	Depth (mm)	Fan speeds	Auto defrost	Auto restart	Continuous drain
Ebac	Amazon 15	compressor	210	13	525	330	270	2	yes	yes	yes
Ebac	2650e	compressor	360	13	525	330	270	2	yes	yes	yes
Mitsubishi	MJE16VX	compressor	275	11.7	570	384	183	auto variable	yes-hot gas	yes	yes
XM	Pro-dry	compressor	220	14.5	543	310	246	1	yes	yes	yes
Meaco	DD122FW	desiccant	390-620	6	475	290	175	2	n/a	yes	yes

## PBO's dehumidifier test results

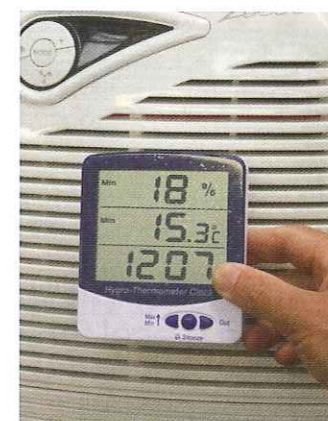
The graph below shows the total water collected, and the table shows the average collection rate in millilitres per hour (ml/h). We also measured the temperature of the air at the exit vent and its humidity. The desiccant model was significantly drier, reaching the measurement limit of our hygrometer, but also significantly hotter.

### Total water collected



### Test measurements

Make	Model	Average collection rate	Air temp at exit	Relative humidity at exit
Ebac	Amazon 15	91.27ml/h	26°C	32%
Ebac	2650e	117.88ml/h	26°C	32%
Mitsubishi	MJE16VX	92.12ml/h	27°C	34%
XM	Pro dry	91.52ml/h	27°C	31%
Meaco	DD122FW	298.18ml/h	34°C	<18%



A digital thermo/hygro meter measured the outlet temperature and humidity for each unit

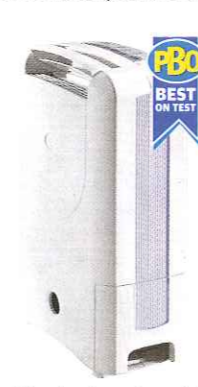
### PBO'S VERDICT

When buying a new dehumidifier, the first decision is whether to choose a compressor or desiccant machine.

Of the compressor models, the Ebac 2650e pulled out most water on our test. The Mitsubishi MJE16VX has many sophisticated extras, but the XM machine ticks all the boxes with an easy-to-see and empty collecting container, an excellent carry handle and a competitive price, so is best buy of the compressor units.



The XM Pro-Dry



The desiccant model proved most efficient

But the clear winner is the desiccant dehumidifier, whose performance was very impressive and would be unaffected by cold conditions. It is also lightweight and the most compact. The only disadvantages are its higher current consumption, so this

unit will cost you more to run, and also that when the humidity is reduced to around 50% the machine still keeps a fan running continuously to sample the air, using around 15W. A preferable system would be that used by Mitsubishi, which samples air by turning the fan on every hour, or a straightforward humidistat such as those used on the other machines, which monitor the relative humidity and switch on or off accordingly.

A final word of warning when choosing a dehumidifier is not to be put off by the host of retailers and brands you will find with a little research, as most of them sell similar or even identical units imported from the Far East. Where possible we have quoted the main importer, but you may find better prices or special offers by shopping around.

### Jargon buster

■ **Humidistat:** pretty much the same as a thermostat monitors temperature, a humidistat measures relative humidity and switches the machine on and off at certain levels.

■ **Relative humidity:** humidity is a measure of the amount of water vapour contained in the air. Relative humidity is the ratio between the amount of water vapour in the air compared with the maximum it could hold at that temperature. The higher the temperature, the more water air will absorb.

■ **Dew point:** when hot, humid air cools down it reaches its dew point, the temperature where the water then starts to condense out of the air, and may appear as droplets on cool surfaces.