$$\mathcal{H}_k \in \mathcal{Y}\times\mathcal{I} \supset \mathcal{I}\times\mathcal{H}_k \ni \mathcal{H}_k$$

$$= \underbrace{\mathcal{H}_k^*}_{k}\eta\underbrace{\mathcal{H}_k}_{k} = \underbrace{\mathcal{H}_k}_{k}\eta\underbrace{\mathcal{H}_k}_{k} = \underbrace{\mathcal{H}_k}_{k} \bigtimes \underbrace{\mathcal{H}_k}_{k} = \mathcal{H}_k \bigtimes \mathcal{H}_k$$

$$= \underbrace{\mathcal{H}_k}_{k}\eta\underbrace{\mathcal{H}_k}_{k}\eta\underbrace{\mathcal{H}_k}_{k}^* = \underbrace{\mathcal{H}_k}_{k}\eta\underbrace{\mathcal{H}_k}_{k}^* = \underbrace{\mathcal{H}_k}_{k}^*$$

$$\underbrace{\mathcal{H}_k}_{k} \bigtimes \underbrace{\mathcal{H}_k}_{k} = \underbrace{\mathcal{H}_k}_{k} \eta \underbrace{\mathcal{H}_k}_{k}^*$$

$$\mathcal{I} \cdot \underbrace{\mathcal{H}_k \mathcal{H}_k}_{k} = \mathcal{H}_k \mathcal{H}_k$$

$\mathbb{K}_N$
$\mathbb{K}_N$