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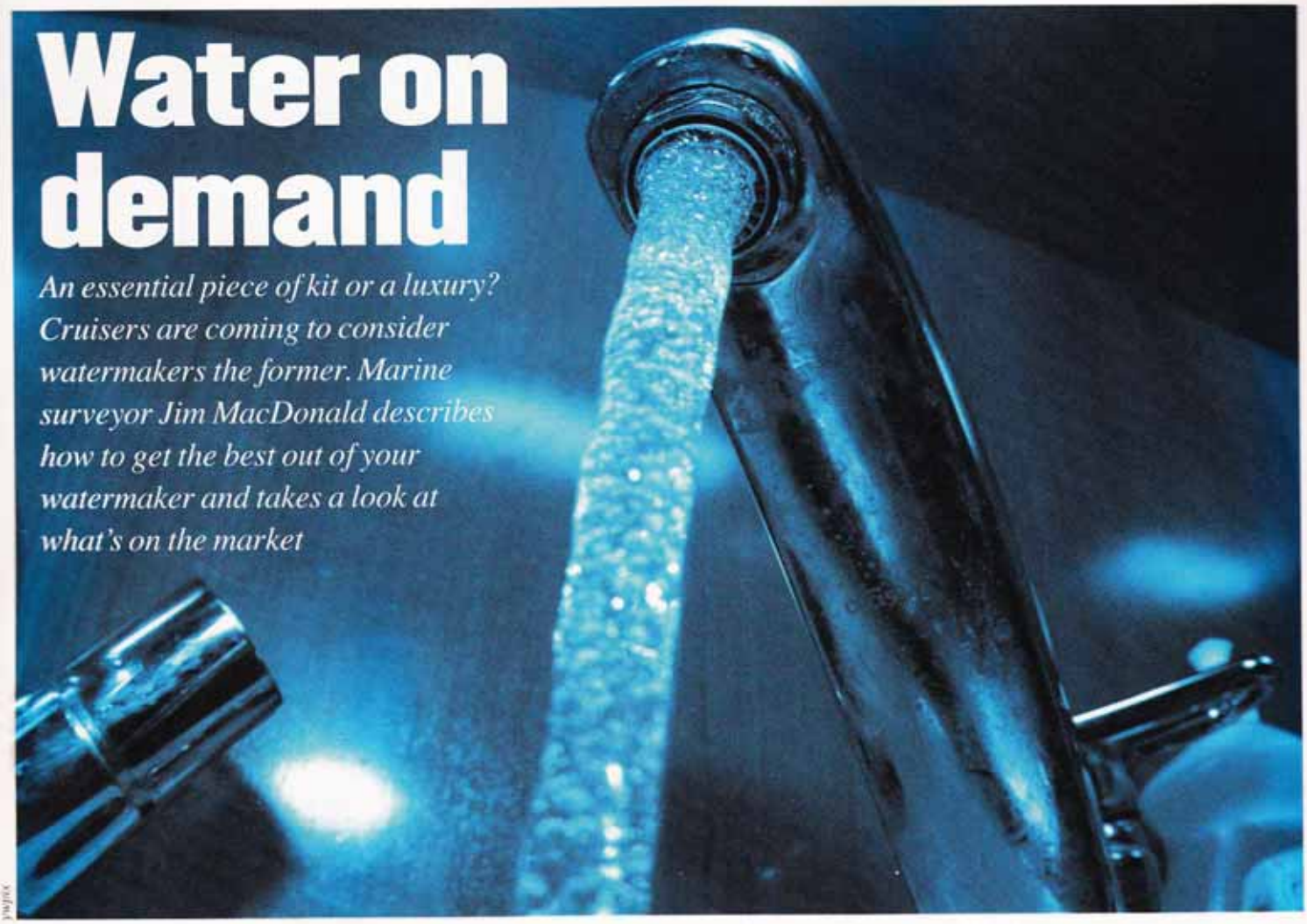
Water on demand

An essential piece of kit or a luxury? Cruisers are coming to consider watermakers the former. Marine surveyor Jim MacDonald describes how to get the best out of your watermaker and takes a look at what's on the market



Watermakers are consistently voted one of the most useful items of gear in our annual survey of skippers taking part in the Atlantic Rally for Cruisers (ARC), second only to an autopilot. This is no great surprise for a transatlantic crossing, especially as onboard energy management and desalination systems have improved immeasurably.

But it is becoming increasingly common to find watermakers on boats of modest size, even among owners whose cruising plans do not involve crossing oceans.

Crews are finding that fresh water can be scarce in the Mediterranean and can even be a challenge in home cruising grounds such as the west coast of Scotland. What a watermaker offers is independence – why call in at a marina to fill up the water tanks when you can continue to enjoy a cruise?

Installation

Watermakers have a reputation for being unreliable and noisy. Some of this criticism was justified; traditional systems were not modified to suit modern yachts and early 'new-generation' units (see panel right) went onto the market before their glitches were sorted out. However, many problems were also the result of incorrect installation.

So what makes a good installation? An uninterrupted supply of seawater is the most critical factor. If the skin-fitting is in an area of turbulence on the hull, the intake becomes aerated. If it is too high up, air will be sucked in as the boat rolls in a seaway. The water intake should be as low as possible on the hull, to the side or abaft the keel. Fit it too far forward and there can be turbulence as the vessel beats into a head sea, too far aft and turbulence around the rudder has a similar effect.

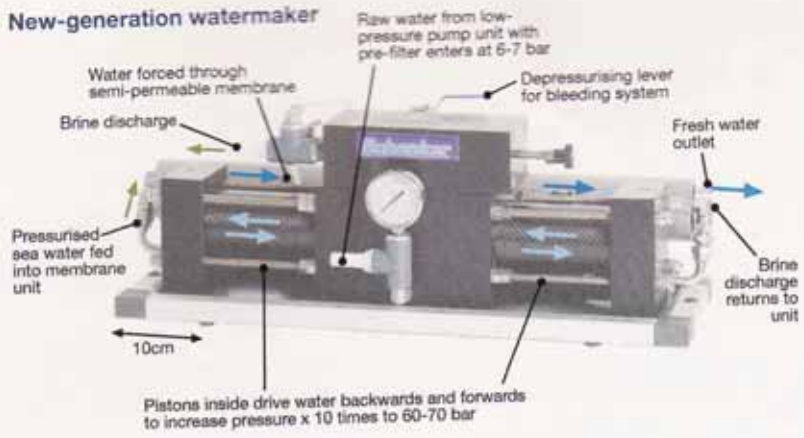
Jim MacDonald is a marine surveyor and owner of Mactra Marine, a bluewater equipment specialist. He has been an active sailor for over 25 years. His current yacht *Helice* is a much-loved Westerly 33 ketch of some 34 years standing. She has taken MacDonald and his family tens of thousands of miles. The family is currently cruising the Baltic

The skin-fitting is also important – a forward-facing scoop provides a good supply of water. Care must be taken if you share an existing skin-fitting with another piece of equipment. It is common to T into the engine or generator water intake, for example, but make sure the watermaker doesn't compromise the cooling water to the engine.

Water storage

A basic system will produce water that can be piped into the vessel's water tanks. Because initial production before the watermaker gets up to full pressure is of poor quality, there should be a way to dump the first water such as a tap in the galley or heads. Initial production goes into the sink until it tastes 'good for the tank', when flow is diverted into the tank with a manual L port valve.

Some systems have an electronic probe that dumps the



How do watermakers work?

In two words: reverse osmosis. Sea water is forced through a semi-permeable membrane at a pressure of 56 bar. Its tiny holes allow water molecules to pass, but not larger salt molecules. Only a small percentage of sea water is turned into fresh water; the rest is discharged as a brine.

Traditional watermakers use a high pressure pump to achieve the 56-bar pressure. The pump is normally run either from a generator or a pulley belt of the engine. The equipment is heavy, noisy and uses a lot of energy. That said, traditional systems are popular and generally very reliable, so are often first choice where space and energy are not an issue.

A new generation of watermakers run from the battery requires much less energy. These units have low pressure pumps to create a pressure of 6 to 8 bar. This level is then increased hydraulically to the high pressure required and the brine discharge is also hydraulically increased before it leaves the watermaker. The process requires only the initial energy of the pump to bring the water into watermaker.

This has made fitting a watermaker possible where space to fit the equipment is limited or where energy is an issue.


DG/yapix

initial production, then diverts the flow of water into the water tank when production has reached a potable quality.

Many owners fit a dedicated tank for watermaker water. The logic goes that at least some water tanks will be spared should the watermaker malfunction and produce bad water. There is no hard and fast rule, but a watermaker that produces good water generally continues to do so.

The main cause of salty or brackish water is a breakdown of the membrane. Membranes can last five to seven years if looked after and it's unusual for water quality to change quickly; it tends to deteriorate over a longer period.

Maintenance

Second only to installation in terms of potential problems is general maintenance. Membranes can be damaged by chlorine in tap water yet the membrane will need

Right: a typical traditional high-pressure installation


Photos courtesy of Webasto spokesman

"Many problems with watermakers are the result of incorrect installation

Left: adding biocide 'pickling' is easy. It takes a couple of minutes and preserves the membranes for up to 12 months

to be flushed periodically with fresh water to remove salt deposits. Manufacturers generally provide a system to remove chlorine via a carbon filter. This ensures any fresh water used to flush the watermaker has been dechlorinated before it reaches the membrane.

All watermakers have some form of filtering of the sea water intake to remove impurities. This takes the form of at least one prefilter cartridge. The filter will need to be changed regularly, particularly when the watermaker is in constant use.

If a watermaker is not used for more than two weeks (particularly in a warm climate), you need to introduce a biocide to the membrane and internal workings. This is known as 'pickling' and takes a couple of minutes to do, but will preserve the membranes for up to a year without use.

Some manufacturers offer timed automatic flushing that will avoid having to pickle. This is fine if you are on board and forgetful, but it's worrying to have equipment running while the vessel is unattended.

Prices

If every yacht was fitted with a watermaker, they would probably be mass-produced in China for a fraction of their current cost. Until that day, they are far from cheap.

Hand-operated emergency watermakers start at just over £500 and the smallest power-driven machine will cost around £2,500. Prices rise with production output: a 60lt an hour watermaker will cost around £4,000 to £6,000.

Most watermaker manufacturers offer extra features that allow machines to be flushed automatically.

Traditional watermakers

AC or DC powered	
Pressure from start-up	56 bar
Consumption	20 Watth/lt
Pressure regulation	Manual
Energy recovery	None

Traditional watermakers are often sold by companies that also retail marine diesel generators – a natural tie-up as the generator will provide the energy for such power-hungry accessories as the watermaker.

Seafresh Desalinators have been a market leader in the sector for years. Manufactured in the UK, they were the system of choice in many of the UK's leading boatbuilders and are widely used by the armed forces. The company have recently been acquired by Cathelco and produce the popular Seafresh 'Ton' H2O and Ocean Series watermakers.

Another good maker, Dessalator, produce watermakers that operate on DC and AC voltages. Ranges include Freedom DC Series, AC Cruise, dual voltage Duo Range and for larger applications the AC Pro. American company Horizon Reverse Osmosis (HRO) produce the well-known Seafari range, which is marketed in the UK by Fischer Panda. Aquafresh also produce a range of watermakers.

Alongside the units of these producers are a number of traditional watermakers by lesser known names such as the Echotec range from Trinidad. These are reliable, no-frills systems – there's much to be said for keeping things simple, not least the prices.

A traditional watermaker can be AC (mains) or DC (12V or 24V). If AC, energy will be from a generator, so not an issue. DC units, however, will be so power-hungry that the vessel's engine (or generator) will have to be run at the same time as the watermaker.

New-generation watermakers

AC or DC powered	
Pump pressure from start-up	8 bar
Consumption	4 Watth/lt
Pressure regulation	Automatic
Energy recovery	Fixed

Though able to run on AC, new-generation watermakers score in their ability to be run from a yacht's batteries independent of generator or engine.

American company PUR were pioneers in the use of energy recovery to reduce the power draw. Now known as Katadyn and still popular (if not as energy efficient as some rivals), they produce extremely compact watermakers for smaller vessels. A 12V DC Katadyn unit makes up to 25lt of water per hour, with a power draw from 4-18amps (2-9amps at 24V) depending on the model. The very reliable Katadyn 40E has long been a favourite of the ocean racing

fraternity. Using 4amps at 12V (2amps at 24V) it produces 5.5lt of water an hour, enough for a solo sailor or couple.

Spectra Water Machines and Schenker are the leading new-generation manufacturers. Spectra's entry-level Spectra Ventura 150 makes 24lt an hour thanks to its Clark hydraulic pump and uses just 9amps. The Catalina and Newport range also use the Clark pump, but the latest offerings from the American company, the Farallon 1800 and 2800, are AC-powered machines that use a newly developed Pearson pump to make 284lt and 454lt per hour.

Italy's Schenker use a patented Energy Recovery System (ERS) to achieve a very low power draw per litre from their units: from 30lt per hour for 9amps at 12V. By doubling up pumps and membranes, the range goes up to 210lt an hour.

Another innovation is the Waterlog, which is towed behind the boat. Its manufacturers claim it will make up to a gallon of water an hour.

TOP TIPS

- **Choose a manufacturer or supplier that has a good reputation – both for their units and back-up.**
- **Always seek advice as to what machine is best for you: a reputable supplier will be honest.**
- **Ensure the installation is correct and that the watermaker works at sea as well as at anchor.**
- **Change consumables and carry out the routine maintenance recommended by the manufacturer.**
- **Watermakers like to be used: it's better to run them for an hour a day, than 7 hours once a week.**