

Nauticam WWL-1B review

by Phil Rudin

The Nauticam WWL-1B is the second generation in a line of high quality water contact optics. Water contact lenses come in two styles; one is removable underwater like the WWL-1 and WWL-1B and non-removable like the outstanding Nauticam WACP 1&2 water contact optics. Both the WWL-1 and WWL-1B wide conversion lenses have a maximum 130 degree field of view underwater when used with a 28mm (75 degree) equivalent lenses.

The original WWL-1 was first reviewed by Peter Rowlands in the Nov/Dec 2015 issue #87 of UWPMAG.com. At the time Peter was using WWL-1 with a Panasonic GX7, Panasonic M43 14-42mm Power zoom and Nauticam housing. At the time of Peter's review, Nauticam had not yet released a buoyancy collar to offset the weight of the lens and the lens came with a removable 67mm thread mount for attachment to whatever flat dome port supported the lens being used.

The thread-in lens attachment system also presented a second issue which was the lens sun shade not always aligning when the lens was

mounted on different ports. As a result the original WWL-1 had a sun shade that could be rotated and then secured to avoid vignetting.

My first experience was with a WWL-1 prototype lens in March of 2015 while the lens was still in development. At the time I was using the WWL-1 prototype with an Olympus EM-1, Panasonic Lumix G power zoom 14-42mm F/3.5-5.6 lens in a Nauticam housing. I think it is very important to recognize the amount of time Nauticam takes in developing these optics.

All of Nauticam's water contact optics are "clean slate" designs, engineered from the ground up as underwater corrective and conversion optics. Much like the classic Nikonos 15 and 28mm and Nikonos RS 13mm and 20-35mm film lenses the WWL-1B is designed for underwater use and is not an adaptation of an in air lens design.

I first reviewed the WWL-1 in uwpmag.com issue #114 using the full frame Sony A7R III, Sony FE 28mm F/2 lens and the Nauticam NA-A7RIII housing. With the WWL-1 and Sony FE 28mm lens the results were



exceptionally sharp, with excellent color rendition and better corner sharpness than any rectilinear lens I had used with a 230mm dome port at like for like F/numbers.

At the time of my review the Sony 28mm F/2 and WWL-1 combination was the only full frame camera line that allowed use of the WWL-1. Since most WWL-1 lenses reviews were with lower megapixel sub-full frame camera bodies mine was the first test using a 40+ megapixel camera body. As I have stated in several past reviews high megapixels tend to expose flaws in any lens when pushed to its limits.

My tests also pushed the ISO values higher than those used underwater with most sub-full frame

cameras. Even at ISO values well above 1000 images with the WWL-1 remained tack sharp with the high levels of detail you would expect from a full frame 40MP+ camera sensor. What was missing in my first review was the ability to use a zoom lens like I had with the original prototype kit I tested back in 2015.

Like the WWL-1, the WWL-1B is a full zoom through design that mates perfectly with many consumer compact cameras which have a 28mm equivalent lens. Some of the more popular compact cameras include the Five Sony Cyber-Shot DSC-RX100 cameras, three Canon PowerShot cameras and the Panasonic Lumix DMC-LX100. Be sure to review the Nauticam compatibility charts for

your compact cameras or contact your local authorized Nauticam dealer for full details about which cameras are supported. I would like to point out that although this review is specific to the Sony full frame line the WWL-1B works across a wide range of cameras and sensor sizes some of which I have listed below.

For Micro Four-Thirds cameras supported lenses include the Olympus 12-50 F/3.5-6.3 EZ, 14-42 EZ and the 14-42 II R from Panasonic 12-32, 14-42 power O.I.S., 14-42 II O.I.S. and the 14mm F/2.5 ASPH. Most of these zoom lenses offer a power zoom feature accessed by using a zoom gear.

The WWL-1B also supports a verity of APS-C cameras and lenses including Canon M cameras with EF-M 22mm F/2 and EF-M 15-45mm F/3.5-6.3 IS STM lenses. Fujifilm XC 15-45mm F/3.5-5.6 OIS PZ. Nikon Z DX 16-50mm F/3.5-6.3 VR. Sony E PZ 16-50 F/3.5-5.6 OSS and the Sigma 19mm F/2.8 DN IA for Sony E mount. Some lenses require a zoom gear and most lenses will vignette if they are used beyond 28mm's for the 35mm full frame equivalent. Check the Nauticam.com port charts for detailed information on lenses you may intend to use with the WWL-1B.

When I first tested the Nauticam prototype WWL-1 I had a hard time wrapping my head around the idea

that a \$350.00 Panasonic "kit" lens could outperform the best M43 glass and optical glass ports. I had the same initial thoughts when I tested the current WWL-1B with the \$498.00 Sony FE 28-60mm F/4-5.6 "kit" lens. This time my bench mark was the outstanding the \$2998.00 Sony FE 12-24mm F/2.8 GM lens and the stellar \$1899.00 Zen Underwater 230mm optical glass dome port.

The second benchmark I was using the Flagship Sony A1 a 50.1 megapixel camera with more than three times the resolution of the Olympus EM-1. If those of you reading this review are skeptics as I was and would like to understand the physics behind why Nauticam water contact optics out perform land lens and dome port combinations I will not reinvent the wheel. I would instead suggest you read Alex Mustard's outstanding articles on this subject in UWP back issues #99 and #100. Issue #99 "Nauticam's WACP" covers the physics of that wet lens as well as the WWL-1 and #100 "Dome Free in Mexico" covers several other water contact optics.

Sony FE 28-60mm F/4-5.6 "kit" lens

Currently Sony has two Full Frame lenses that work with WWL-1B; the Sony FE 28mm F/2 lens and



the newly released Sony FE 28-60mm F/4-5.6 "kit" lenses. The new Sony 28-60 zoom was released with the compact Sony Full frame 24MP A7C which I reviewed in the last issue of uwpmag.com issue #119. Included in that review were images taken with the 28-60 and WWL-1.

The 28-60mm is referred to as a "kit" lens because it can be purchased along with the A7C camera with a \$100.00 discount. This is Sony's first compact full frame camera and lens combination and in my A7C review I speculated that more compact lenses would be coming from Sony. Since that review, Sony has released three very compact high quality F/2.8

lenses; a 24mm. 40mm and 50mm. Sony has also just announced the Sony FE 14mm F/1.8 GM lens which is about two-thirds the size and less than half the weight of Sigma's 14mm F/1.8.

The reduction in size has not compromised build quality, image quality or speed, in fact the Sony FE 28-60mm F/4/5.6 outperforms Sony's FE 27-70 F/3.5-5.6 in every area. Size wise the new Sony is 66.6x45mm and 167g verses the old 28-70 which is 72.5x83mm and 295g. The new 28-60mm has a 40.5 filter thread and the smaller overall size is why it is able to work on full frame with the WWL-1B.

In the past Nauticam has recommended the older 28-70 for use with Sony FF and the Nauticam WACP-1 but until now only the 28mm F/2 could be used with the smaller WWL-1/1B. The new 28-60 can now be used with both the WACP-1 and WWL-1/1B. The new lens also has better weather sealing and much better overall image quality. On the new Sony A1 the lens can continuously auto focus at up to the maximum 30 frames per second.

The Nauticam WWL-1B information page describes the Sony 28mm F/2 as “Most impressive is the outstanding performance available with the full frame Sony A7 series cameras using the Sony 28mm f/2 Prime lens. In our tests, this combo out-performed all of the Sony wide angle lenses behind dome ports, and is especially well matched to the demanding 61 megapixel sensor in Sony A7R IV”. While slower at F/4 on the wide end I believe the Sony FE 28-60mm performs at the same level as the 28mm F/2 and I found the zoom range much more useful than the fixed lens. I would say that both lenses are excellent choices depending on your needs.

For this review I used the Sony A1 with V1.0 firmware. The recently released Sony A1 has a new 50.1 megapixel stacked sensor and other exceptional features that are being

covered in another review. Based on my experience with WWL-1 I would expect the WWL-1B to work equally well with the current Sony A7R IV with 61.2 MP sensor.

The Sony FE 28-60mm F/4-5.6 zoom lens when locked for storage is only 45mm long. When you turn the zoom ring the lens unlocks to the 28mm wide end of the lens. At 28mm the lens barrel extends by an additional 22mm to around 67mm. When you zoom to the 60mm long end of the lens the extension is also about same 22mm and half way through the zoom range the lens extends about 18mm. As a result the distance from the front of the lens to the rear element of the WWL-1B is the same at both ends of the lens allowing the maximum reach in both directions. On any Sony full frame camera the WWL-1B has a field of view from 130 degrees to 68 degrees and zooms fully through to cover everything in-between.

The optical design incorporates three aspherical lens elements which reduce distortion and spherical aberrations and produces greater sharpness. The lens also has a linear motor and internal focusing which quickly, accurately and quietly focuses for both stills and video.

The lens body has advance weather sealing including a seal at the lens to camera interface.

Nauticam WWL-1B

The 130° to 68° degree field of coverage for the Sony 28-60mm zoom and WWL-1B combination is outstanding. It is wider than the widest Sony 12-24 rectilinear lens which is 122 to 84 degrees and nearly as narrow as a full frame 35mm lens which covers 63 degrees.

The WWL-1B is constructed of 6 precisely ground elements of highly refractive optical glass. All internal elements are coated with a broadband anti reflective coating to keep flare and internal reflections to an absolute minimum.

The WWL-1B at 130 degrees sits in a sweet spot for underwater photography between the 180 degree full frame fisheyes and the narrower 107 degree 16mm end of most 16-35mm rectilinear full frame lenses.

Nauticam from the beginning of the design process targeted the 130 degree coverage area as the ideal coverage area for a verity of uses from big animals to wide reef scenes and fish portraits. The WWL-1B focuses so close to the port glass it can be used for close focus wide angle shots.

The WWL-1B's stunning field of view has extremely high overall sharpness and contrast making it very



well suited to high resolution cameras like the Sony A7r III, A7R IV and Sony A1.

The WWL-1B also eliminates the extreme distortion associated with fisheye lenses and the poor corner and edge sharpness associated with wide rectilinear lenses behind dome ports. I have repeatedly advocated in past full frame camera reviews that wide rectilinear lenses should be shot at F/13 and above to reduce blotchy distorted corners and edges. The Sony 28-60mm/WWL-1B combination is competitive at F/values as low as f/5.6 to F/8 offering the same reduction in corner sharpness found at F/13 with full frame rectilinear lenses. In the center, sharpness is outstanding even at high levels of magnification in the F/4 range.



Water Plants, Florida Springs, Sony A1, Sony FE 28-60mm at 28mm, WWL-1B, Nauticam NA-A1 housing, E-Turtle TTL trigger, two Inon Z330 flashes, ISO-500, F/6.3, 1/400th sec

While I clearly would judge the optical performance of the WWL-1 and WWL-1B to be all but identical the new 1B version has some excellent upsides over the original WWL-1. First the WWL-1B ships with the bayonet mount already permanently installed on the rear of the lens. This



CFWA shot, Florida Springs, Sony A1, Sony FE 28-60mm at 28mm, WWL-1B, Nauticam NA-A1 housing, E-Turtle TTL trigger, two Inon Z330 flashes, ISO-500, F/6.3, 1/160th sec.

eliminates the need to align the numerous Allen screws on the rear of the lens when switching from threaded to bayonet mount. It also eliminates the need to realign the screws when adding the optional foam buoyancy collar to the rear of the lens.

The WWL-1B has a built-in aluminum

buoyancy collar which reduces the overall size compared to WWL-1 with the foam buoyancy collar. The Total dimensions of the WWL-1B are 156 X 97mm, the WWL-1 is 130 X 97 without the foam collar.

The new WWL-1B is small enough that it fits into the included travel case without the need to remove the float collar and the case is only slightly larger than the original WWL-1 travel case. I found it annoying with WWL-1 that I had to remove the foam buoyancy collar for travel to fit the lens into the storage case. Traveling long distances with limited space I always had to find extra room for the foam collar in my luggage.

Lastly in the water WWL-1 with the foam collar is about 160g while the WWL-1B drops to 120g. The reduced weight of the overall system is always welcome when you are working in the water for several hours a day.

The new WWL-1B also ships with a spring mounted hard storage cover to protect the front element. While I remove the hard cover before entering the water I always replace it as soon as I can after the dive has ended.

The last comment I would make on the design of the new WWL-1B is that the aluminum buoyancy collar has a wide rubber ring around the center to help protect it from damage. It also has the same excellent finish used on the newer Nauticam housings to protect them from chipping or other cosmetic damage.

The Nauticam WWL-1B is available from your local authorized Nauticam dealer at a retail price of \$1465.00/£1195.00.



Selfie, Florida Springs, Sony A1, Sony FE 28-60mm at 28mm, WWL-1B, Nauticam NA-A1 housing, E-Turtle TTL trigger, two Inon Z330 flashes. Full Frame 50 MP 8640 X 5760 file. NO Cropping, ISO-500, F/9, 1/400th sec.



The same but with the Sony FE 28-60mm at 60mm

Field Testing the WWL-1B

My test equipment included the WWL-1B and Sony FE 28-60mm zoom with Nauticam NA-A1 housing, Nauticam N100 flat port 45 with focus knob, SEF2860F focus gear, M67 to bayonet converter II, S-Turtle TTL flash trigger and two Inon Z330 flashes.

The bayonet converter II is mounted to the 67 mm threads on the flat port 45 with the included tool. You then mount the WWL-1B by aligning

the white dot on the top of the lens with corresponding dot on the bayonet mount, the WWL-1B is then turned clockwise less than a quarter turn until it locks into place.

The WWL-1B can be removed while in the water and replaced with a bayonet mounted Nauticam CMC-1 or CMC-2 closeup lens. Both of these closeup lenses work well with the 28-60 allowing magnification in the 1:1.1 and 1:1.4 range respectively.

The WWL-1B is a breeze once in the water, trust me when I say it is

much easier to manoeuvre and swim with than the same housing with a 180 mm or 230 mm dome port all else being equal.

As a tool for video this is a much more fluid system than one with a large port and the lens is super quiet while focusing. The Sony A1 auto focus is the best money can buy both super fast and extremely accurate even in low light.

Traveling with the WWL-1B uses about a third of the space my Zen 230mm port requires and at about half

the weight. The WWL-1B easily fits into a shoulder bag or roller bag for carry-on and is much less conspicuous when luggage is inspected.

The 50.1 MP Sony A1 with WWL-1B crushed any of the lens/dome port combinations I have tested with Sony's high megapixel cameras. I have tested Sony 12-24 F/2.8, 16-35 F/4, Zeiss Batis 18mm F/2.8, Sony 24mm F/1.4, Rokinon 15mm F/2.8 and more with the Zen Underwater 230mm dome port. The Sony 28-60 zoom and WWL-1B outperformed



Older WWL-1, Cenote Hicte-Ha, Yucatan, Mexico, Sony A7R III, Sony 28mm F/2, Nauticam NA-A7RIII housing, ISO-320, F/10, 1/250th sec

them all and at wider apertures. This should not be viewed as a reflection on the excellent quality of these lenses or the dome port, all are at the top of their class. The fact remains that a “kit” lens used with a very well designed water contact optic will always outperform a land lens and port. Buyer’s should be aware that not all water contact optics are created equal and in most cases you are going to get what you pay for. I have no doubt that Nauticam is the gold standard for water contact optics.

The only downside with the

WWL-1B and wet wide optics in general is that they are not well suited to over/under (split) images. The WWL-1B works above water when dry but splits are difficult at best. The main reason is that the front element is quite small but the biggest problem is that when the lens is lifted out of the water droplets of water will remain between the port glass and the back of the lens. I will include a shot I took raising the camera above water, the image is sharp but it contains spots from the water droplets trapped between the port glass and the rear



Water droplets between lens and port, Florida Springs, Sony A1, Sony FE 28-60mm at 28mm, WWL-1B, Nauticam NA-A1 housing, E-Turtle TTL trigger, two Inon Z330 flashes

of the WWL-1B. I will also include images taken with the original WWL-1 and some other cameras so you can judge the differences in the 28mm F/2 and the 28-60 zoom. The WWL-1B does an excellent job of controlling the distortion associated with ultra wide lenses. Lens flare and chromatic aberration are also well controlled when shooting towards bright sun light.

Nauticam WWL-1B allows you to use Sony high megapixel full frame cameras for extreme wide angle without the compromises of full frame

wide rectilinear lenses and dome ports. I am hoping to see compatibility with Canon and Nikon full frame mirrorless cameras soon but that will require a small lens similar to the Sony 28-60 zoom.

I would once again like to thank the folks at Nauticam USA for both equipment and technical assistance for this review, they are always extremely helpful.

Phil Rudin
Instagram