BASICS OF BETTER UNDERWATER PHOTOGRAPHY

CHOOSING CAMERAS & HOUSINGS

OPTICAL OCEAN SALES
UNDERWATER PHOTOGRAPHY EQUIPMENT

CHOOSING

UNDERWATER CAMERAS & HOUSINGS

Deciding on an underwater photography system to buy doesn't have to be a bewildering experience. Knowing the basic characteristics and classes of cameras and housings can help organize your choices.

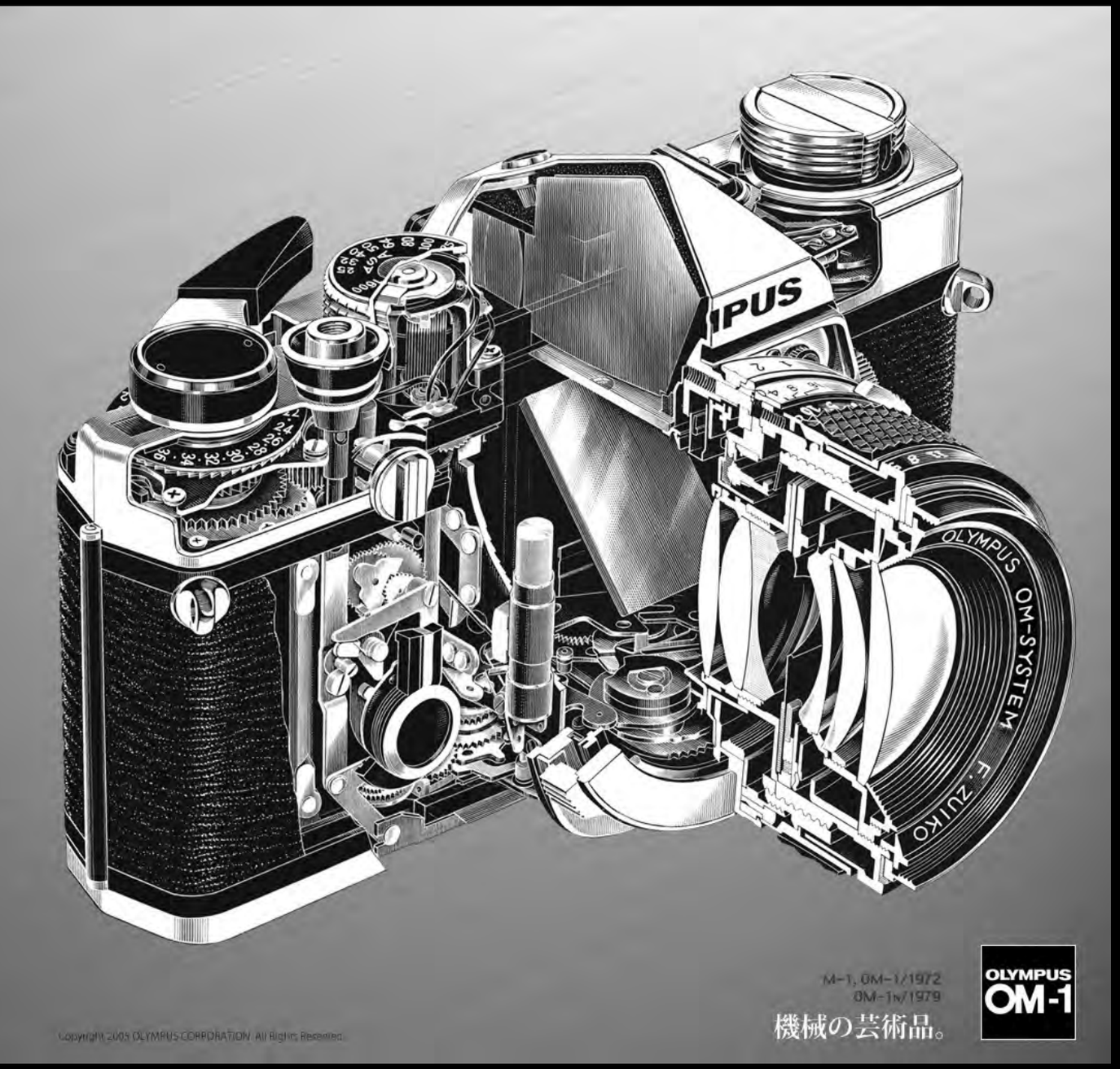
Then your personal preferences and budget can help narrow it down further to your best options.

In this Handbook we'll go over:

- **Camera Design & Components**
- **Basic Cameras Formats**
- **Considerations for Housings**
- **Ports, Gears, Wet Lenses**
- **Housing Accessories**
- **Underwater System Components**

BASIC CAMERA CONCEPTS

DESIGN CONSIDERATIONS FOR UNDERWATER PHOTOGRAPHY



Digital cameras have many parts, but are all basically pretty similar in their basic operation.

Light is reflected off a subject, focused by a lens on a sensor, adjusted by controls, and is captured, processed and written to memory.

Obviously size, design, weight and price can determine much of their capabilities. But components also break them down into various classes of design by camera manufacturers.

Considerations include:

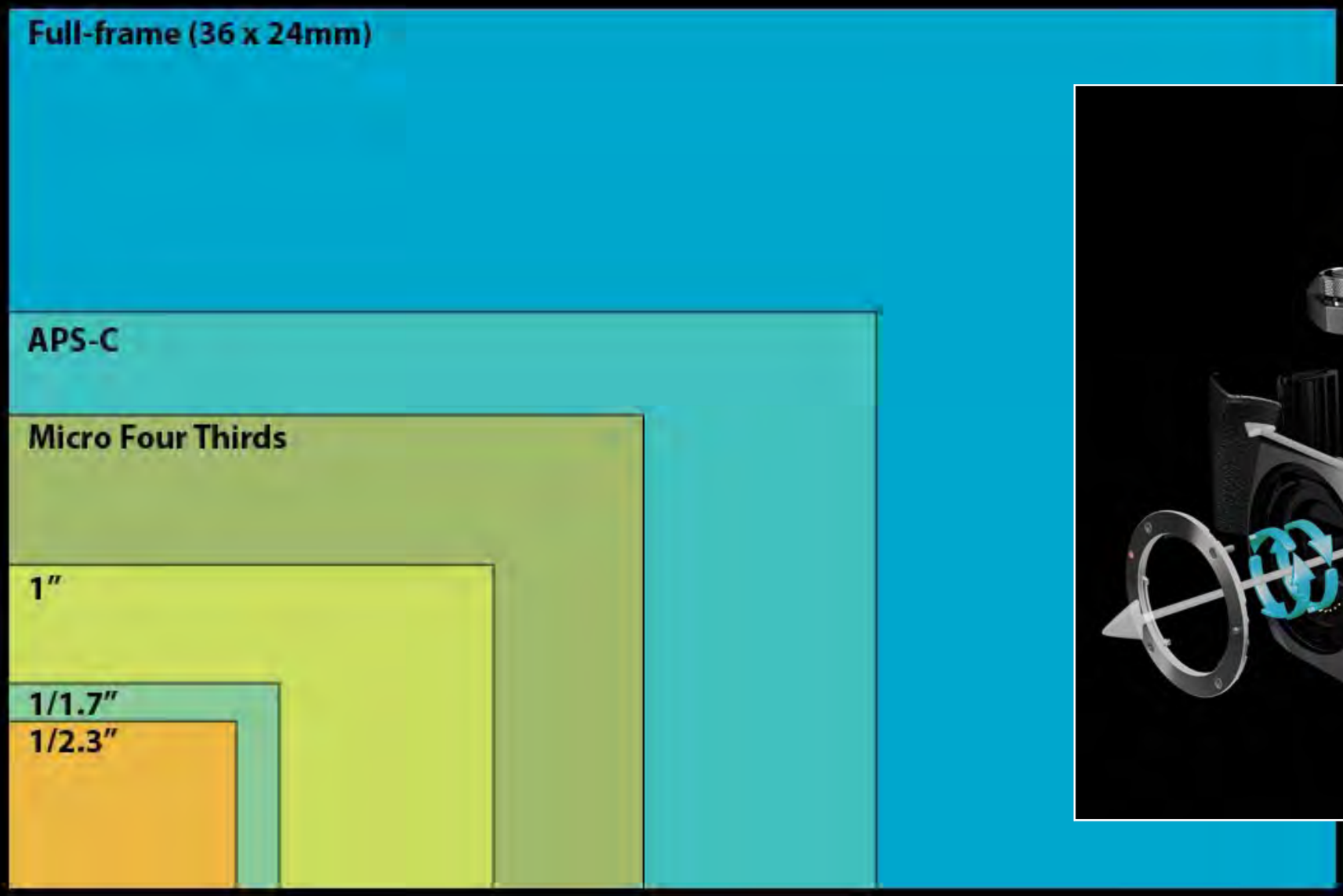
- **Sensors**
- **Lens(es)**
- **Controls**
- **Processor, frame buffer, battery, viewfinder, etc.**

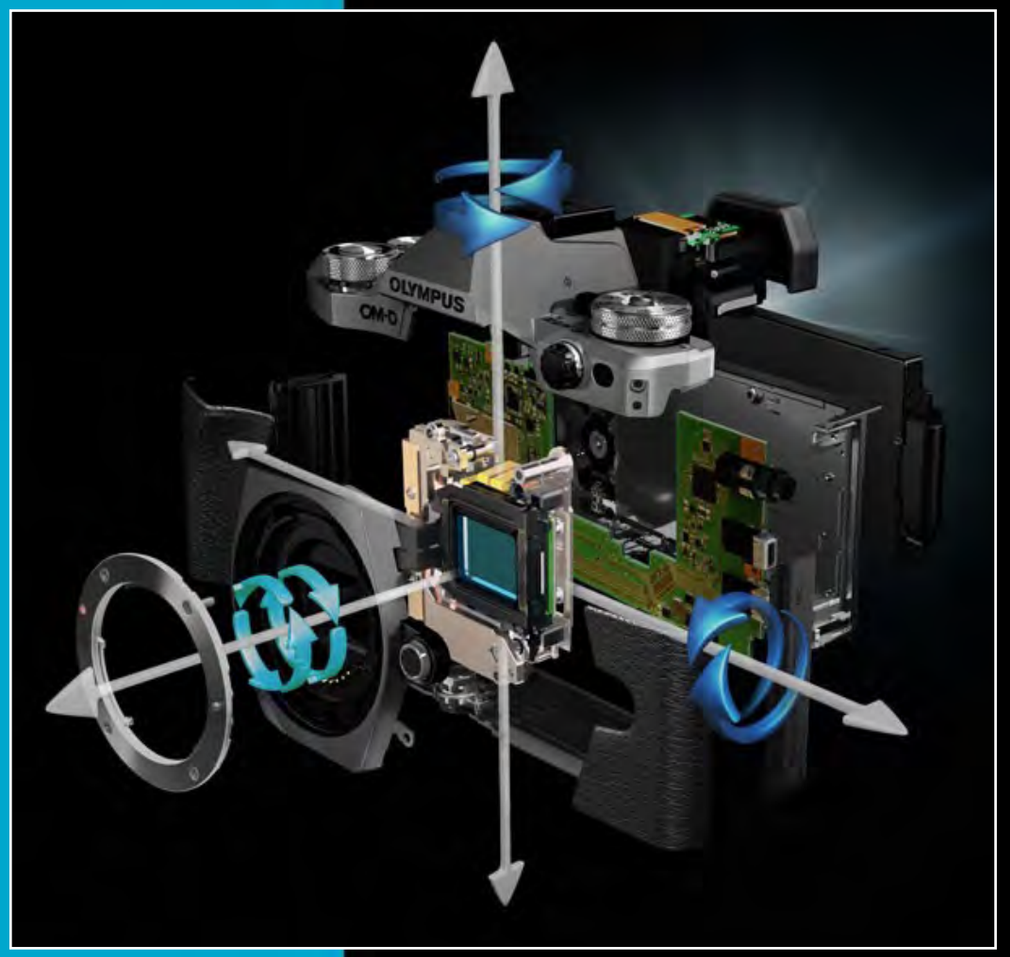
SENSOR SIZE

BIGGER IS BETTER

Sensors are the “film” the camera uses to capture images on it’s “pixels”. The larger the sensor, the larger and denser the amount of pixels, thus more detail, sharpness, fine colors and gradation can be captured. It also has better low-light abilities.

- **Pixel Count:** Don’t confuse mega-pixel count (MP) with sensor size. A larger sensor with a smaller MP count is a better imaging engine, because it’s spreading the image over larger pixels. Larger pixels capture more information.





LENSES YOUR IMAGING EYE

Underwater, we want to get close to eliminate water between the camera and the subject for better sharpness and color saturation. So wide angle and macro lenses are used.

- **Quality:** Look for high quality glass and construction.
- **How Fast:** Aperture is a ratio of the opening of the lens. A faster lens (smaller f-stop like f/2.8) allows faster focus and usage in low-light conditions found underwater.
- **Close Focusing Ability:** Wide angle lenses need to focus to about 9" or less to be used in dome ports.
- **Optical Stabilization:** Helps for longer exposures, not all that important underwater using strobes.
- **Mount:** Metal or plastic, impact or water resistant?

SEE OUR GUIDE ARTICLE: "RECOMMENDED LENSES FOR UNDERWATER PHOTOGRAPHY" TO LEARN MORE.

CAMERA CONTROLS

MAKE IT EASY

- **Direct controls are better –** Allow quicker access so you don't have to move your eye from the subject while making adjustments
- **Generally less expensive cameras have fewer direct controls and more "automatic" modes –** Control over basic exposure modes, shutter speed and ISO are important. One-touch white balance and video on/off are nice to have. Function buttons and "programmable" modes are very useful. "Super" control panels are a big help as they allow quicker control.
- **Software –** Play with the software and see how easy/hard it is to set up and access various options.
- **Underwater Auto Scene Modes –** Found on compact cameras and some SLRs. They work best in tropical conditions, in shallower water without strobes.

OTHER CAMERA COMPONENTS

THAT ARE IMPORTANT

- **Processor –** How fast it is, how well it renders images. Next to the sensor, it's the most important component.
- **Frame Buffer –** Helps processor speed up writing the image.
- **Battery, charger –** You'll need an external charger & spare battery (avoid 3rd party).
- **Viewfinders/view screens –** How easy to see through, size and brightness.
- **Overall fit and feel –** How comfortable it is to you, how it handles in your hands, it's weight, size and construction.

BASIC CAMERA FORMATS

"POINT & SHOOT" & ADVANCED COMPACT CAMERAS

Advantages

- Small pocket-size cameras
- Single zoom lens
- Models with larger sensors, faster processors and better lenses now available.
- Record 1080HD Video
- Can shoot wide angle and macro on one dive with wet lenses
- No need for additional ports or zoom gears
- Easy to handle underwater
- Excellent to travel with.

Disadvantages

- Small sensors, so only average low-light performance, dynamic range and sharpness.
- Slower AF compared to m4/3rd & DSLRs, particularly in low-light.
- "Wet lenses" add to system cost.
- Not on par with m4/3rd & DSLRs when shooting very small, or very large subjects

BASIC CAMERA FORMATS

MIRRORLESS (MIR) SLR CAMERAS

Advantages

- Sensors 4-8 times larger than found in compacts
- Faster processors and better software.
- Faster autofocus than compacts.
- Record in 1080HD, up to 4K. Most have continuous AF for video
- Smaller and lighter then DSLRs
- Excellent choice of lenses

Disadvantages

- More expensive than compacts
- Smaller sensor than DSLRs
- Typically 2-3 camera lenses needed
- Will have to commit to subject matter; either macro or wide angle for a dive
- Will require two housing ports, one for macro and one for wide angle. Also zoom gears.

BASIC CAMERA FORMATS

CROPPED SENSOR (APS-C) & FULL-FRAME DSLR CAMERAS

Advantages

- Largest sensors
- Best low light performance and sharpness
- Excellent Dynamic Range
- Widest choice of lenses
- Fastest autofocus systems
- Best processors, cache, fastest performance
- Broadcast quality HD Video options
- Quality construction - weather sealed
- Maximum control for advanced shooters

Disadvantages

- Largest and heaviest
- Will have to commit to subject matter; either macro or wide angle for dive
- Will require two housing ports, one for macro and one for wide angle. Also zoom gears.
- Many don’t have continuous auto focus for video
- Most expensive

UNDERWATER HOUSINGS

PROTECTING YOUR CAMERA & MAKING IT ACCESSIBLE

Consider these when shopping for a housing.

- **Shop for the Housing First:** Check out housings before buying a camera. There can be a limited selection, or none available for certain types of cameras such as “super-zooms”. Popular brands like Nikon, Canon, Olympus, Panasonic and Sony are generally supported, but not all models.

- **House the Latest Camera Available:** Housings cost the same for an older camera as a newer one. Housing an old camera is typically not a good investment. Plus resale later isn’t as great.
- **House an Advanced Model Camera:** Quality housings can cost as much, or several times more, than a camera. The camera actually becomes the least expensive part of the system. You’ll find better choices and have better resale later with a more advanced camera, then a lower-end prosumer model.

CONSTRUCTION & DESIGN

ARE IN THE DETAILS: CONTROLS, ERGONOMICS, LATCHES

- **Materials:** Generally plastic carbonate or milled aluminum. Finishes include anodizing and/or powder-coating.
- **Latches:** There are several types: metal clip, integrated into the housing body, cam-lock, swivel. Ports also can have latches.

- **Controls:** How easy do they work for you? Can you shoot without "looking up"? Are the buttons far enough away from each other to use? Are knobs smooth and allow fine adjustments? Are controls dedicated to one function, or shared between several?
- **Ergonomics:** How is the layout of the controls? What about the handles and feel of the housing in your hands?
- **Ports:** How do they attach?
- **Size & Weight:** How bulky is it? Most housings are close to neutral in the water. Don't be overwhelmed by weight and size on land; housings are designed to be used in the water. Arm floats can be added to help.

PORTS & GEARS

YOUR WINDOW TO THE WORLD

DSLR, SLR, and even some Compact housings use a separate port for housing lenses. These are generally sold separately. Light physics mean that as take optics underwater we loose 1/3 of our field of view (FOV) through refraction.

Flat Ports: Are used for Macro lenses and some consumer mid-range lenses. They utilize refraction to magnify close-up subjects larger.

- **Dome Ports:** For Wide Angle lenses. Alters refractive optics to give a wide FOV by creating a "virtual" image inside the dome port for the lens to focus on.
  Fisheye lenses work especially well in dome ports underwater as they become "rectilinear" but retain sharp corners in their images.
- **Gears:** Adjusts zoom and focus rings on the lenses. They are accessed from a knob on the housing or port.

WET LENSES

EXTEND THE POSSIBILITIES

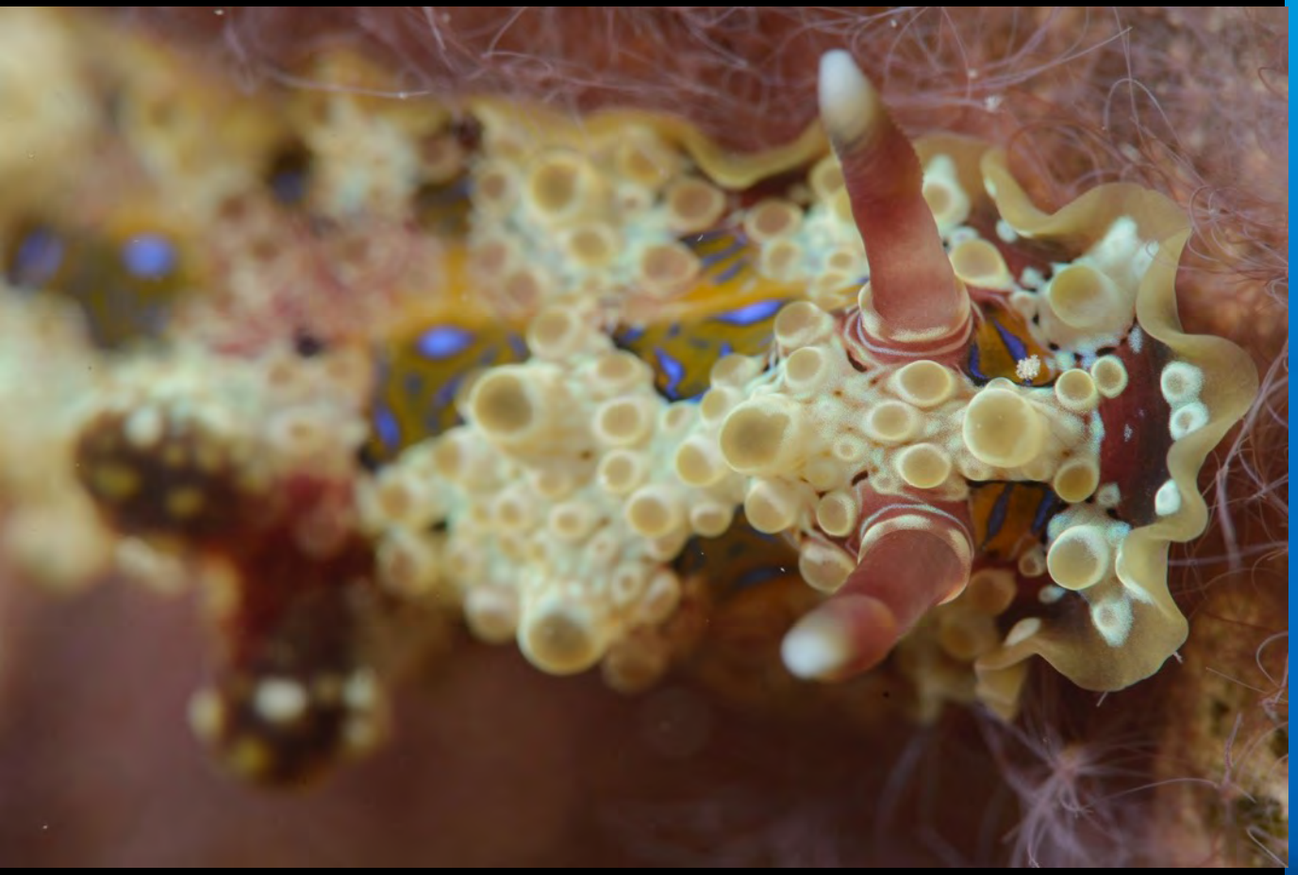
Add-on wet lenses can be used on the outside of ports. They can be changed underwater.

- **Macro "diopter":** Makes the image larger and allows closer focusing.
- **Wide angle:** Gives a larger FOV.
- **Holders:** A holder for macro lenses can be utilized to move the lens in/out of position.
  - Can't be used with Wide Angle lenses as they cause vignetting (darker corners).

EXAMPLES

OF LENSES/PORTS

- *(right)* - Wide angle using a dome port and a Sigma 15mm FE lens.
- *(below)* - Macro shot using flat port, 105mm macro lens and diopter wet lens.



ACCESSORIES

VIEWFINDERS, LEAK DETECTION & MORE

Consider how extendable the housing is for adding external monitors for video, viewfinders and other devices. A vacuum leak detection system can take the worry out of taking your camera underwater.

CONNECTIVITY

STROBE BULKHEADS

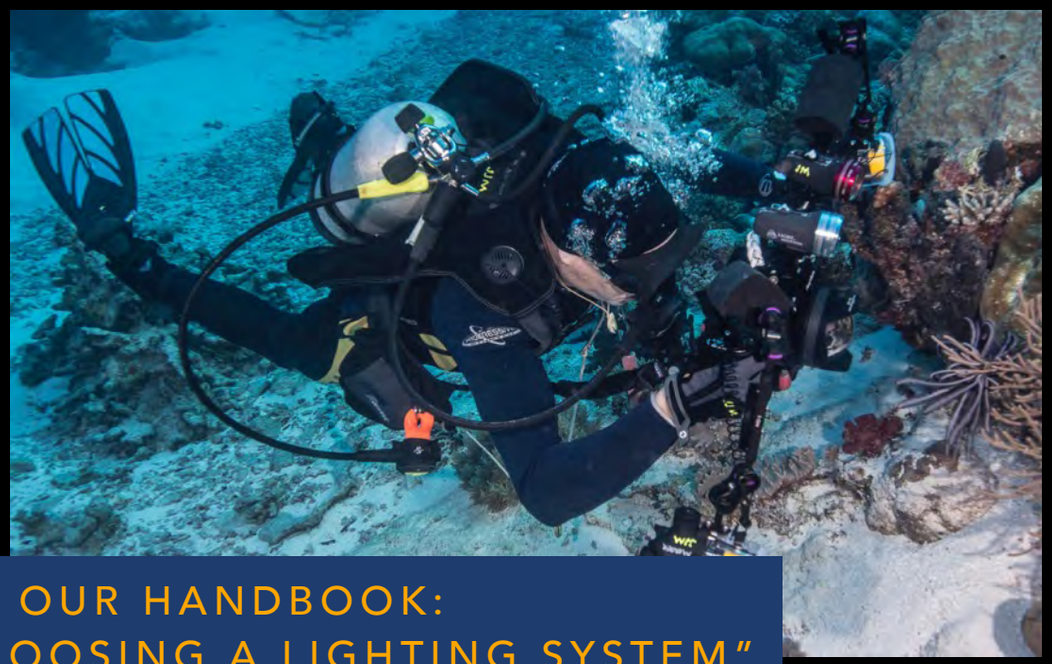
Strobes and lighting are very important underwater. There are two ways they connect to underwater housings:

- **Electrical Bulkheads:** Uses an electrical signal to connect to the camera's hotshot and trigger the strobe.
- **Fiber Optical:** Uses a thin fiber optic cord to transmit the camera's flash to an external strobe. No need for a physical hole in the housing, just a clear area for the light to go through.

PUTTING IT ALTOGETHER

CREATE YOUR UNDERWATER IMAGING SYSTEM

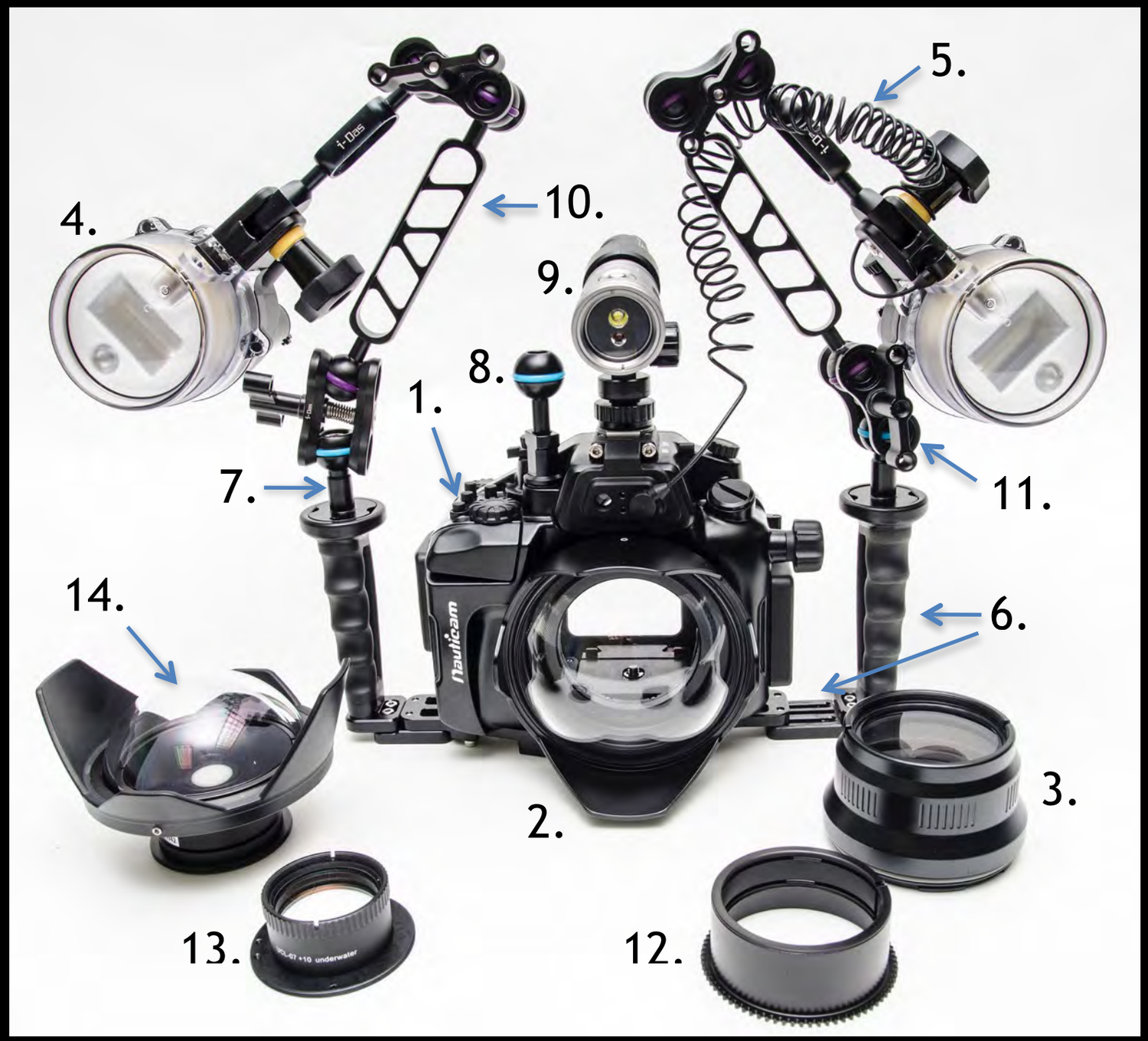
When shopping for a camera and housing, don't forget that they will become part of a larger system that includes lighting, a tray and arms. **Good lighting is as important, or more important, than a good camera underwater.**



SEE OUR HANDBOOK:
"CHOOSING A LIGHTING SYSTEM"
TO LEARN MORE.

COMPONENTS

OF AN UNDERWATER HOUSING SYSTEM



1. Housing
2. Dome Port
3. Flat Port
4. Strobe
5. Sync Cord
6. Tray & Handles
7. Handle Mount Ball
8. Housing Mount Ball
9. Focus/Video Light
10. Strobe Arm
11. Clamp
12. Focus/Zoom Gear
13. Macro Diopter
14. Wet Mount WA Lens*

* Wide angle wet mount lenses are typically used only with compact cameras

Part of the “Basics of UW Photography” Series

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