

# Installation Manual

**PH3 POWERHALT**  
AIR INTAKE EMERGENCY SHUT-OFF VALVES by **PACBRAKE**



PH3 AUTOMATIC ACTIVATION (Mk II)

L6492 • ECN 1-2939

800.663.0096

[www.powerhalt.com](http://www.powerhalt.com)



## **ATTENTION**

Prior to installation, read through all system requirements.

If you cannot meet certain requirements, or are unsure of your system, contact your dealer or PowerHalt representative and we can work with you to overcome your installation constraints and challenges.

**A PowerHalt Technical Representative can be reached Monday-Friday 6:00-4:30 (PST) at 800.663.0096**

## **CAUTION**

**Failure to comply with these instructions may result in PRODUCT DAMAGE:**

- Maximum ambient air temperature at valve must not exceed 120°C.
- Maximum air intake temperature at valve must not exceed 175°C.
- Maximum ambient air temperature at controller must not exceed 85°C
- Install valve upstream of air intake flame trap, if present.
- All hoses, adapters, and fittings must be suitable for vibration of engine application.
- Do not mount controller directly on engine, vehicle frame, or other components exhibiting harsh vibration.

## **CAUTION**

**Failure to comply with these instructions may result in ENGINE DAMAGE:**

- Confirm overall pipe quality and integrity. Use additional support brackets for long pipe runs and/or excessive vibration applications.
- Flexible hose gaps should be kept to a minimum to avoid hose collapse during valve activation.
- Clear intake plumbing of any shavings and/or debris prior to installation.

**CAUTION**

**Failure to comply with these instructions may result in SYSTEM FAILURE – FALSE TRIPS AND/OR IMPROPER FUNCTION:**

- Install away from bends in engine piping to reduce pressure drop and exposure to vibration resulting from turbulent flow.
- Ensure all intake plumbing gaps are kept to a minimum to avoid system leaks preventing engine shutdown.
- Crankcase breather connections to intake system must be located upstream of shut-off valve.
- If more than one shut-off valve is installed ensure valve activation is simultaneous for all valves.
- Use common battery ground when synchronizing valve activation. If common battery ground is not possible, use relays to create isolation barrier.
- Do NOT remove pins from harness connectors to pass wiring harness through small sized holes.
- Do NOT bend wiring harnesses less than minimum bend radius of 15mm
- Do NOT operate engine with any harness connections disconnected. Doing so could cause system components to fail under extreme operating conditions.
- Ensure power is drawn directly from battery.
- If extending wiring harness lengths, individual runs must not extend beyond 6 meters [20 feet] from controller. Use sealed connections and specified wire type & size as indicated on wiring schematic.
- No extension of speed signal cables is permitted.
- As this is a safety device, activation testing must be employed at a minimum of once per month to ensure system remains functional and valve is free moving. Daily activations are recommended to ensure proper function of the system.

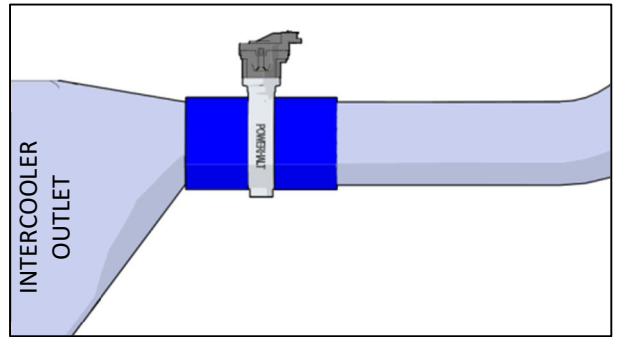
Thank you for your purchase of a PowerHalt Air Intake Emergency Shut-Off Valve by Pacbrake.  
Please read entire manual before you begin to ensure you can complete installation once started.

**Should you have any issues during installation, please call technical support at 800.663.0096.**

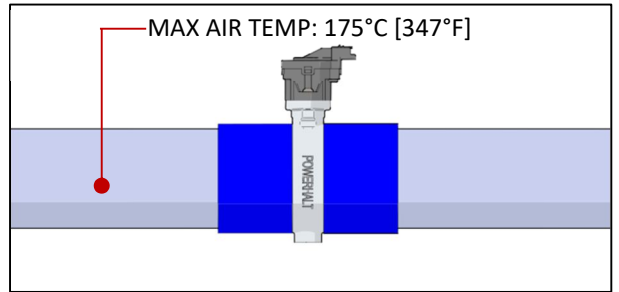
## 1 Valve Installation

Read requirements below to select location and install valve.

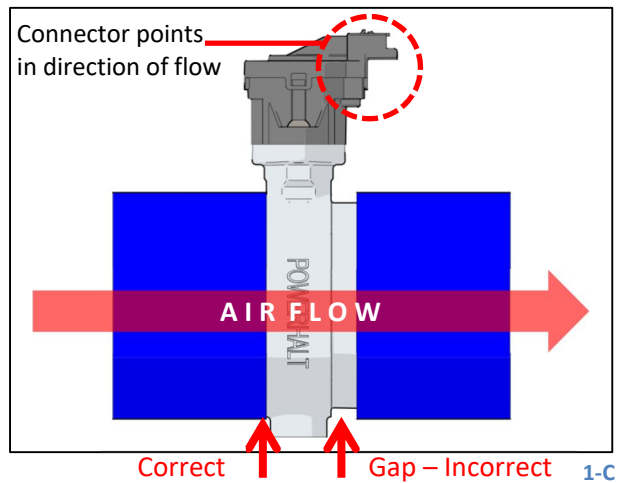
- ⚠ If modifying factory engine hose, ensure air path is clear of any interfering wires or protrusions
- ⚠ Install away from elbows where possible. Areas of laminar flow at end of straight pipe sections will reduce pressure drop and exposure to vibration.
- ⚠ Ensure maximum intake temperatures do not exceed 175°C [347°F].
  - For applications with intercooler, mounting directly at outlet of intercooler as shown in FIGURE 1-A is recommended to ensure flow is laminar and air temperature is less than specified limit.
  - For applications without intercooler, mount in straight section of pipe away from turbocharger as shown in FIGURE 1-B to ensure flow is laminar and air temperature is less than specified limit.
- Ensure 1" clearance from valve to surrounding components. Valve can be rotated as long as it is correctly oriented with respect to air flow.
- Remove appropriate length from intake plumbing to allow for installation of valve. Clear intake plumbing of all shavings and debris.
- If applicable, use beaded pipe to ensure hose retention. See Page 9 for more information on optional PowerHalt Bead Ring Kit.
- Correctly orient valve to flow of air as shown in FIGURE 1-C.
- Fully seat hoses onto valve as shown in FIGURE 1-C.
- Torque provided clamps to 8.5 Nm [75 in-lbf].



1-A



1-B



1-C

## 2 Speed Sensor Installation

Follow relevant step below depending on your sensor.

**⚠** Speed signal functionality is dependent on ordering correct harness & controller. Contact PowerHalt Representative for more information.

### 2.1 Magnetic Pick-Up Sensor

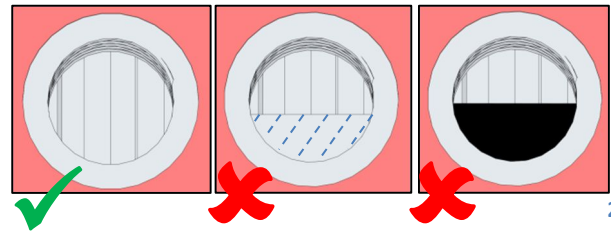
To install sensor, thread sensor into port on bell housing until it contacts flywheel teeth and back off ½ turn. Tighten jam nut securely as per TABLE 2-A.

**⚠** Use bottoming tap to clean port threads.

**⚠** Sensor port must be centered over flywheel teeth as shown in FIGURE 2-B. Contact PowerHalt Representative if sensor port is offset.

2-A

Sensor Thread	Installation Torque
3/8 – 24 (Stainless)	5.1 Nm [45 in-lbf]
5/8 – 18 (Stainless)	25.8 Nm [19 ft-lbf]
3/4 – 16 (Stainless)	81.3 Nm [60 ft-lbf]
3/4 – 16 (Plastic)	21.7 Nm [16 ft-lbf]



**For Detroit Diesel 13/15/16 Engines without sensor port:**

1. Replace stock engine flywheel access cover plate with Adapter Plate to create sensor port.

**For all other engines without sensor port:**

1. Find suitable location on bell housing for mounting magnetic pick-up sensor.
2. Drill and tap bellhousing directly – based on sensor thread.

### 2.2 Push-In Magnetic Pick-Up Sensor

To install sensor, remove stock fastener and cover plate. Insert provided sensor into port. Re-install stock fastener and torque to factory specifications.

### 2.3 R- or W- Terminal Harness

Allows system to sense speed from engine alternator. Ensure alternator has R- or W- Terminal prior to ordering.

To install harness, follow provided wiring schematic.

**⚠** Ensure harness is grounded directly at battery.

### 2.4 Jumper Harness





Allows system to use factory installed crank position sensor to sense speed. Harness is compatible with certain engines only – confirm before ordering.

To install harness, locate factory crank position sensor and follow provided wiring schematic.

## 2.5 Gen-End Harness

Allows system to sense speed from generator output terminals by utilizing an inline frequency sensing circuit. Frequency sensing circuit features galvanic isolation between the AC system and the low voltage frequency signal to the PowerHalt controller.

To install harness, select suitable size ring terminals to fit the output terminals of your generator. Strip ends of the black harness wires and crimp your terminals to the wires. Mount the inline frequency sensing circuit using self tapping screws or provided tie straps. Connect ring terminals to the generator output terminals on the LINE SIDE of the circuit breaker and secure. Wire polarity does not matter.

-  DO NOT connect frequency sensing wires to voltages exceeding 250V AC. Installation on multi-voltage generators with 480 V or 600 V output may be possible on 10-wire or 12-wire alternators by connecting the frequency sensing wires to a single winding of the machine. For example, across terminals **T0** and **T7** on 10-wire machines or **T10** and **T7** on 12-wire machine using the NEMA or IEC nomenclature. Machines using ISO nomenclature will call these terminals **U5** and **U6** or **U5** and **N**. Installation on higher voltage systems is possible through use of a transformer to reduce voltage.
-  Mount frequency sensing circuit away from locations exposed to harsh vibrations, moisture or ambient temperatures above 85°C.
-  Harness must be connected on line side of the breaker to ensure PowerHalt system maintains functionality should the circuit breaker be tripped.
-  DO NOT extend the black harness wires that connect to the generator. These wires are designed to safely transmit high voltage AC electricity. Modification can result in serious safety hazards.

## 2.6 CAN Bus Harness

Allows system to retrieve speed signal from engine CAN Bus system via designated signal lines. Harness can connect to CAN Bus signal lines via spliced-in connection, engine-specific connectors, or through one of the standardized ports shown in FIGURE 2-C. Refer to *PH3 – Mk II Air Intake Emergency Shut-Off Valve Datasheet* for full list of engine-specific applications.

**⚠** Confirm your connection type and engine CAN Bus communication baud rate prior to ordering.

To install harness with standardized connector, locate connection port on vehicle and plug harness directly into respective port.

To install harness with engine-specific connector, locate the CAN Bus signal connection port. If the port is unused, plug applicable harness directly into connector. If the port is in use, disconnect existing line and install applicable T-harness connection into signal port and removed connection.

**⚠** Ensure all connection points are fully attached and secured.

If engine specific harness is not available for your application or the port is in use and a T-harness is not available, a generic CAN Bus harness is required.

To install generic harness with splice-in connection wires, locate the CAN high (CANH) and CAN low (CANL) signal wires on your engine. Strip the ends of the supplied harness wire and splice in to your signal lines – yellow wire to CAN high and green wire to CAN low.

**⚠** Ensure all wires are properly insulated and sealed if using splice-in connection setup.

**⚠** DO NOT extend lengths of CAN Bus signal lines. CAN Bus signal lines cannot exceed certain lengths as per SAE J1939 standards. Extending lines beyond specified lengths can result in system failure.



2-C

### 3 Switch Installation

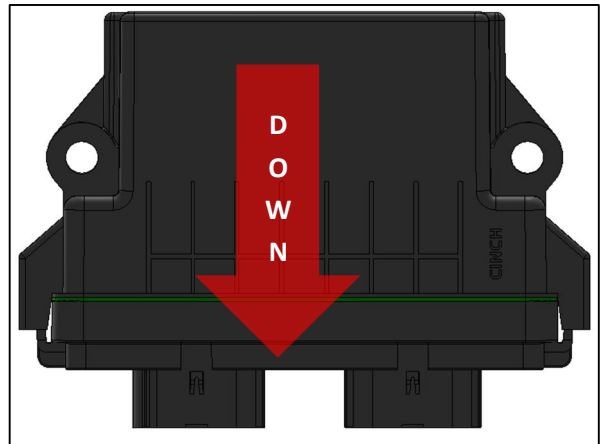
Read requirements below and find suitable location on vehicle dash or engine control panel to install provided switch and faceplate.

- For Vehicle Applications, switch must be on dash and accessible from ground outside of driver's door.
- Mount switch away from locations exposed to high pressure water and excessive UV exposure.
- For toggle switches, drill 1/2" hole and install switch assembly with toggle cover.

### 4 Controller Installation

Read requirements below and find suitable location for controller. Mount using self-tapping screws or provided tie straps.

- ⚠ Mount controller within vehicle cab underneath dash or within control panel of stationary engines.
- ⚠ Do NOT mount directly on engine, vehicle frame, or other components exhibiting harsh vibration.
- Mount controller away from locations exposed to high pressure water or steam during engine cleaning.
- Mount controller away from locations exposed to ambient temperatures above 85°C.
- Mount controller with connectors exiting from bottom to prevent ingress of standing water.



4-A

## 5 Wiring Harness

Read requirements below and follow wiring schematic on following page to make all electrical connections.

- ⚠ Do NOT remove pins from connectors to pass through small sized holes.
- ⚠ Do NOT bend wiring harnesses less than minimum bend radius of 15mm
- ⚠ Ensure power is drawn directly from battery.
- ⚠ If extending wiring harness lengths, individual runs must not extend beyond 6 meters [20 feet] from controller. Use sealed connections and specified wire type & size, see Wiring Schematic for details.
- ⚠ Extending speed signal cables is NOT permitted.
  - Securely latch all connectors. Do NOT disconnect connectors once latched.
  - Allow adequate slack in wiring harness near connections to prevent vibrating components from straining wires.
  - Secure wiring harness away from moving parts or high heat sources with provided tie straps.

### 5.1 Secondary Trip Speed [Optional]

System can force engine shutdown at 2 different engine speeds. Secondary Trip Speed can be used for protection of auxiliary equipment powered by Power Take-Off (PTO) system or as anti-theft mechanism when set near idle speed.

To activate Secondary Trip Speed, provide 6 to 36 VDC to Pink Wire (Pin 7 on Connector B). This can be done via existing PTO activation device or via latching switch (not provided).

For use as an anti-theft device, install a latching switch within the vehicle in a concealed location. When the switch is engaged, ground will be provided to the Secondary Trip Speed Input. Set the Secondary Trip speed to a low value such as 1000 or 1250 RPM. While the switch is activated, the vehicle will shut down if an attempt is made to drive away without deactivation the Secondary Trip Speed.

See Wiring Schematic for more detail.

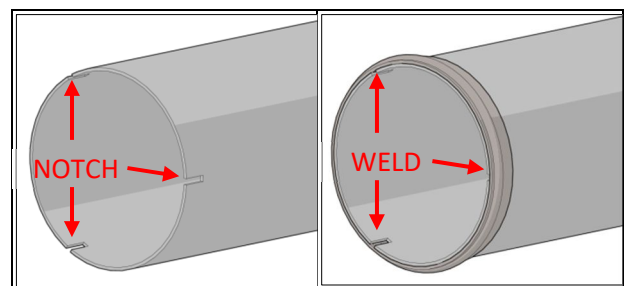
## 6 Optional Accessories

Contact PowerHalt Representative to purchase optional accessories below.

### 6.1 Bead Ring Kit

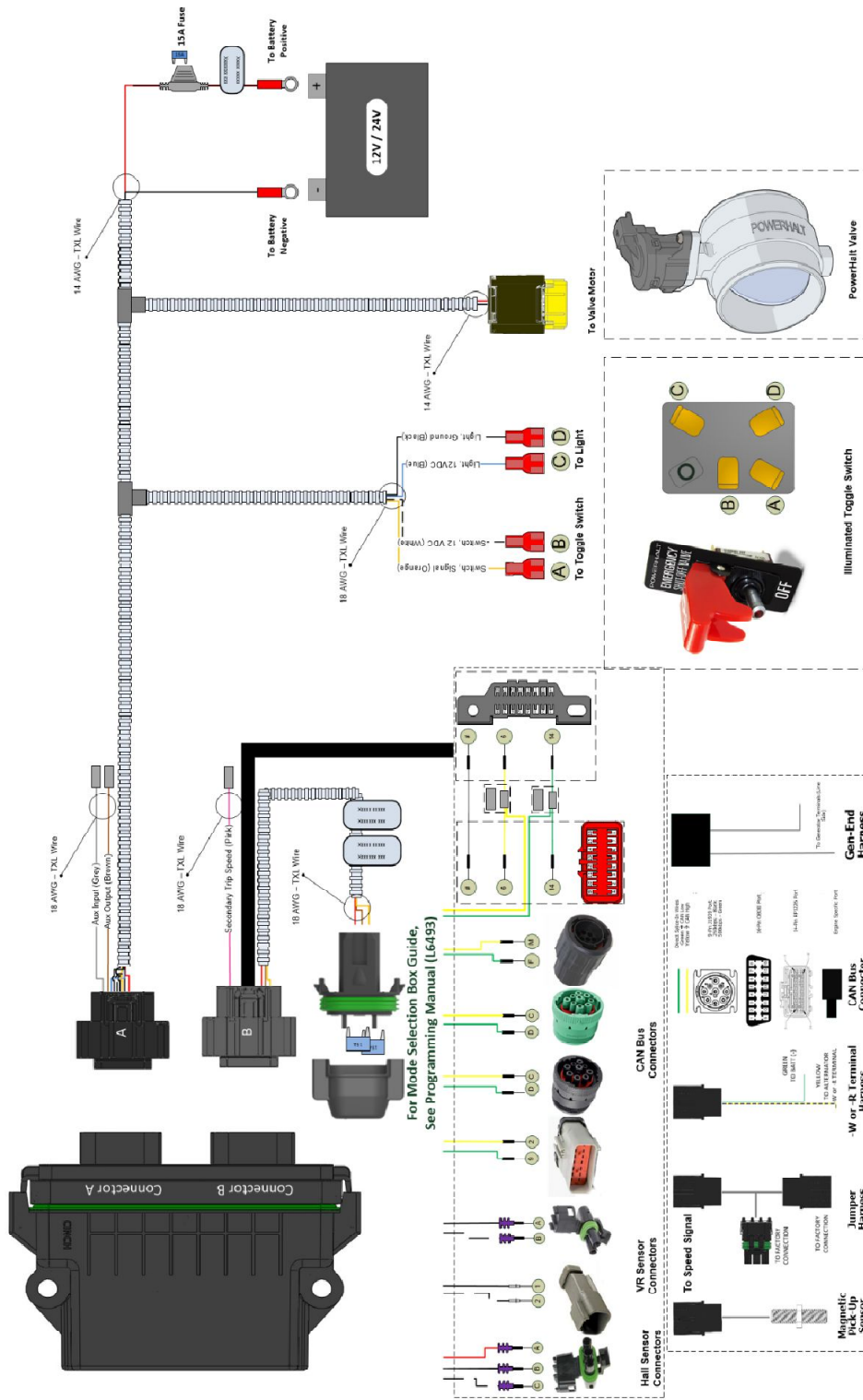
Creates beaded end on modified engine piping to ensure silicone hoses remain seated.

To install bead ring, notch ends of cut pipe in 3 equal places, attach machined bead ring to pipe, and tack weld at notches as shown in FIGURE 6-A.



6-A

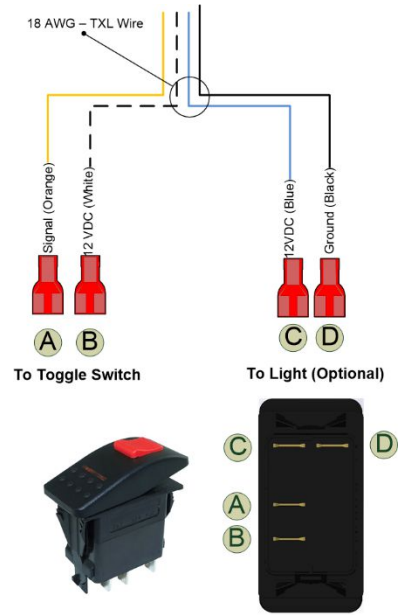
# Wiring Schematic



NOTE: SPEED SIGNAL FUNCTIONALITY IS DEPENDENT ON ORDERING CORRECT HARNESS & CONTROLLER. CONTACT A PACBRAKE REPRESENTATIVE FOR MORE INFORMATION.

### 6.2 Lighted Rocker Switch

An optional illuminated rocker switch is available that fits in into OEM panel openings for vehicle integrators. In this case no drilling is required, but removing a cosmetic cover may be necessary. Refer to FIGURE 6-B for the wiring connection. Your switch may not have a light.



6-B

## 7 Additional Features (Optional)

### 7.1 Auxiliary Input Signal

In addition to provided toggle switch, signal from external device can also be used to close valve. Signal specifications:

- Valve will close and remain closed while 6 VDC to 36 VDC is applied
- Valve will open and remain open while less than 6 VDC is applied

To close valve via auxiliary input signal, splice external device into grey wire (Pin 11 on Connector A) and supply specified voltage.

Examples of Auxiliary Input Devices:

- Secondary Toggle Switch
- Overspeed Signal from 3<sup>rd</sup> Party Engine Controller
- Output Signal from adjacent Shut-Off Valve Controller

### 7.2 Auxiliary Output Signal

Output Signal for powering external devices becomes active when valve is closed. Output signal specifications:

- Voltage: 12 VDC
- Max Output Current: 330 mA

To power external device via auxiliary output signal, splice external device into Brown wire (Pin 4 on Connector A) and close valve.



Examples of Auxiliary Output applications:

- Illuminate additional indicator light
- Activate external relay
- Synchronize activation of adjacent Shut-Off Valves


**Note:** Auxiliary Output Signal will NOT become active if valve is activated via an Auxiliary Input Signal

### 7.3 Synchronizing PowerHalt Shut-Off Valves

Follow steps below to synchronize valve activation.

-  Connections must be accessible to allow for disconnecting during programming of automatic shut-down function.
-  Synchronizing with competitor shut-off valves may require custom designed circuit using Auxiliary Input and Auxiliary Output Signals.

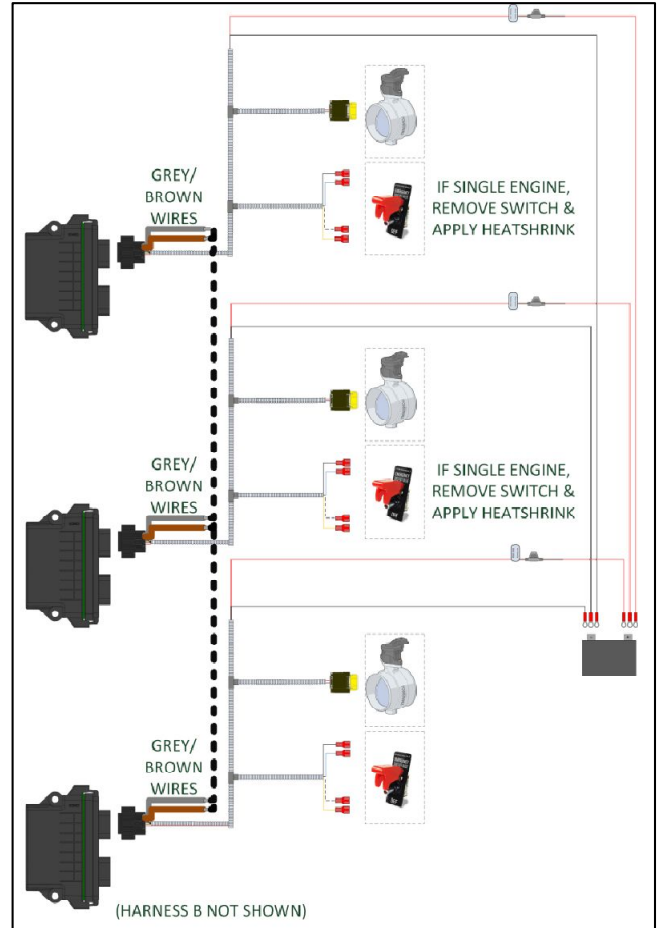
#### 7.3.1 Common Battery Ground for System

 All PowerHalt valves must be connected to common battery ground – single battery bank for all devices OR separate batteries with connected ground terminal. If ground is not common, valves may fail to synchronize or activate unexpectedly.

1. Install valves as per wiring schematic.


NOTE: If application involves a single engine with multiple intakes, only one toggle switch is necessary for activating all valves. If disconnecting toggle switches, protect exposed harness terminations with heat shrink.

2. Splice Brown Wires (Pin 4 on Connector A) and Grey Wires (Pin 11 on Connector A) from all valves together as shown in FIGURE 7-A.
3. Prior to running engines, test systems by independently activating each toggle switch and ensuring that each toggle switch closes all valves.




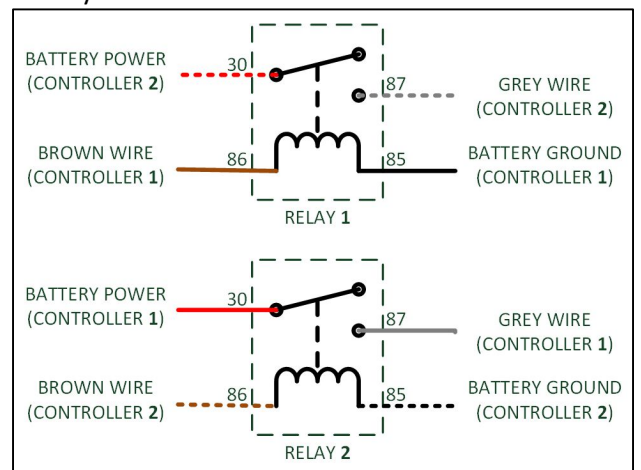
7-A

#### 7.3.2 Different Battery Grounds

 If systems are connected to different battery grounds, relays must be used to create isolation barrier between systems and ensure safe functionality.

1. Install valves as per wiring schematic.
2. Follow FIGURE 7-B to integrate relays:
  - Splice Brown Wire (Pin 4 on Connector A) from each controller into Pin 86 on separate relays.
  - Splice Pin 85 from each relay to each controller's corresponding battery ground.
  - Splice Grey Wire (Pin 11 on Connector A) from each controller into Pin 87 on opposite relays.
  - Splice Pin 30 from each relay to each controller's corresponding battery power.
3. Prior to running engines, test systems by independently activating each toggle switch and ensuring that each toggle switch closes all valves.

 Current output limit for Auxiliary Output Signal (brown wire) must be respected when connecting relays.



7-B

## 8 System Operation

- The PH3 Air Intake Emergency Shut-Off Valve is an automatically resetting Normally Open valve.
- Activating the toggle switch closes the valve and shuts down the engine.
- Auto Reset Mode: Valve will remain closed for a minimum of 15 seconds and then automatically reset itself to open position. If switch is held closed, valve will remain closed until switch is released.
- Manual Reset Mode: Valve will remain closed for a minimum of 15 seconds. Valve will only reset itself to open position once operator activates toggle switch again.
- Valve is able to remain completely closed for a maximum time of 18 minutes after which point it will begin to de-rate in order to protect itself.

Refer to Programming Manual (L6493) for more details on system operation and Reset Mode selection.

## 9 Post Installation

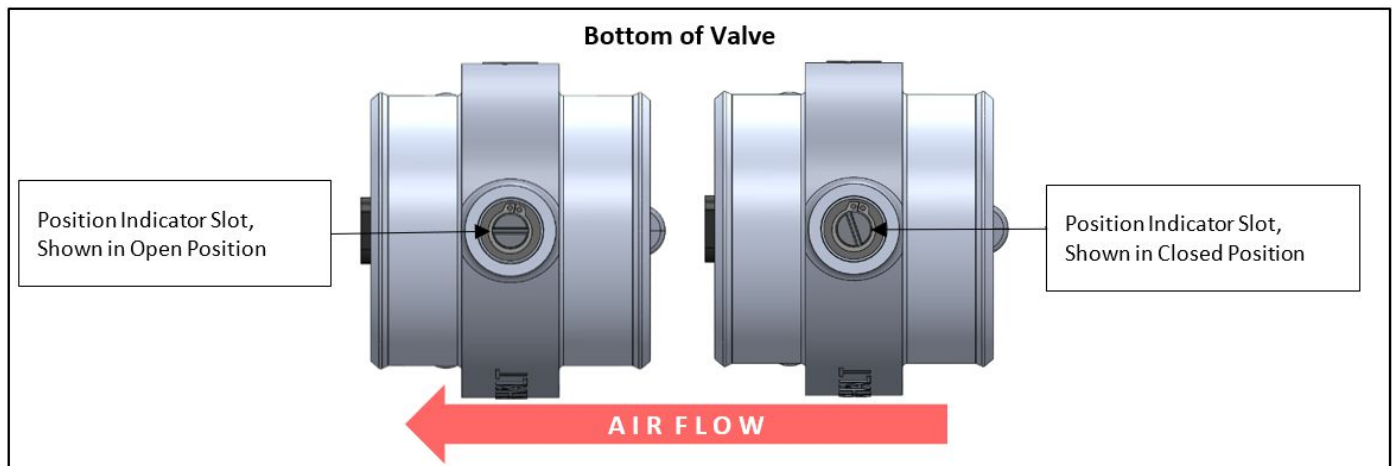
Once installation is complete, ensure all steps, schematics, and requirements have been followed before testing your system:

1. Activate and release toggle switch while engine is running.
2. Confirm engine shuts down and the valve is closed.
  - Check all intake plumbing for leaks if engine does not shut down
3. Confirm valve resets itself 15 seconds after closing in Auto Reset Mode or upon toggle switch activation in Manual Reset Mode.

Refer to Programming Manual (L6493) for procedure on programming and testing automatic shutoff function.


Valve operation can also be verified with the engine off by observing the position indicator slot on the bottom of the valve. When the valve is open, the slot will be parallel to the direction of air flow. When the valve is closed, the indicator slot will be perpendicular to the direction of air flow.

**Note:** The position indicator does not rotate a complete 90 degrees in the closed position.



## 10 Maintenance

To ensure a trouble-free long life of your PowerHalt Shut-Off Valve, a scheduled monthly maintenance procedure is mandatory:

-  As this is a safety device, activation testing must be employed at a minimum of once per month to ensure system remains functional and valve is free moving. Daily activations are recommended to ensure proper function of the system.
- Inspect all fasteners, clamps, and support brackets for tightness and required torque
- Inspect all wiring / cable runs for corrosion, vibration wear, and loose connections
- Inspect all hoses for cracks, damage, and leaks
- Inspect controller for damage, dirt, and poor connections



### *CUSTOMER SERVICE HOURS*

MONDAY TO FRIDAY FROM 6:00 AM TO 4:30 PM PST

### *BUSINESS HOURS OF OPERATION*

MONDAY TO FRIDAY FROM 7:30 AM TO 4:00 PM PST

### *CORPORATE HEADQUARTERS / R&D CENTER*

26688 56TH AVENUE  
LANGLEY, BRITISH COLUMBIA

Patents pending. Pacbrake is a registered trademark of Pacbrake Company. Other trademarks used herein are property of their respective holders.



ISO 9001  
QMI-SAI Global