$$\begin{array}{ccc} F_C(A) & \xrightarrow{\ F_M(f)\ } & F_C(B) \\ {\scriptstyle\varphi(A)}\downarrow & \circlearrowright & \downarrow{\scriptstyle\varphi(B)} \\ G_C(A) & \xrightarrow[G_M(f)]{} & G_C(B) \end{array}$$