

ABSTRACT

The invention relates to a telescopic rock fall pipe system for subsea rock installation, featuring a hybrid heave compensation assembly capable of both active and passive operation. The system comprises a telescopic pipe supported by a carriage and gimbal, a double drum lifting winch, and a hydraulic cylinder coupled to a moving sheave block. A logic-integrated hydraulic manifold, controlled by a PLC and a Motion Reference Unit (MRU), enables a Passive Heave Compensation (PHC) mode for low sea states using high and low-pressure accumulators as hydro-pneumatic springs, and an Active Heave Compensation (AHC) mode for higher sea states. The hydraulic circuit includes a specific bypass valve (SV3) configured to momentarily connect the cylinder's piston and rod chambers during over-pressure or over-speed events, ensuring mechanical integrity. The system provides precise, energy-efficient vertical stabilization of the fall pipe end point relative to the seabed, to compensate for vessel motion.

[Figure 1]