

Nauticam WACP-C

Wide Angle Conversion Port

by Phil Rudin

The Nauticam WACP-C is a third generation optic in the high quality line of outstanding water contact optics that include Nauticam WACP 1 & 2.

The WACP-C sits between the excellent WWL-1 and WWL-1B wide conversion lenses which all share the maximum 130 degree field of view underwater when used with a full frame 28mm (75 degree) equivalent lenses. The larger WACP-1 also has a 130 degrees with a 28mm full frame equivalent lens while the WACP-2 can go to 140 degrees with a compatible FF 14mm lens.

The original WWL-1 was first review by Peter Rowlands in the Nov/Dec 2015 issue #87 of UwP. 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 his 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 67mm thread.

My first experience with a WWL-1 prototype lens was 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 and 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 conversion optics. Much like the classic Nikonos and Nikonos RS film lenses, the WWL-1 and WACP line are all designed for underwater use and are not adaptations of in air lens designs.

I first reviewed the WWL-1 in UwP issue #114 using the full frame Sony A7R III (42MP), Sony FE 28mm F/2 lens and the Nauticam NA-A7RIII housing. I later reviewed the WWL-1B in issue #120 using the Sony A1 (50MP), Sony FE 28-60mm zoom and Nauticam NA-A1 housing.

I have now used all of the WACP offerings (1, 2 and C) with a three different Sony lenses 28mm F/2 28-60mm zoom, 28-70mm zoom and for WACP-2 Tamron 17-28mm F/2.8



zoom. I have found all three of these high quality water contact optics to be outstanding with high megapixel full frame cameras.

With all three lenses results have been exceptionally sharp, with excellent color rendition and better corner sharpness than any rectilinear lens I had used with a 230mm dome port at like F/numbers.

As I have stated in several past reviews, high megapixel cameras tend to expose flaws in any lens when pushed to its limits. Even at ISO values well above 1000, images with the

WACP-C remained tack sharp with the high levels of detail you would expect from a full frame 61MP camera like the Sony A7R V I used for this review.

Like WACP-1&2 the WACP-C is a full zoom through design that mates perfectly with many brands of zoom lenses. The WACP-C also supports a wide verity of cameras and lenses for both stills and video. Video cameras include Blackmagic, Canon, Panasonic, Red and Z-cam in both full frame and APS-C formats. Supported lenses include Canon EF-S 18-55 and Sigma 18-35 in APS-C

along with Canon EF 28-80, EF 28-70 and RF 15-30mm for full frame video. Not all of the listed lenses provide full zoom through.

For stills and hybrid video, Canon is supported with full frame (EF and RF) and APS-C, Fujifilm APS-C, Nikon FX, DX and Z, Panasonic L-mount and Sony FE full frame. Be aware that a verity of lenses are supported but not all lenses will zoom through the entire range. Also lenses from other manufactures with lens adapters many give full zoom through while native lenses will not.

Before making a purchase consult the Nauticam WACP-C port charts for full lens selections and be aware that the charts are updated from time to time with new supported lenses.

Also be aware that WACP-C has an N100 mount not the N120 mount. With N100 housings the port charts show the recommended N100 port extension for the lenses being used. With N120 housings N120 to N100 port adapters need to be used and they need to be specific lengths for the lenses being used, so again consult the port charts and confirm with your local authorized Nauticam dealer before purchase.

I have also been told that



sagadive.com has started to make custom adapters for housing brands other than Nauticam for use with WACP-C.

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. For this review my benchmark was the outstanding the \$2998.00 Sony FE 12-24mm F/2.8 GM lens, Sony A7R IV 61MP camera and the stellar \$2099.00 Zen Underwater 230mm optical glass dome port. I was more than skeptical when I tested the current WACP-C with the \$498.00 Sony FE 28-60mm F/4-5.6 “kit” lens using the new Sony A7R V - a 61 megapixel camera with almost four times the resolution of the Olympus EM-1.

If those of you reading this review are as skeptical as I was and would like to understand the physics behind



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Tonic water from the Santa Fe River flowing over the Devils Ear Spring entrance, Ginnie Springs, High Springs, Florida USA, Krissy, Sony A7R V, Sony FE 28-60mm zoom at 32mm, Nauticam NA-A1 housing with N100/30 port extension, Nauticam WACP-C, two Inon Z330 flashes in manual, ISO-640, F/8, 1/160th sec.

why Nauticam water contact optics outperform lens/dome configurations, I 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 issue #100 “Dome Free in Mexico” covers several other water contact optics.

Nauticam WACP-C

WACP-C has the same dry mount lens design as WACP-1 and WACP-2. It is designed like the WACP-1 to work with full frame equivalent lenses with a focal length of 28mm.

At 28mm the WACP-C offers a very wide 130 degree angle of view. The WACP-C has a 130 to 68 degree angle of view with the Sony FE 28-60mm zoom. WACP-C is wider than the widest Sony FE 12-24 rectilinear

lens which is 122 to 84 degrees and nearly as narrow on the long end as a full frame 35mm lens which has a 63 degree angle of view.

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

The WACP-C 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 WACP-C focuses so close to the port glass it can be used for close focus wide angle shots.

Besides the stunning field of view WACP-C has extremely high overall sharpness and contrast making it very well suited to high resolution cameras like the Sony A7R IV, V and A1. The WACP-C also eliminates much (but not all) of the extreme distortion associated with fisheye lenses and the poor corner and edge sharpness associated with wide rectilinear lenses behind dome ports.

By comparison Nauticam rates the WACP-C corner sharpness improvement to be three F/stops over a 230mm dome configuration while the WACP-1 offers a four F/stop improvement. 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 FE 28-60mm/WACP-C combination at F/5.6 has the same reduction in blotchy distorted corners as full frame rectilinear lenses and 230mm dome port shot at F/13. In the center of the frame sharpness is outstanding even at high levels of magnification in the F/4 range.

The WACP-C has a built-in aluminum buoyancy collar which offsets the weight of the lens in water and a built-in shade that helps protect the front glass element. The lens also ships with a plastic snap-in front cover, standard N100 rear cover, nifty carrying case, spare O-ring and cleaning cloth.

The total dimensions of the WACP-C are 170 DIA X 145.5mm, by comparison WACP-1 is 194 DIA X 176, the weight difference is 2.2kg (4.85Lb) v 3.9kg (8.6Lb) with in water buoyancy of -0.1kg (3.53oz) v -0.32kg (11.29oz). Cost differences between the two wet lenses are also significant with WACP-C retailing for \$3283.00 while WACP-1 retails for \$5159.00.

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 know doubt that Nauticam is the gold standard for water contact optics.



Sony FE 28-60mm F/4-5.6 “kit” lens

Currently Sony has three Full Frame FE lenses that work with WACP-C the Sony FE 28mm F/2 lens plus Sony FE 28-70mm and Sony FE 28-60mm F/4-5.6 “kit” lenses.

The newer Sony 28-60 zoom was released with the compact Sony Full frame 24MP A7C which I reviewed in issue #119 of UwP. Included in that review were images taken with the 28-60mm WWL-1 and WACP-1. The reduction in size of the 28-60mm has not compromises build quality, image quality or speed, in fact the Sony FE 28-60mm F/4/5.6 outperforms Sonys 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 WWL-1/1B, WACP-1 and WACP-C. The FE 28-60 zoom also has better weather sealing and much better overall image quality than the older 28-70 zoom.

On the new Sony A1 the 28-60 zoom can continuously auto focus at up to the maximum

30 frames per second making the AF very fast. The Nauticam WWL-1B information page describes the Sony 28mm F/2 this way “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 outperformed 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”.

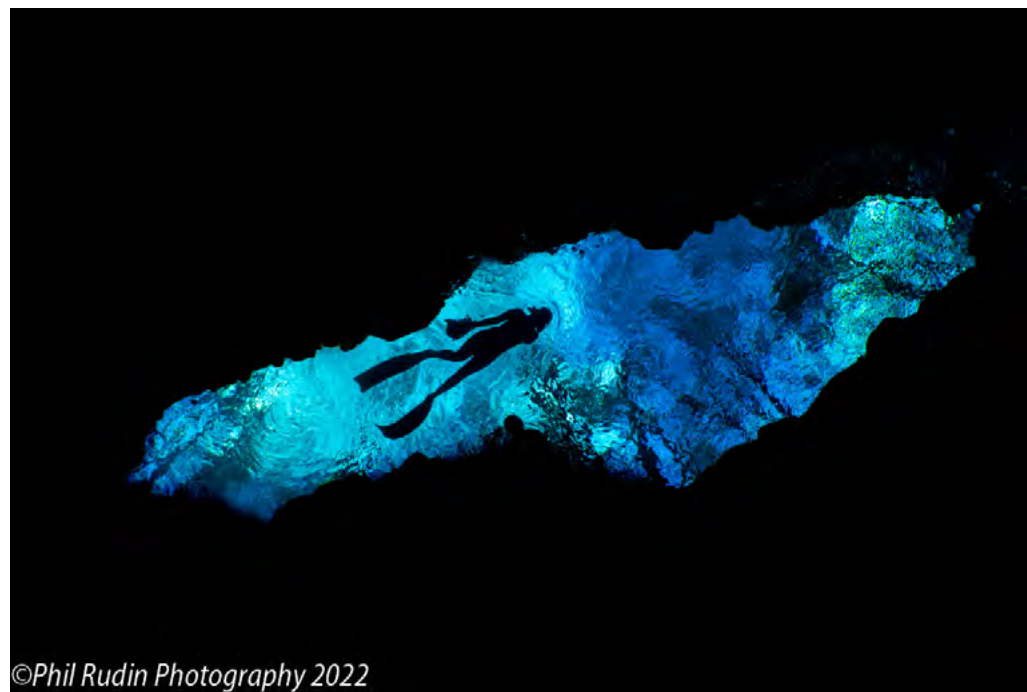
While slower at F/4 on the wide end I believe the Sony FE 28-60mm outperforms the 28mm F/2 even at 61MP and I found the zoom range much more useful than the fixed lens. I would say that both lenses are excellent choices depending on your needs.

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 range. At 28mm the lens barrel extends by an additional 22mm to around 67mm. When you zoom to the 60mm long end of the range 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 WACP-C is the same at both ends of the lens



allowing the maximum reach in both directions.

On any Sony full frame camera the WACP-C has a field of view from 130 degrees to 68 degrees and zooms fully through to covers everything in-between. The optical design incorporates three aspherical lens elements, which reduce distortion and spherical aberrations, this allows for greater sharpness. The lens also has a linear motor and internal focusing which quickly, quietly and accurately focuses for both stills and video. The lens body has advance weather sealing including a seal at the lens to camera interface.



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Devils Spring, Ginnie Springs, High Springs, Florida USA, Krissy, Sony A7R V, Sony FE 28-60mm zoom at 28mm, Nauticam NA-A1 housing with N100/30 port extension, Nauticam WACP-C, two Inon Z330 flashes in manual, ISO-640, F/13, 1/160th sec.

Field Testing WACP-C

My test equipment for this review included the Nauticam WACP-C with Sony A7R V camera, Sony FE 28-60mm zoom lens, Nauticam NA-A1 housing, Nauticam N100/30 port extension, SEF2860F focus gear, UWTechnics TTL flash trigger and two Inon Z330 flashes.

NOTE I do not recommend the A7R V and Nauticam NA-A1 housing for Sony A1 combination because the

LCD screen on the A7R V is thicker than on the A1. When closing the housing extra pressure is added on the LCD which could lead to damage. Perhaps a redesigned camera tray could help with this problem.

Nauticam has also just released the NA-A7RV housing for the new A7R V. For the Sony FE 28-60mm zoom and 28mm F/2 Nauticam recommends the N100/30 port extension with the older 28-70mm an N100/50 extension is recommended.



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Devils Eye Cave Entrance, Courtland, Ginnie Springs, High Springs, Florida USA, Krissy, Sony A7R V, Sony FE 28-60mm zoom at 28mm, Nauticam NA-A1 housing with N100/30 port extension, Nauticam WACP-C, two Inon Z330 flashes in manual, ISO-640, F/10, 1/30th sec

The WACP-C is a breeze once in the water, trust me when I say it is much easier to manoeuver 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 A7R V auto focus is both very fast and extremely accurate even in low light.

Traveling with the WACP-C uses about a third the space taken up by

my 2.2kg (4.85Lb) Zen 230mm dome port which is the same weight as the WACP-C.

The 61 MP Sony A7R V with WACP-C 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, 16-35mm F/4 and 16-35mm PZ, Sony 14mm F/1.8, Zeiss Batis 18mm F/2.8, Sony 24mm F/1.4, Rokinon 14mm F/2.8 and more all with the Zen Underwater 230mm dome port. The Sony 28-60mm zoom and WACP-C out preformed them all



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Blue Grotto, Williston, Florida USA, Taylor, Sony A7R V, Sony FE 28-60mm zoom at 57mm, Nauticam NA-A1 housing with N100/30 port extension, Nauticam WACP-C, two Inon Z330 flashes in manual, ISO-640, F/14, 1/160th sec

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.

The only downside with the WACP-C and wet wide optics in general is that they are not designed for over/under (split) images and for those I have recently acquired the

Matty Smith 12 inch acrylic dome for splits reviewed in this issue of UwP.

The port has a total weight of 1.75kg or 3.9Lb including the neoprene port cover. Together the weight of the 12 inch port and WACP-C are about the same as the weight of WACP-1. I can stand the 12 inch port and the WACP-C both in bubble wrap in my Think-Tank Urban Disguise 60/2.0 shoulder bag for easy carry-on when traveling. This is the best solution I have come up with if I need both while traveling.



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Blue Grotto, Williston, Florida USA, Bluegill, Sony A7R V, Sony FE 28-60mm zoom at 60mm, Nauticam NA-A1 housing with N100/30 port extension, Nauticam WACP-C, two Inon Z330 flashes in manual, ISO-640, F/16, 1/250th sec

For me the WACP-C has become my sweet spot offering better image quality than the WWL-1B wet-changeable lens which attaches to a flat macro port. The WACP-1 & WACP-2 offer a one or two F/stop difference with a weight and price difference that would cover the cost of the Matty Smith 12 dome and in the case of WACP-2 the dome and a quality zoom lens and gear.

I own both WACP-1 and WACP-C but I have found myself reaching

for WACP-C much more often than WACP-1 simply because of the weight difference.

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. The Nauticam WACP-C and port extensions are available from your local authorized Nauticam dealer.

Phil Rudin

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Issue 130/29

Swimming with dwarf minke whales

Follow the Code of Practice:

- Follow instructions from crew at all times.
- Never swim towards a whale.
- Enter and exit the water quietly.
- Hold onto safety lines in the water (when provided).
- Do not touch or make physical contact with a whale.
- Avoid rapid movements when in the water.
- Use natural light only for photography.

Support the Minke Whale Project:

- Donate copies of underwater photos/video to our photo-ID study.
- Complete a Minke Whale Questionnaire.
- Become a *Friend of the Minke Whale Project*.
- Visit www.minkewhaleproject.org for more information.

www.uwpmag.com