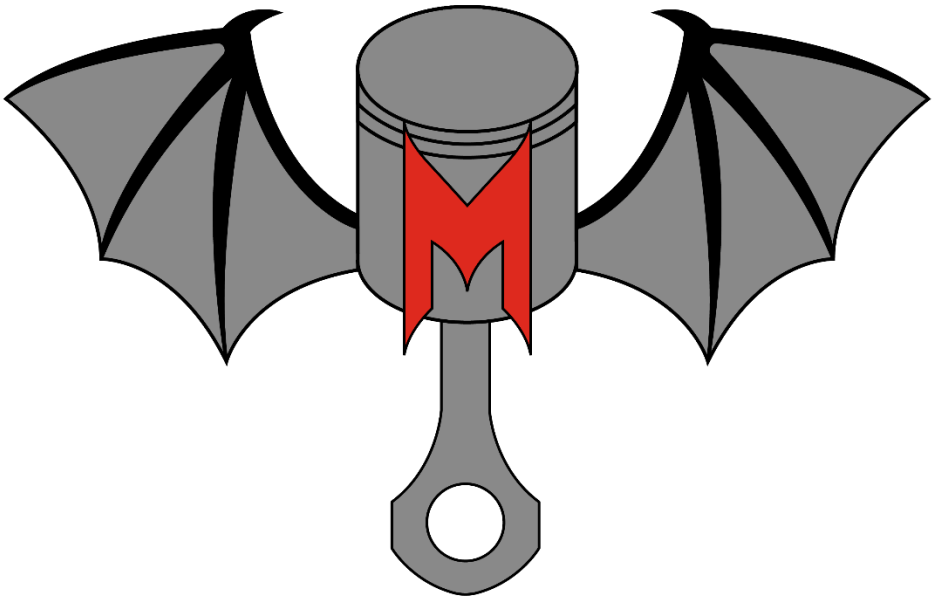
User Manual and Installation Guide



The Rear Pressure Indication System is a system designed to enhance safety during vacuum truck operations by detecting residual pressure in the rear flange. When pressure builds in the flange after closure, opening it can result in the cap being forcefully ejected, posing a serious risk of injury to the operator. This system provides an early warning of residual pressure through a visual warning light and an audible alarm, ensuring safer operation.

Disclaimer: This system is not meant to be a replacement for safe SOP. RPIS is designed to be an added layer of security. Ensure that the system is cleared of pressure every time camlock is disconnected. Motorhull, LLC is not liable for any injuries or damage that result from an uncontrolled release of pressure.

What is provided

A. Control Box
B. Pressure Sensors (2)
C. Light and Alarm Combination Unit
D. 2.5’ Power Wire
E. 5’ & 2.5’ Sensor Wires
F. 1/4” Self-Drilling Screw (10)

Compatibility

This system is compatible with any truck or trailer equipped with a pressure release point in a flange. While there are no specific requirements for the valve, some flange modifications may be necessary during installation.

Product Specifications

- Power Supply: Wired from truck running lights to internal battery
- Box Dimensions: 5.5" x 4.5" x 2.8"
- Connectors:
    - Alarm: Standard 4-pin DIN
    - Power & Sensors: Standard 2-pin DIN
- Pressure Detection Range: Up to 150 psi
- Water Resistance: Designed to resist water exposure; ensure all seals and connectors are intact
- Operating Temperature: -40°C to 85°C (-40°F to 185°F)

Installation

Tools Required

- Wire strippers and crimpers
- Wrench set/Crecent wrench
- Drill with 1/4” drill bit
- Multimeter

Installation:

1. Mount the Box & Alarm
    a. Place the box and light tower where they’re going to sit on the trailer. Note: When picking a location make sure that the light tower is visible from the driver’s side and rear of the trailer. The box needs to be mounted where it will not be stepped on or otherwise damaged. Also, prolonged exposure to sunlight will cause deterioration of plastic. It is suggested to mount control box where light exposure is limited.

Light Tower Mounted

Control Box Mounted

    b. Secure the box (A) to a selected location on the trailer using provided hardware (F). Ensure it is mounted in a safe, accessible position.
    c. Secure the alarm (C) to selected location near the flange of the trailer using provided hardware (F).
2. Install Pressure Sensors
    a. Drain air pressure from air lines leading to rear flanges.
    b. Disassemble the air intake assembly. (Air hose, Ball valve, Flange)
    c. Attach the pressure sensors (B) to a brass tee. Ensure they are tightly secured to avoid leaks.
    d. Attach the brass tee to the flange.
    e. Connect sensor wires (E) to the sensor and run the wire to the control box.

f. Reassemble the air intake assembly. (Air hose, Ball valve, Sensor tee, Flange)

If modifications to the flange are necessary, consult your company's maintenance team or follow flange manufacturer guidelines.

3. Connect the Power Supply
    a. Identify the hot-wire at the rear of the trailer for the running lights.
    b. Splice provided power wires (D) into trailer running light power wires.
    c. For ground wire either splice into trailer running ground or tap a new ground.
    d. Connect the power wire DIN to the control box.
4. Connect the Light Tower
    a. Attach the light tower unit wires to the system using the 4-pin DIN connector.
5. Verification
    a. Check that the alarm responds to simulated pressure or sensor faults.
        i. (Green – No pressure detected)
        ii. (Red + Alarm – Pressure detected)

b. Ensure all DIN connections are tight to maintain the system's water resistance.

User Operation

Intended Users

- Drivers: Must understand the alarm states and respond appropriately to maintain safety.
- Mechanics: Should be familiar with the system to prevent damage during maintenance and repair.

The Rear Pressure Identification System ensures operator safety by detecting residual pressure in the flange:

- The system uses two pressure sensors to monitor pressure above atmospheric levels in the flange.
- If either sensor detects pressure, it triggers a switch that activates the alarm (a visual red light and audible sound).
- For added safety, the alarm is set to turn off only if both sensors detect no pressure, minimizing the chance of a false safe state.
- The system is charged by the trailers running lights, so Motorhull, LLC recommends using running lights whenever the state of the flanges wants to be checked, and during transport.

System States

The Pressure Monitoring System has two primary states, indicated by the alarm:

- Green Light:
    - No residual pressure detected.
    - Safe to open the flange.
- Red Light and Alarm:
    - Residual pressure detected in one or both sensors, or a fault in the system.
    - Do not open the flange until the pressure is cleared according to company safety protocols.

Steps for Operation

1. Before Starting Work
    - Verify that the system is powered on.
    - Check the status light:
        - Green: Proceed with normal operations.
        - Red: Follow the procedure below.
2. If the Alarm Activates
    - Do not open the flange.
    - Follow your company's standard training to safely release the residual pressure from the flange.
    - Do not attempt to bypass the system or open the flange while the alarm is active.
3. After Clearing Pressure
    - Check the status light again.
        - If the light turns green, proceed with normal operations.
        - If the red light remains active, treat the system as if pressure is still present and recheck the flange.

Servicing & Routine Maintenance

1. Visual Inspection (Monthly):
    - Inspect the system for visible signs of damage, such as cracks in the box, loose connections, or wear on the wiring.
    - Check that all DIN connectors are securely attached and free of dirt, debris, or corrosion.
    - Verify that the lid is sealed properly to maintain waterproofing.
2. Alarm Test (Every 3 Months):
    - Simulate pressure in the flange by creating a controlled environment where one or both sensors detect pressure.
    - Confirm the alarm activates correctly (red light and sound).
    - Ensure the alarm resets to green after the pressure is cleared.

Repair Guidelines

1. Power Down:
    - Always disconnect power before performing any maintenance or repairs.
2. Inspect After Repairs:
    - After completing repairs, thoroughly inspect the system for potential faults or damage.
    - Re-test the alarm to ensure proper functionality.

Waterproofing Maintenance

- Ensure all connectors are tightened.

Signs of Faults

- Alarm remains inactive despite detected pressure.
- False green light with confirmed residual pressure.
- Intermittent or inconsistent alarm activation.

If any of these faults occur, contact your company's maintenance team or consult with Motorhull LLC for replacement parts or support.

Troubleshooting

Common Issues and Solutions

Issue	Possible Cause	Solution
Alarm does not activate when pressure is present.	Faulty pressure sensor or connection.	Check sensor connections and replace if needed.
Red light and alarm remain active even after pressure is cleared.	Pressure still present, faulty sensor, sensor too sensitive, or faulty connection.	Verify flange is fully depressurized, inspect sensors, and test switches. Replace any faulty components. Ensure sensors are connected. Adjust sensor sensitivity.
Alarm does not reset to green after repair.	Power cycling or connection issue.	Disconnect and reconnect power to reset the system. Inspect connectors.
Alarm activates intermittently without pressure.	Environmental damage (heat, cold, water intrusion) or sensor fault.	Inspect for environmental damage. Replace affected components and improve waterproofing.

Step-by-Step Troubleshooting

1. Verify Power Supply
    - Ensure the system is receiving adequate power from the truck or trailer battery.
    - Check the battery voltage (12V) and replace it if necessary.
2. Inspect Wiring and Connectors
    - Examine all DIN connectors for secure attachment and signs of corrosion or damage.
    - Replace any damaged connectors or wires.
3. Test Sensors and Switches
    - Adjust sensitivity of sensor.
    - Disconnect the sensors and test them individually using a controlled pressure source.
    - Replace any sensor that does not respond as expected.
    - Test switches for proper operation when triggered by pressure sensors.
4. Environmental Damage Check
    - Inspect the box and components for signs of water, excessive heat, or cold damage.
    - Replace or repair affected parts and improve environmental shielding if necessary.

Adjust Sensor Sensitivity

- Pressurize Flange. (Open the ball valve to flange then close once a desired pressure has been reached)
- Remove the rubber cap from the sensor. Locate the set screw between the two connectors.
    - If alarm is sounding with no pressure: turn the set screw into the sensor until alarm no longer sounds then back off the screw one ½ turn.
    - If alarm is not sounding with pressure: turn the set screw out of the sensor until alarm sound.
- Once alarm is working properly, depressurize the flange and insure operation with no pressure. Cycle the pressure through the system to ensure proper function.

Safety & Warnings

General Warnings

- The release of the flange cap under pressure can cause it to eject at high speed, posing a severe safety risk to operators.
- Always follow company-standard training to clear the flange of residual pressure when the alarm is active.
- Wear the appropriate personal protective equipment (PPE) as recommended by your parent company.
- Environmental Considerations
    - The system is water-resistant but not designed to withstand direct pressurized washing or excessive temperatures, either heat or cold.
    - Exposure to harsh environmental conditions may result in system failure or cause the system to display a false green light.
    - If the system fails, treat the flange as if it contains residual pressure and clear it as per company safety protocols.

Prohibited Actions

- Do not ignore the system alarm. Always respond as trained to ensure safety.
- Avoid tampering with the wiring, sensors, or alarm components, as this may cause system malfunction and compromise safety.

Best Practices

- Always follow your company's standard operating procedures when working with the system.
- Treat all alarm activations as genuine unless verified otherwise.
- Never ignore or bypass the system alarm, even during perceived malfunctions.