

Decades of experience providing valving solutions 

PH3 POWERHALT[®]

AIR INTAKE EMERGENCY SHUT-OFF VALVES *by PACBRAKE*

Operator's Guide

OPERATE ■ TEST ■ MAINTAIN ■ TROUBLESHOOT

Helping you achieve optimal results with your PH3 PowerHalt Shut-Off Valve

 **PACBRAKE[®]**

800.663.0096 / www.powerhalt.com

||| **PACBRAKE**® COMPANY



As a proud family run business since 1961, Pacbrake Company™ has been committed to providing its customers with the highest quality products for a wide range of applications. Pacbrake is recognized as a leading manufacturer in the design of engine brakes, exhaust brakes and various valving solutions for diesel engine applications.



Current with today's standards, Pacbrake develops valves that push the limits on environments, temperatures, torques and control strategies. One such product is PowerHalt, a growing line of Air Intake Emergency Shut-Off Valves, which are specifically geared towards diesel engines working in the oil & gas industry.



With over 2 million valves in service to-date, across a wide range of markets and applications, Pacbrake has the experience to ensure the PowerHalt product line is designed to the highest industry standards.

Behind every Pacbrake product stands a team of qualified engineers, state of the art CNC manufacturing processes and an internationally recognized ISO 9001:2008 quality management system. Each product is backed by the best warranty in the industry.

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Thank you for purchasing Pacbrake's PH3 PowerHalt Air Intake Emergency Shut-Off Valve.

This product is designed to provide years of trouble-free, safe operation, while reducing operating and maintenance costs.

You can be assured while on your work site that we have you covered, keeping you safe and clear of potentially dangerous runaways.

HOW THE SHUT-OFF VALVE WORKS

Pacbrake's PH3 is an electronically controlled emergency engine shut down system which forces engine shutdown by blocking an engine's air intake path.

The valve is activated by means of a manual override function. Automatic control kits also include the PowerGuard Controller which continuously monitors the engine RPM and automatically activates the valve to shut down the engine when it exceeds a user set trip speed. The valve electronically returns to the open position after emergency engine shutdown when in Auto Reset Mode.



A smart system with the safest control options on the market

AUTOMATIC POWERHALT CONTROLS



◀ POWERGUARD CONTROLLER

Pacbrake's PowerGuard controller provides hands-free activation of the shut-off valve. The controller has a programmable trip speed – when the programmed trip speed is exceeded, emergency engine shutdown will occur automatically. Emergency shutdown can be activated at any time through a manual override button, **TRIP**.



◀ POWERHALT MEMBRANE SWITCH

RESET Used during set-up procedure & to open the valve when in Manual Reset Mode. *(Red light above the button)*

TRIP Used for a manual activation. *(Manual Override button)*

TEST Used to test the automatic function & during the set-up procedures. *(Green light above the button)*



Complete **PowerGuard Programming & Testing** info can be found on our website:
www.pacbrake.com/PH3Programming

VALVE OPERATION

- **When the engine is not running**, neither light will flash on the membrane switch.
- **When the engine is running**, the green light should flash every 5 seconds to indicate the system is active and the engine speed is being monitored.
- **When the engine is running with the Secondary Set-Point active**, the green light should exhibit a double flash every 5 seconds to indicate the system is active and the engine speed is being monitored.
- **When an emergency condition arises and engine shutdown is needed**, press **TRIP** (or activate the toggle switch, if applicable) and the valve will close.
- **In an overspeed runaway condition**, the PowerGuard controller will automatically close the valve and shut down the engine.
- **When the valve is closed**, the red light will become lit.
- **When Auto Reset Mode is selected**, the red light will extinguish and the valve will automatically reset itself to the open position 30 seconds after closing.
- **When Manual Reset Mode is selected**, the red light will remain lit as long as the valve is closed. The red light will begin flashing after the engine shuts down to indicate it is safe to manually reset the valve. The valve will reset itself to the open position once the operator presses **RESET**.

POWERGUARD CONTROLLER SET-UP

AUTOMATIC CONTROL KITS ONLY

Set-up is required for the emergency shut-off system to function. The PowerGuard Controller uses an input engine speed and uses input engine speed and user defined safety margin to program system trip speed.

IMPORTANT: Consult engine manufacturer and relevant safety operating procedures to determine 'Emergency Engine Shut-Off Speed' prior to proceeding.

! Perform a Calibration upon installation of replacement components. (See page 8).

FOR ON-HIGHWAY VEHICLES WITH VARIABLE ENGINE SPEED:

1. Determine desired Trip Speed.
 - Pacbrake recommends 30% above Rated Engine RPM
2. With engine running at idle, enter SET Mode:
 - Hold **RESET** & **TEST** until both lights begin to flash
3. Raise engine speed to Input Speed – half of desired Trip Speed – and hold constant.
4. Press & release **RESET** 4 times to set Trip Speed to double Input Speed.
5. If successful, red light will blink 4 times and you may then return to idle. Green light should then flash every 5 seconds.
6. Document Trip Speed for future reference.

FOR STATIONARY ENGINES WITH CONSTANT OPERATING SPEED:

- With engine running at constant operating speed, enter SET Mode:
 - Hold **RESET** & **TEST** until both lights begin to flash
- Choose desired Overspeed Margin from below to set your Trip Speed:
 - Press & release **RESET** 1 time – Operating Speed + 10%
 - Press & release **RESET** 2 times – Operating Speed + 20%
 - Press & release **RESET** 3 times – Operating Speed + 30%
- If successful the red light will blink the same number of times **RESET** was pressed. Green light should then flash every 5 seconds.
- Document Trip Speed for future reference.

NOTE: The table below demonstrates a simple example of programming your system:

| INPUT SPEED | RESET PRESSES | OVERSPEED MARGIN | | TRIP SPEED |
|-------------|---------------|------------------|--------|------------|
| | | MARGIN | RMP | |
| 1000 | 1 | + 10% | + 100 | 1100 |
| 1000 | 2 | + 20% | + 200 | 1200 |
| 1000 | 3 | + 30% | + 300 | 1300 |
| 1000 | 4 | Double | + 1000 | 2000 |

POWERGUARD CONTROLLER TEST**AUTOMATIC CONTROL KITS ONLY**

After following the Set-Up Procedure, the system must be tested to ensure speed was programmed correctly. Using TEST Mode causes system to trip at 'Input Speed' from Set-Up Procedure – raising engine speed to actual 'Trip Speed' is unsafe & unnecessary.

1. With engine running at idle, enter TEST Mode:
 - Hold **RESET** & **TEST** until both lights begin to flash and then press & release **TEST**
2. Increase engine speed to 'Input Speed.'
3. Valve will close and red light will illuminate until 0 RPM is detected and 30 seconds elapses.
 - Pressing **TEST** will bypass 30 second timer
4. Valve will automatically reset itself to open position after above conditions.

If valve did not close, controller was not successfully programmed. Confirm installation and re-follow the steps indicated in **PowerGuard Controller Set-Up** (Page 4).



Complete **PowerGuard Programming & Testing** info can be found on our website:
www.pacbrake.com/PH3Programming

SECONDARY SET-POINT (PTO)

To set and test the secondary emergency engine shut-off speed (if applicable):

1. Activate latching switch to connect the Purple Wire (Pin 9) from the wiring harness to a suitable ground.
2. Re-follow **PowerGuard Controller Set-Up** (Page 4) & **PowerGuard Controller Test** procedure (Page 6).

POWERHALT MANUAL TEST

To test the valve, follow the steps below:

1. With engine running at idle: press **TRIP** on the membrane switch (*IF EQUIPPED*)
OR activate the toggle switch.
2. Confirm red light is on and either:
 - Wait 30 seconds for valve to auto-reset (*if applicable*)
 - **OR** press **RESET** to reset valve (*if applicable*)
3. Confirm:
 - a. Engine shuts down within a few seconds
 - b. Hose collapse is not severe
 - c. No excessive leaks are present in system

RESET OPTIONS: AUTOMATIC OR MANUAL

(Serial Numbers CPZ001673 & CPB000386 and beyond ONLY)

This function changes the valve behavior to either automatically reset itself 30 seconds after closing or to require user input to reset itself. To change the valve behavior between Auto/Manual Reset:

- Hold **RESET** & **TEST** until both lights begin to flash, then choose your desired behavior:
 - ▶ **AUTOMATIC RESET** – Press **RESET** & **TEST** together 1 time
 - ▶ **MANUAL RESET** – Press **RESET** & **TEST** together 2 times

Manual Reset must be chosen to comply with CSA B621-14 & B622-14
- If successful, both lights will confirm input by blinking the same number of times **RESET** & **TEST** were pressed.

CALIBRATION

This function calibrates controller to travel limits of PH3 valve butterfly. When performed, valve will cycle open and closed to identify limits. To perform Calibration:

- Ensure engine is off. **Never perform Calibration while engine is running.**
- Hold **RESET** & **TEST** until both lights begin to flash and then press & hold **TEST** until the valve cycles.



System must be re-calibrated upon installation of replacement components.

TROUBLESHOOTING



A complete **PH3 Troubleshooting Guide** can be found on our website; www.pacbrake.com/PH3Troubleshooting, which includes a more detailed list of potential issues and their solutions.

Most issues, however, can be solved by ensuring:

- All wiring harness connections are securely latched to their mates.
- Wiring is free of any signs of damage or wear that could cause electrical shorts or discontinuities.
- Valve is re-calibrated if individual system components have been replaced (*See **Calibration**, page 8*).
- Battery is supplying sufficient voltage and fuse is intact.
- Secondary RPM Set-Point is correctly enabled/disabled depending on your application. (*See **Secondary Set-Point** procedure, page 7*)

SYSTEM ERROR CODES

AUTOMATIC CONTROL KITS ONLY

The PH3 is a smart system which can monitor operating conditions during the life of the product. It ensures that any potential issues are identified in a timely manner, preventing unwanted downtime and safety concerns.

If there is a system error detected during operation, the following will occur:

1. Rapid alternating flashing of red and green lights on the membrane switch.
2. A one second pause followed by a number of simultaneous light flashes corresponding to the error code. (See **Error Codes**, pages 11-14).
3. Cycle repeats until error is resolved and power is cycled.

WARNING:

- **Valve is disabled when the system is displaying an error code. The valve will not respond to any commands and is not actively holding its position.**
- **Cycling power will clear an error code but should only be done once the issue has been remedied. Do NOT cycle power to the system until the underlying cause has been resolved.**
- **Do NOT attempt to cycle power by removing connectors from the PowerGuard Controller. The power must be cycled by disconnecting power directly at the battery or fuse.**
- **Do NOT attempt to operate the engine with any of the harness connections disconnected. Doing so is dangerous and could cause the valve to trip.**

ERROR CODES

Error codes are determined by the number of times the LED lights flash simultaneously.

ERROR CODE 1-2

| Cause | Solution |
|--|---|
| The valve failed to close (1) or open (2) – the motor position is not reading. | <ul style="list-style-type: none">• Inspect the valve for any obstructions and remove if possible.• Perform Calibration to re-calibrate the valve. <i>(See page 8).</i>• Ensure all connectors are fully installed and latched.• Ensure continuity from the valve connector to the controller.• Cycle power to the system.• Disconnect gear tooth sensor harness connection & attempt to cycle power. If error does not re-occur immediately, replace gear tooth sensor. |

ERROR CODE 3-4

| Cause | Solution |
|--|---|
| The valve opens (3) or closes (4) too slowly or not all the way. | <ul style="list-style-type: none">• Inspect the valve for any obstructions and remove if possible.• Attempt to manually press the flap closed/open while feeling for any binding.• Disconnect gear tooth sensor harness connection & attempt to cycle power. If error does not re-occur immediately, replace gear tooth sensor. |

| ERROR CODE 5 | |
|---|---|
| Cause | Solution |
| The valve is drawing too much current. | <ul style="list-style-type: none"> • Ensure continuity from the valve connector to the controller and to the power wires. • Check all wiring for damage that could cause a short & replace if necessary. • Replace controller if necessary. |
| ERROR CODE 6-9 | |
| Cause | Solution |
| Internal controller error. | <ul style="list-style-type: none"> • Replace controller. |
| ERROR CODE 10 | |
| Cause | Solution |
| Motor position sensor reading is out of range, disconnected, or failed. | <ul style="list-style-type: none"> • Ensure all connectors are fully installed and latched. • Ensure continuity from the valve connector to the controller. • Cycle power to the system. • Disconnect gear tooth sensor harness connection & attempt to cycle power. If error does not re-occur immediately, replace gear tooth sensor. |

ERROR CODE 11

Cause

Electrical motor is receiving no power or a low voltage.

Solution

- Ensure all connectors are fully installed and latched.
- Check battery voltage and replace/charge if necessary.
- Check for damage to wiring causing discontinuity & replace if necessary.
- Perform Calibration to re-calibrate the valve. *(See page 8)*

ERROR CODE 12

Cause

Electrical motor failed to rotate in the correct direction and may be miswired.

Solution

- Replace wiring harness.

ERROR CODE 13

Cause

High position deviation from calibrated range.

Solution

- Visually check for mechanical integrity of the valve.
- Cycle power to the system and recalibrate the valve.
- Disconnect gear tooth sensor harness connection & attempt to cycle power. If error does not re-occur immediately, replace gear tooth sensor.

ERROR CODE 14-18

| Cause | Solution |
|----------------------------|--|
| Internal controller error. | <ul style="list-style-type: none"> • Inspect all wiring for signs of damage and replace if necessary. • Ensure battery voltage is not less than 10V and replace/charge battery if necessary. • Cycle power to the system • Replace controller. |

ERROR CODE 19

| Cause | Solution |
|--|--|
| The valve has seized and is stuck in position or is moving too slowly. | <ul style="list-style-type: none"> • Perform Calibration to re-calibrate the valve. <i>(See page 8)</i> • Ensure all connectors are fully installed and latched. • Ensure continuity from the valve connector to the controller. • Inspect the valve for any obstructions and remove if possible. • Attempt to manually press the flap closed/open while feeling for any binding. • Cycle power to the system. • Disconnect gear tooth sensor harness connection & attempt to cycle power. If error does not re-occur immediately, replace gear tooth sensor. |

MAINTENANCE REQUIREMENTS

To ensure a trouble-free long life for your PowerHalt Shut-Off Valve a scheduled maintenance procedure is mandatory.

It is recommended that you follow the requirements and procedures stated below:

MONTHLY REQUIREMENTS

- ▶ Inspect all fasteners, clamps, and support brackets for tightness and the required torque
- ▶ Inspect all wiring / cable runs for corrosion, wear, and loose connections
- ▶ Inspect all hoses for cracks, damage, and leaks
- ▶ Inspect the PowerGuard controller for damage, dirt, and poor connections
- ▶ Confirm the green light flashes every 5 seconds when the engine is running (Automatic Control Kits ONLY)
- ▶ If your engine has not been started for over 30 days, cycle the valve as per **PowerHalt Manual Test** procedure (Page 7) and ensure there are no Error Codes

CAUTION: Use your discretion to restart the engine after an engine shut-down. In most cases, it is recommended to wait until the cause is understood and shared with the necessary safety parties before restarting.

Contact Pacbrake Customer Support, 800.663.0096 if you have any questions or concerns.



PACBRAKE CUSTOMER SUPPORT

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