



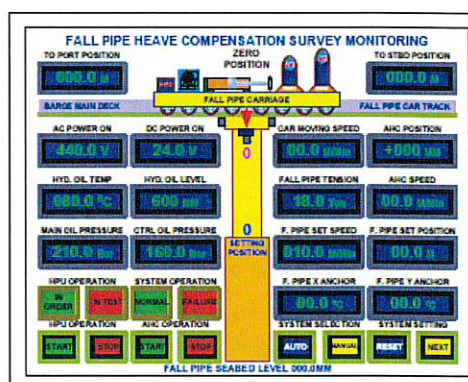
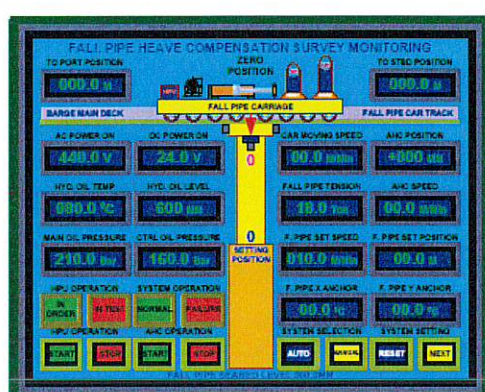
TIANCHENG ELECTRICAL MARINE EQUIPMENT PTE LTD

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Description of the Drawings:

(FIGURES AND DRAWINGS SECTION) [Include drawings/illustrations of the system components, if available]



Fallpipe heave compensation systems are crucial for precise subsea engineering tasks like pipeline protection, cable burial, and seabed leveling. These systems ensure stability and accuracy during operations, even in challenging sea conditions. Here's an overview of the components and functionalities of such a system:

Components and Functionalities

1. Heave Compensation System:

- **Active Heave Compensation (AHC):** Uses sensors to detect vessel motion and adjust winch or crane movements in real-time to counteract heave. This ensures the load remains stable and accurately positioned.



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- **Passive Heave Compensation (PHC):** Relies on mechanical components like springs and dampers to absorb and counteract vertical motion. It's energy-efficient and cost-effective.
- 2. **Survey Monitoring System:**
 - **Measurement Devices:** Instruments like Motion Reference Units (MRUs) measure the vessel's roll, pitch, and heave motions. These measurements are crucial for precise AHC during delicate offshore operations.
 - **Real-Time Data Output:** Provides real-time data on heave amplitude, velocity, and acceleration, essential for accurate compensation.
- 3. **Control System:**
 - **User-Friendly Interface:** A control panel interface for seamless barge operations, including dynamic positioning controls.
 - **Integrated Control:** Combines winch and crane control to ensure safe and effective operations. The system can be configured to match specific applications and tuned for optimal performance.

Benefits

- **Increased Operational Window:** AHC systems increase the operational window in bad weather, improving safety and efficiency.
- **Cost Reduction:** By enhancing operational efficiency and reducing downtime, these systems contribute to cost savings.
- **Precision and Control:** Ensures precise placement of construction components, reducing rework and operational costs.



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Detailed Description of the Invention:

1. Heave Compensation System:

- **Active Heave Compensation (AHC):** The system includes sensors to detect the heave motion of a vessel and adjust winch or crane movements in real-time to counteract the heave. This ensures the load remains stable and accurately positioned, even in rough sea conditions.
- **Passive Heave Compensation (PHC):** The system relies on mechanical components like gas springs and hydro-pneumatic devices to absorb and counteract vertical motion. PHC systems are energy-efficient and cost-effective, providing long-term stability for operations such as maintaining constant tension on mooring lines.

2. Survey Monitoring System:

- **Measurement Devices:** Instruments like Motion Reference Units (MRUs) measure the vessel's roll, pitch, and heave motions. These measurements are crucial for precise AHC during delicate offshore operations.
- **Real-Time Data Output:** The system provides real-time data on heave amplitude, velocity, and acceleration, essential for accurate compensation.

3. Control System:

- **User-Friendly Interface:** A control panel interface for seamless barge operations, including dynamic positioning controls.
- **Integrated Control:** The system combines winch and crane control to ensure safe and effective operations. The system can be configured to match specific applications and tuned for optimal performance.

4. Dynamic Positioning (DP1) System:

- **System Interface:** The DP1 system features a user-friendly control panel interface for seamless barge operations, including dynamic positioning controls. Real-time data and control options are displayed on the master control system software, featuring DP1 integration.



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- **Integration with Sub-Systems:** The DP1 system enhances the precise positioning and control of mooring winches and active heave compensation systems, ensuring stability in varying sea conditions.

5. Benefits:

- **Increased Operational Window:** AHC systems increase the operational window in bad weather, improving safety and efficiency.
- **Cost Reduction:** By enhancing operational efficiency and reducing downtime, these systems contribute to cost savings.
- **Precision and Control:** Ensures precise placement of construction components, reducing rework and operational costs.