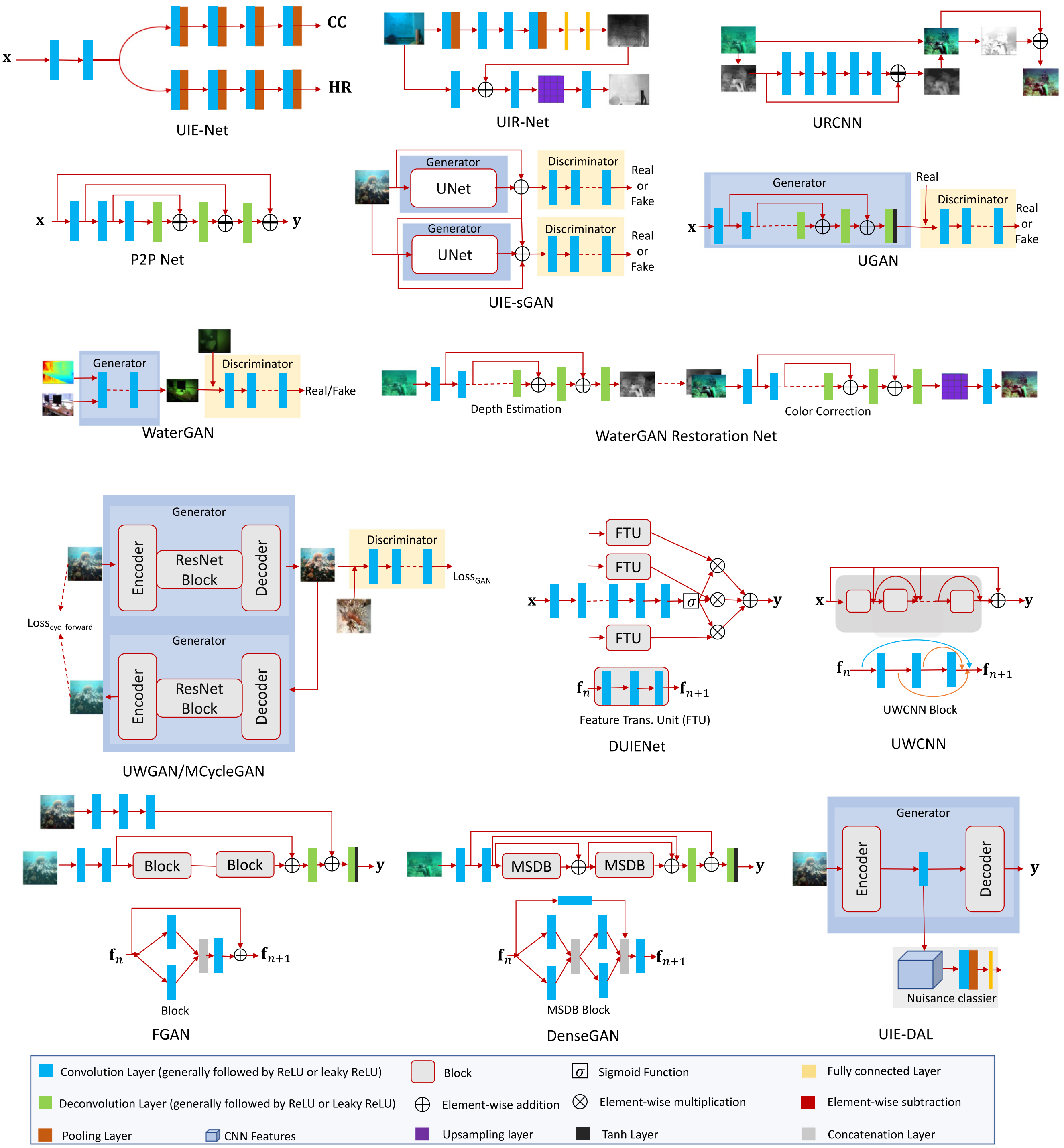

Fig. 2. Network architectures: A glimpse of network architectures used for underwater image enhancement using CNNs and GANs. Best viewed with zoom-in on a digital display.

3.3.3. FGAN

Fusion generative adversarial network, abbreviated as FGAN [34], takes multiple inputs and passes them through different branches in the same network. In the end, the features are summed before the loss of the generator. The architecture of FGAN [34] is similar to DenseGAN with slight modifications in the block's architecture. The generator with the fundamental block structure is shown in Fig. 2. The discriminator is composed of five convolutional layers employing spectral normalization [28]. The discriminator is similar to PatchGAN [18].

A batch-mode learning method with a batch size of 16 is applied. The RGB images of size 256 × 256 are used as inputs. Further, the learning rate is set to 10^{-3}. The loss function is a combination of relativistic GAN loss [35], adversarial loss, and ℓ_2 loss.

3.4. Depth-guided networks

Depth map or transmission map plays a vital role in restoring the underwater image, which is related to the degradation induced by scattering. Therefore, it is a natural choice to predict the depth map or transmission map of the underwater image to improve the performance of enhancement and restoration. We list the depth-guided networks next.