We prove duality isomorphisms between Heisenberg cosets of subregular $\mathcal{W}$-algebras of type $A$ and Heisenberg cosets of principal $\mathcal{W}$-algebras of type super $A$ for generic level. The simplest case is the isomorphism between the parafermion vertex algebra and the Heisenberg coset of the $N = 2$ superconformal vertex superalgebra. We also prove the similar duality for type $B$ and type super $C$. These results may be interpreted as generalizations of Feigin-Frenkel duality in the context of S-duality by Creutzig-Gaiotto. (Received September 06, 2019)