



Recommended Camera Settings for GATES AX700 / Z90 Housing System

Rich in features and capability, the Gates AX700 / Z90 system represents a new level in underwater shooting. Sony cameras in particular provide innovative tools for focus and exposure, new recording codecs, and color correction capability previously unavailable to the amateur and professional shooter. These tools and capabilities require special setup consideration to achieve the best underwater imaging results.

This guide presents recommended settings, a starting point for anyone new to the AX700 / Z90 system. Note that these recommendations apply to all supported cameras: FDR-AX700 / NXR-NX80 / PXW-Z90 / PXW-X70

Credits and thanks go to Juan Monterey for his extensive testing of this system, both AX700 and Z90 cameras. Most of what follows stems from his testing, with certain exceptions where he and this author disagree (e.g. Autofocus settings).

- **WHITE BALANCE.** Auto WB does not provide consistent color correction, so manual white balance should be established at every shot. With the AX700 / Z90 system, WB SET can be assigned to any of the three housing user buttons, however the housing design places it best on USER 2 and suitably at the right fingertip. To establish WB SET at this control, go to:

MENU→OTHERS→ASSIGN BUTTON→ASSIGN 5:WB SET

Note that use of a white balance slate is unnecessary. Accurate (or reasonably so) white balance is established by WB SET with any given scene.

- **STEADYSHOT: ACTIVE.** This mode provides greater stabilization of the scene without affecting image quality. It also works well with the GP34A port.

MENU→CAMERA SET→STEADYSHOT: ACTIVE

- **AUTOFOCUS.** With limited exception, there is no practical need to manual focus underwater clips with this system. The Sony camera autofocus is fast, locks onto a subject and tracks. To maximize the effectiveness of autofocus underwater, the cameras have two autofocus settings that help: AF FOCUS TRACKING DEPTH and AF FOCUS SWITCH SENSITIVITY. These settings control how fast (or slow) the camera switches subjects to track.

AF DRIVE: FAST. Allow the camera to acquire and retain subject focus quickly.

MENU→CAMERA SET→AF SUBJ. TRACK SET→AF DRIVE: FAST

AF FOCUS TRACKING DEPTH: NARROW. This setting holds camera attention in a narrow band fore and aft of the subject. That is, the camera has less tendency to



jump focus to a different subject before or behind the subject.

(MENU→CAMERA SET→AF SUBJ. TRACK SET→AF TRACKING DEPTH: NARROW).

Note: Juan Monterey prefers WIDE setting.

AF SUBJECT SWITCH SENSITIVITY: SLOW. Similarly, this setting limits camera tendency to switch subjects. For example: A fish swimming through frame in front of your blenny will be ignored, the camera tendency to remain focused on the blenny (subject).

MENU→CAMERA SET→AF SUBJ. TRACK SET→AF SUBJ SW SENS: SLOW

Note: Juan Monterey prefers FAST setting.

FOCUS AREA: WIDE. Allow the camera to use the entire frame (and all 273 focus points) to optimally find a subject, lock and track.

MENU→CAMERA SET→FOCUS AREA: WIDE

LOCK ON AF: OFF. This feature is only available with the touch screen, so turn off for underwater use.

MENU→CAMERA SET→LOCK ON AF: OFF

FACE DETECTION: ON Sony's face detection algorithm generally helps identify critters with eyes, and produce background blurring effects (bokeh).

MENU→CAMERA SET→FACE DETECTION: ON

SCENE SELECTION: PORTRAIT Works with the previous setting to provide blurry background effects.

MENU→CAMERA SET→SCENE SELECTION: PORTRAIT

- **EXPOSURE.** The variety of camera exposure control tools available can be daunting, so here are some recommendations.
 - **ISO / GAIN SELECT:** Use either ISO or GAIN to indicate sensitivity on the LCD overlay.
- **AE SHIFT: -0.2EV.** This setting is preferential. This author recommends slight underexposure for richer colors, more depth. A time-tested technique.

MENU→CAMERA SET→AE SHIFT→ON/OFF: ON
MENU→CAMERA SET→AE SHIFT→LEVEL: -0.2EV



- **AUTO ISO / GAIN LIMIT:** OFF There appears to be no GAIN / ISO level that introduces noise, so it is unnecessary to limit how far GAIN / ISO can adjust. That said, if using more advanced SLOG2 and SLOG3 curves (PICTURE PROFILE settings), then set to ON and limit

MENU→CAMERA SET→AUTO ISO LIMIT: OFF
MENU→CAMERA SET→AGC LIMIT: OFF

- **SHUTTER SPEED / GAIN-ISO / APERTURE.**

These three settings are not in the menu, but accessible directly on the camera, and the AX700 / Z90 housing as well, giving you complete exposure control. Recommended settings are:

- **SHUTTER SPEED:** 1/60 or 1/50 depending on region. They are a good balance between light sensitivity and motion blur. Use 1/30 for more motion blur, and 1/120 or higher to capture fast action.
 - **GAIN – ISO.** Automatic. Allow camera sensitivity to adjust freely to different lighting conditions.
 - **APERTURE.** This adjustment you should make manually to control depth of field. Small aperture for narrow DOF (and blurry backgrounds), or higher f-stops for a big DOF.
- **RECORD SETTINGS.** These settings define a) the file format and b) resolution / frame rate, two of the most important ones in this guide.

- **FILE FORMAT:** XAVC. Unless you have specific reason to do otherwise, use XAVC file format. It is an MP4/H.264 codec that supports 4K 4:2:0 100Mbps or HD 4:2:2 100Mbps. You'll record the best quality images with this format.

MENU→REC/OUT SET→REC SET→FILE FORMAT: XAVC QFHD or XAVC HD

- **REC SET:** (as desired). Many resolutions / frame rates are available here. It is expected you are shooting 4K, so select 2160/30P or 2160/25P / 100Mbps to obtain the highest quality recording.

MENU→REC/OUT SET→REC SET→FILE FORMAT: as desired

- **PICTURE PROFILE.** This menu area defines a 'look' or picture quality to your underwater images, and where you can utilize some of the latest technology found in the Sony camera: HDR.

Large amounts of information are available on the internet to learn about HDR (High Dynamic Range), but for the purposes of this guide we'll focus on two recommended PICTURE PROFILE settings as a starting point.



- **PICTURE PROFILE: OFF.** With PP off, the camera will default to the most commonly used color space, known as BT709. It is readily supported by all editing suites.

For this guide, we'll use PICTURE PROFILE 10:

MENU→PICTURE PROFILE→PP10: OFF

- **PICTURE PROFILE: HLG2 / BT2020.** To utilize HDR, two settings are changed in PP10. These settings have been extensively tested by Juan Monterrey, and the HGL2 setting is a good balance between dynamic range and noise.

MENU→PICTURE PROFILE→PP10→GAMMA: HLG2

MENU→PICTURE PROFILE→PP10→COLOR MODE: BT2020

- **ASSIGN BUTTONS:** (as desired). As noted above, WB SET is recommended for ASSIGN 5. Two other ASSIGN buttons are accessible on the AX700 / Z90 housing, #4 (shared with the REC control) and #6 (shared with the ASSIGN 5 control). Refer to the Gates AX700 / Z90 Setup, Use and Care Guide for more information.

Typical functions used for #4 and #6 are:

- FOCUS MAGNIFIER
- ZEBRA
- HISTOGRAM
- PHOTO (AX700 only)
- PEAKING (for manual focus assist)
- PICTURE PROFILE (if you wish to switch underwater)

MENU→OTHERS→ASSIGN BUTTON→ASSIGN X: (as desired)