WELL AND TRULY TESTED

Sometimes only a long-term test will do the job, and that has been the case with a device that can be retrofitted to DSLR camera housings to prevent leaks. NIGEL WADE reaches his verdict

LEAK SENSOR
VIVID HOUSINGS LEAK SENTINEL V3

Above: The complete package with Leak Sentinel and hand pump.

"IT'S NOT A CASE OF IF IT'S going to happen, but when it's going to happen." So the saying goes. I'm talking about the underwater photographers' worst nightmare – a camera flood.

I've been extremely lucky, having experienced it only once. By lucky, I mean that it happened in a rinse tank, and I managed to save my expensive DSLR camera and lens.

The event left a mental scar and, as you'd expect, a phobia of it ever happening again.

If you're a regular reader of DIVER *Tests* you'll remember the crusade on which my predecessor John Bantin embarked to inform the underwater photography world about the benefits of vacuum leak detectors.

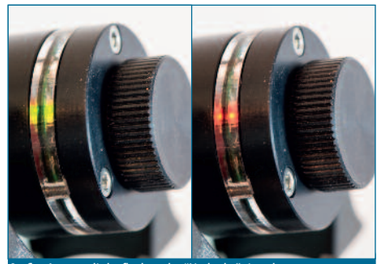
I was a total convert, as were a few underwater housing manufacturers that have designed and fitted, as standard, a generic vacuum system to their product ranges.

For those of us who don't own one of these housings, the only solution was, and still is, a third-party system.

Some models have appeared from across the Atlantic and have already featured on these pages. Meanwhile I have been using and evaluating for the past year a system from Europe – the Leak Sentinel from Slovenia-based Vivid Housings.

The Principle

Simply put, a negative pressure is created inside the closed and (we hope) sealed camera housing by removing a small percentage of the air. The housing is left to sit for a short period of time, during which any leaks will result in air being drawn in from the outside, equalising the pressure inside.



Left: A green light flashes the "No leaks" signal.
Right: A red light indicates that internal pressure has equalised.

There are a couple of ways to indicate equalisation of the pressure. An analogue gauge can be fitted and used to indicate a drop, or it can be monitored via electronic wizardry with a permanent visual display showing the state of play.

Air, unlike salt water, is non-destructive, so if you have a leak it won't destroy your expensive camera system and ruin your week.

Air is also less dense than water, and will find even the smallest inlet caused by hair, fluff, grit or salt crystals on the housing's O-rings or mating surfaces.

The Design

Version 3 of the Sentinel features a calibrated pressure-sensor and processor in the form of electronic circuitry that's set in a robust anodised aluminium body. Tiny red or green LEDs behind a transparent acrylic window indicate the pressure state inside the housing.

A one-way valve is formed by a red silicon disk, which is in turn sealed via a screw-in blank cap. Vivid supplies various stainless-steel adaptors to connect the whole thing to the camera housing via an unused bulkhead port. Every joint is O-ring protected.

Power is supplied from a coin battery fitted inside, making the whole unit self-contained and compact.

I fitted the Leak Sentinel to my Subal Nikon D800 housing, which has three 14mm bulkhead ports, two of which I've used for Nikonos-type three-pin strobe synch connections and the third (which was originally a spare and blanked off) for the Sentinel.

Vivid supplied my unit complete with a stainless steel M14x1 adaptor, which fitted seamlessly into the Subal with an O-ring seal.

I had to juggle the bulkhead connections a little, as the original layout put two ports close together. The Leak Sentinel is 31mm in diameter, and there wasn't room to connect the Sea & Sea synch cable when it was fitted.

Instead I positioned it on the right-hand side, just above the housing's shutter release, and placed both the strobe connections on the left.

In Use

Before activating the Leak Sentinel, all the O-rings, grooves and mating faces need to be checked for any contamination and the housing's rear clamshell securely fastened.

The Sentinel is switched on by removing the blank cap and pressing firmly on the centre of the silicon valve-seal, which activates a micro-switch. The unit automatically and instantly calibrates for the ambient air pressure.

A red flashing LED will be seen through the transparent acrylic window at this stage. Screwing the pump adaptor into the threaded valve body connects the hand-pump, and by pumping slowly air is extracted from inside the housing.

The number of strokes varies, depending on the volume of the housing and the choice of port. With a 60mm macro port fitted, around six or seven strokes starts the LED blinking alternately red and green. A further five or six and the LED shows only green, indicating that a sufficient negative pressure has been achieved.

It's a case of waiting with your fingers crossed for 15-30 minutes to see if the LED changes back to flashing red, which would indicate an equalisation in pressure and therefore a leak.

If this is the case, the integrity of the housing will need to be re-checked and the process repeated until a satisfactory seal is achieved.

I like to leave the unit switched on for the whole diving day, and have found that it lasts for at least a fortnight of use. After the dives, the protective blank cap can be removed and the pressure equalised with a simple sideways movement of the silicon seal. A firm press to its centre then turns the unit off.

Above: The Leak Sentinel from Vivid Housings.

I've heard horror stories involving dome-ports coming adrift when a camera-housing has been passed to a diver on the surface, but the vacuum system clamps everything tightly in place, including the lens ports, making it almost impossible to remove them.

I'm not a boffin, I'm a diver, but I do know that as a gas (air) increases or decreases in temperature the pressure also increases or decreases. It would therefore be feasible that if you set the Sentinel up in an air-conditioned room and then took it out on the hot, sunny deck of your dive-boat, the pressure would rise inside the housing and falsely indicate a leak.

Well, in the 12 months that I've had this unit fitted this situation has not arisen – and it has been used almost exclusively in hot climates.

The opposite would happen if you took the camera-housing from a nice warm environment and then dived in the cold winter waters off our coastline, although this would have a positive effect as the internal air volume was reduced.

SPECS

PRICES ›› **£200 euros, free shipping to the UK**
DEPTH RATING ›› **100m**
SIZE ›› **25 x 31mm diameter**
WEIGHT ›› **Valve body 45g, Hand-pump 140g**
POWER ›› **3V CR1632 lithium coin cell battery**
ADAPTORS ›› **Sea & Sea, Aquatica, Nauticam, Subal, Hugyfot, Seacam, Ikelite**
CONTACT ›› **www.vividhousings.com**
DIVER GUIDE - ★★★★★★★★★☆

Conclusion

Unlike some models of vacuum leak-detectors, the Sentinel's integral LED indicators offer instant feedback without having to fit a gauge to see if the pressure inside has dropped.

For me this represents a real-world advantage, because a quick glance is all that's needed to make that all-important decision about whether to take the camera under water or leave it at the surface.

The Vivid Leak Sentinel needs an auxiliary port to be fitted to an underwater camera housing, and unfortunately these are not found on most compact models. However, if you own a housing that has one, Vivid can supply an adaptor to retrofit the Sentinel.

After a year of hard diving representing almost 300 hours under water, my Leak Sentinel has proved robust and reliable.

Most significantly, there have been a number of occasions on which I've found that the housing wasn't sealed properly, and the little Vivid system has saved the day (and my wallet).

It has become an integral part of my photographic set-up – one I wouldn't ever want to be without. ■

REGULATOR
ATOMIC AQUATICS **M1**

VERY FEW MANUFACTURERS build a regulator that's a true all-rounder, a single model that can be used for dedicated high-O_2 deco gas or air and nitrox in the same package.

One such regulator is the well-established M1 model from Atomic Aquatics. Until recently it was rated for use with up to 80% oxygen, but it has now been upgraded to be compatible with 100% oxygen.

I took one for a week's mixed diving, including some deep tec, in the northern Red Sea.

Above: Atomic Aquatics M1 regulator.

Nomenclature

The Atomic naming system is a simple affair, with the letter denoting the material used: 'B' for Brass, 'Z' for Zirconium, 'T' for Titanium and, in the case of this 'M' model, Monel. The number denotes the edition.

Monel is a nickel-based alloy that contains between 29 and 33% copper. The alloy exhibits high corrosion resistance in acids and alkalis, high mechanical strength, good ductility and a low coefficient of thermal expansion.

Most importantly, it is compatible with the use of high-pressure oxygen.

First Stage

Employing chrome-plated brass for the main body and monel for key internal components, the first stage is a high-flow piston design with four low-pressure ports set around a swivel turret and a fifth central lp port at the tip.

Two high-pressure ports are fixed within the main body.

The first stage is environmentally sealed for freeze and contamination protection.

The M1 is factory-ready for non-dedicated nitrox mixes up to 50% or dedicated oxygen mixes up to 100%, although at anything above 50% you'll have to follow Atomic's strict guidelines on dedicated oxygen regulator use.

Let me explain: contaminates such as oils

can be transferred into cylinders when charged with air, especially in areas where clean air standards are uncertain. This oil can then contaminate the high-pressure components within the regulator's first stage.

High-percentage oxygen at high pressures can cause this oil to spontaneously combust, producing toxic carbon monoxide and damaging the internal components.

The M1 is built for high oxygen use, but if this is your intention it must be dedicated for that use only. Alternatively, it can be safely used interchangeably with compressed air or nitrox mixes up to 50%.

Second Stage

The second stage is constructed using high-grade polymers with precision-machined zirconium plated brass, 316 stainless steel and titanium components.

It has a fixed thermal heat-sink, which makes it suitable for coldwater diving, and Atomic's patented seat-saving orifice.

This is a clever design that lifts the valve away from its seat when the regulator isn't in use, ensuring that it doesn't become engraved, and thereby prolonging its life. The result is a two-year or 300-dive service interval.

Unlike most regulators, the front cover on the M1 has its inlet ports around the edge as opposed to the front. This ensures that water flow from strong currents, or when using a scooter (DPV), won't press against the diaphragm and cause an unwanted increase in gas flow.

Other features include Atomic's patented Automatic Air Flow (AFC), which is a pressure sensor that adjusts the venturi vane according to depth, a rapid-adjustment knob to manually de-tune the second stage, and an enlarged exhaust opening with widened ports to distribute exhaled bubbles away from the diver's face.

Last but not least is a comfort-fit mouthpiece, which is formed from dual silicon and has tear-resistant bite tabs.

Under Water

I started a week's diving, having configured this regulator for recreational depths using a single tank set-up, and set off to explore the reefs around Egypt's Ras Mohammed marine park.

The first-stage low-pressure ports are set in pairs around the swivel turret, which makes hose-configuration a doddle, putting everything exactly where I want it.

My first impressions as I put the M1 through my standard set of tests were of a regulator built to exacting standards using high-quality materials. The regulator breathed extremely smoothly at shallower depths, without the slightest hint of a freeflow when I hit the water.

I inverted myself to see if there was any leakage when it was used upside-down, and the mouthpiece remained dry. Nor was there a freeflow when I spat the second stage out.

Everything seemed simple but effective, especially the purge, which is big, easy to locate and operates superbly, progressively increasing airflow the more it's depressed. It easily cleared any water from my mouth, without trying to blow a hole in the back of my head.

I found the rapid-adjustment knob easy to locate and to use as well, but at shallow depths there seemed to be little if any difference in performance. It wasn't until I took the reg down to 50m on a technical dive that it came into its own, with a discernible difference in breathing resistance as I detuned the reg.

On the deeper dives this regulator seemed to come to life. Don't get me wrong, it was first-rate at recreational depths, it's just that it became even better the deeper I went.

The enlarged exhaust with wide ports meant that bubble distribution was excellent, and I also found it easy to exhale.

The attention to detail is second to none, with little touches such as the silicone mouthpiece that make this package ooze class. The mould-lines removed around the edges to create a smooth surface that didn't rub the corners of my mouth made long, repetitive dives a joy.

However, unlike other models in the Atomic range the M1 on test lacked a second-stage swivel, and I found it a little stiff, especially with the heavy rubber intermediate-pressure hose fitted as standard.

While Atomic will fit a swivel as an option, hardcore tec divers are likely to see this as a failure point.

Most importantly, as an all-rounder the M1 lacks the facility to change the hose-configuration to the left for true versatility when configured for a twin or sidemount set-up.

SPECS

PRICE ›› **M1 £526, M1 Octo £220**
FIRST STAGE ›› **Jet-seat piston**
PORTS ›› **5lp, 2hp**
CONNECTIONS ›› **DIN, A-clamp, M26 x 2**
SECOND STAGE ›› **Pneumatically balanced poppet with seat-saving orifice.**
CONTROLS ›› **Automatic Flow Control (AFC), rapid-adjustment knob.**
NITROX ›› **Non-dedicated EAN 50%, dedicated EAN up to 100%.**
WARRANTY ›› **Limited lifetime (not contingent on proof of purchase).**
SERVICE INTERVAL ›› **2 years / 300 dives**
CONTACT ›› **www.atomicaquatics.com**
DIVER GUIDE - ★★★★★★★★★☆

Conclusion

There are some pretty good regulators in today's marketplace, especially in terms of build quality and performance. I have dived with a few of these high-end models recently and my past interpretation of what makes a good performer has changed considerably.

In my opinion the Atomic M1 is an extremely good regulator, its performance second to none, but for what is a claimed all-rounder it lacks total versatility.

However, like all Atomic products the design, attention to detail, materials and performance still put it right up there with the very best in its class. ■

WETSUIT
PINNACLE CRUISER 5mm

HERE'S THE DISCLAIMER: I'm a huge fan of Pinnacle wetsuits and use the 3mm "elasoprene" model for all my warmwater diving when I'm not testing anything else. The problem I have encountered is in obtaining Pinnacle products. They're made and distributed in the USA, and it has proved difficult and expensive to get its stuff shipped across the Atlantic.

Now, however, UK-based Sea & Sea has become distributor on my side of the pond, so I badgered it into sending me a 5mm model to test on a recent Red Sea outing.

Above: The Velcro ribbon-keeper on the rear zip adds a nice touch.
Above right: Cruiser 5mm wetsuit modelled by Alec Jones.

The Design

Pinnacle Aquatics has pigeonholed the Cruiser as a budget suit, with its higher-end products incorporating Merino wool for insulation and comfort.

The Cruiser has a titanium lining but features many of the design aspects of its more expensive brethren. Constructed with high-stretch neoprene in its extremities, all the joints are blind-stitched and glued, giving a feeling of quality and durability.

A full-length rear zipper with gusseted ankle-zips makes the suit easy to don and doff. Smoothskin neck-, ankle- and wrist-seals along with a 10mm spine-pad help to keep water flow to a minimum, and enhance the suit's thermal properties.

The Cruiser also incorporates moulded rubber shoulder-pads to help keep the BC in place, and roughskin kneepads to add to its durability.

Neat little touches such as a Velcro keeper to hold the zip pull-tape in place and stop it floating around your head, and the good-quality materials used in the suit's construction, belie the fact that this is a budget version.

Finished in black, with tasteful and understated red, white and silver livery, the Pinnacle Cruiser looks the business.

In Use

The Cruiser in 5mm neoprene was the natural choice for my Red Sea foray. The water temperature at the beginning of March is around 24°C – any cooler and I would have considered a thicker model, or might have even contemplated going the drysuit route.

On my rotund frame the suit was tight-fitting, but the stretchy neoprene allowed for easy movement without any noticeable problems in flexibility. It was certainly warm, and after the initial flush of cooler water down my back it kept me nice and toasty on all my dives.

The salinity in the Red Sea is quite high, and it's noticeable that extra weights are usually needed. The Cruiser (as a new suit) seemed very buoyant in this scenario, and I had to re-evaluate my weight requirements, ending up with 3kg more than I had anticipated.

At depth the suit didn't seem to compress too much, leaving me with enough thermal insulation to enjoy long dives.

The finish on the outer surface resists that unavoidable Velcro rash that quickly ruins a suit – this model should last for years.

SPECS

PRICE ›› **£200**
SIZES ›› **XS, S, M, L, XL, XXL, XXXL. Short and tall sizes also available.**
COLOURS ›› **Black only**
VERSIONS ›› **3, 5 and 7mm (the 3mm model doesn't have ankle-zips).**
CONTACT ›› **www.sea-sea.com**
DIVER GUIDE - ★★★★★★★★☆☆

Conclusion

Last month's **DIVER** *Tests* included a photo of me in a Lycra undersuit, and I would like to apologise wholeheartedly for the trauma that must have caused. I asked Elite Diving's Instructor Alec Jones to model the Pinnacle Cruiser for these pages, as I couldn't bring myself to subject you to more horrors.

I can however report that this suit was a delight to use. It fitted me very well in size L/S (Large-Short), was stretchy and flexible, didn't limit my movements and, most importantly, kept me warm.

For the ninja fashion fans out there, this all-black suit should be right up your street. ■

MASK
AQUA LUNG **LINEA**

Above: Aqualung Linea mask in Twilight livery.
Left: Sarah deputises as tester with the Linea.

VERY FEW GEAR MANUFACTURERS cater specifically for female divers. Some add pink accents to generic dive kit and call it their "ladies' range", while others produce a range that is gender-specific.

Forward-thinking Aqua Lung is one of the latter companies, and it sent me samples from its women's range, which I'm obviously not qualified to test. I took its Linea mask with me on a recent reef-diving trip, hoping to find a surrogate female tester to help me out.

The Design

The Linea is specifically engineered for the female face, manufactured using Aqua Lung's "Micromask" technology.

The frame and skirt are moulded in one hit without clipping various components together, and the result is a very low-volume model with a thin frame and smooth lines that's also unobtrusive and light in weight.

The single lens is held closer to the face, providing a larger field of vision. It's also raked slightly to enhance the view lower down. The clear silicone used is soft and pliable, and the skirt is elongated at the sides to improve fit.

Aqua Lung uses differing textures around the skirt's edge to enable a superior seal. The buckle system incorporates a four-way swivel, meaning that it's free to move in and out as well as up and down, ensuring that the wearer can find a perfect position.

It has an elongated strap-guide on the buckle, which gets rid of the need for keeper-rings and prevents long hair getting entangled, something I've seen and winced at in the past.

The strap is adjusted with the use of a double-pinch button that's easy to access and provides smooth movement. The rear of the strap is anatomically cut, with a 3D profile that nestles neatly round the back of the wearer's head.

The Aqua Lung Linea is available only with a clear silicon skirt, and comes with three frame-colour options.

Under Water

I met Sarah Valentine on Elite Diving's day-boat at Shark's Bay in Egypt's Sharm el Sheikh. She was enjoying a diving holiday with her husband Mark, and agreed to deputise as a **DIVER** tester with the Linea.

Sarah told me that she had experienced problems with mask-fit in the past and had to resort to using children's snorkel masks, as these were the only models that provided a total seal around her face.

Her first impression of the Linea was that it was small, unobtrusive and feminine. When she tried it on and tested the fit, a big smile appeared on her face. "Perfect," was all she said.

We entered the water and completed two full one-hour dives together. Not once did I see her pull at the mask or try to adjust the fit. She just enjoyed her time under water, seeming to have forgotten that the mask was even there.

Back on the boat she told me: "This is the most comfortable mask I've ever used. The nose-piece was a lovely fit. I also loved the style, and the bright view through the lens."

Sarah went on to say that unlike other masks she had used the Linea felt non-claustrophobic and gave a fantastically wide view of the reefs. "There were hardly any water leaks; in fact I had a really trouble-free dive in that respect.

"I didn't get my long hair hooked up in the strap or buckles either, which is a first for me," Sarah added.

"This is the mask I've been looking for since I learnt to dive – I'm going to get one for myself and for my daughter Katie when I get home".

SPECS

PRICE ›› **£56**
COLOURS ›› **Twilight, pink, white Arctic**
CONTACT ›› **www.aqualung.com/uk**
DIVER GUIDE - ★★★★★★★★★★

A Photographer's Perspective

A few issues ago, Alex Mustard produced **DIVER**'s cover shot, featuring a female diver exiting a wreck with clever red lighting in the interior. The mask she was wearing was a white Aqua Lung Linea, and it looked fantastic.

I know I'm not alone in saying that eye contact is everything when shooting divers.

Most wear black-skirted masks (myself included), which creates all sorts of problems with regard to shadows, and doesn't look nearly as good.

I photographed three female divers wearing the Linea mask on this Red Sea trip, and I'm more than pleased with the results. The minimalist look of the fine white frame accentuated the eyes without any troublesome shadows, making for a clean facial image.

I had to pry the mask from Sarah's hands after the test dives, and had to repeat the process with the other ladies too.

Back in the UK, I asked Aqua Lung if I could keep the mask for a little longer, for those rare opportunities when someone of the opposite gender consents to model under water for me.

For the women who dived with this mask and for me as a photographer, it proved a perfect solution to our long-standing problems. Win-win all round. ■