An example of an endoscopy group.

Let $G = \text{Sp}(2n)$, then $\hat{G} = \text{SO}(2n+1)$.

Take $x = \begin{pmatrix} 0 & & & \vdots & & 0 \\ -1 & -1 & & & & \\ & 0 & \ddots & & & \\ & & & -1 & 0 \\ & & & & 0 & & \\ & & & & & 0 & \end{pmatrix} \in \hat{G}$. The centralizer of $x$ is isomorphic to $\text{O}(2n)$, so its neutral connected component, $\hat{H}$, is isomorphic to $\text{SO}(2n)$.

Let $H$ be the dual of $\hat{H}$, then $H = \text{SO}(2n)$.

Conclusion. $\text{SO}(2n)$ is an endoscopy group for $\text{Sp}(2n)$.

Remarks. (i) $\text{SO}(2n)$ cannot be embedded into $\text{Sp}(2n)$. Moreover, for $n \geq 4$ the Lie algebra of $\text{SO}(2n)$ cannot be embedded into the Lie algebra of $\text{Sp}(2n)$.

(ii) The Dynkin diagram of $G$ is $\cdots \Rightarrow$

The Dynkin diagram of $\hat{G}$ is $\cdots \Rightarrow$

The extended Dynkin diagram of $\hat{G}$ is $\cdots \Rightarrow$

The Dynkin diagram of $\hat{H}$ is $\cdots \Rightarrow$