

# REVGUARD 2

## Automatic Overspeed Detection Shutdown System

Instructions for the Installation,  
Programming, and Testing of REVGUARD 2



### GENERAL INFORMATION

The following instructions are designed to assist in the installation, operation and maintenance of Revguard 2. Product users and maintenance personnel should thoroughly review this manual prior to working on the Revguard 2. To avoid possible injury to personnel or damage to equipment, all instructions, including the WARNING AND CAUTION notes must be strictly followed and adhered to. Modifying this product, substituting for non-factory parts, or using maintenance procedures other than outlined in the manual may affect performance, be hazardous to personnel and equipment, and may void any applicable warranties.

### SAFETY

Service, repair, and overhaul of equipment should be carried out by qualified personnel only. Do not conduct servicing, overhauls, or repairs until all requirements in the instructions have been read and understood. Read the entirety of each step before carrying it out. Certain operations may be hazardous and could cause injury to personnel or damage to equipment if the instructions are not carried out exactly as described. Self-protection is the fundamental responsibility of the operator. Appropriate safety gear includes, but is not limited to safety footwear, safety glasses, and safety gloves. Users should observe all approved safety procedures instituted at the facility or site where this product is manipulated and/or inspected.



Incorrectly wired units can cause serious injury to personnel from electrical shock, and damage to equipment. Electrical connections must only be installed by qualified and/or licensed personnel. Keep clear of valve path to prevent injury as a heavy compression spring is used to close the valve. **Ensure valve is in CLOSED position prior to installation** to prevent injury to personnel.

### WARNING

A Warning indicates a hazardous situation that, if not avoided, could result in death or serious injury to personnel. The text of the warning describes the hazard and details of the precautions that must be applied before the step of the procedure is carried out.

### CAUTION

A Caution indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. The text of the caution describes the hazard and details of the precautions that must be applied before the step of the procedure is carried out.

### NOTICE

A Notice contains supplementary information that may be useful to the operator and may appear before or after a particular step in the procedure.

### WARNING

Perform programming and testing in a well-ventilated area. Failure to be in a well-ventilated area could lead to carbon monoxide poisoning.

### NOTICE

It is recommended that only genuine Revguard 2 activation kits are utilized to ensure proper Revguard 2 function.

### PRODUCT SUPPORT

All necessary settings and alterations to the Revguard 2 are described in this manual. Please contact factory for assistance if any difficulties arise during installation, operation, testing, maintenance, or troubleshooting. Failure to follow all the instructions described in the manual or any unauthorized modification of Revguard 2 products may result in serious personal injury or product damage and will void any applicable warranty on the Revguard 2 product.

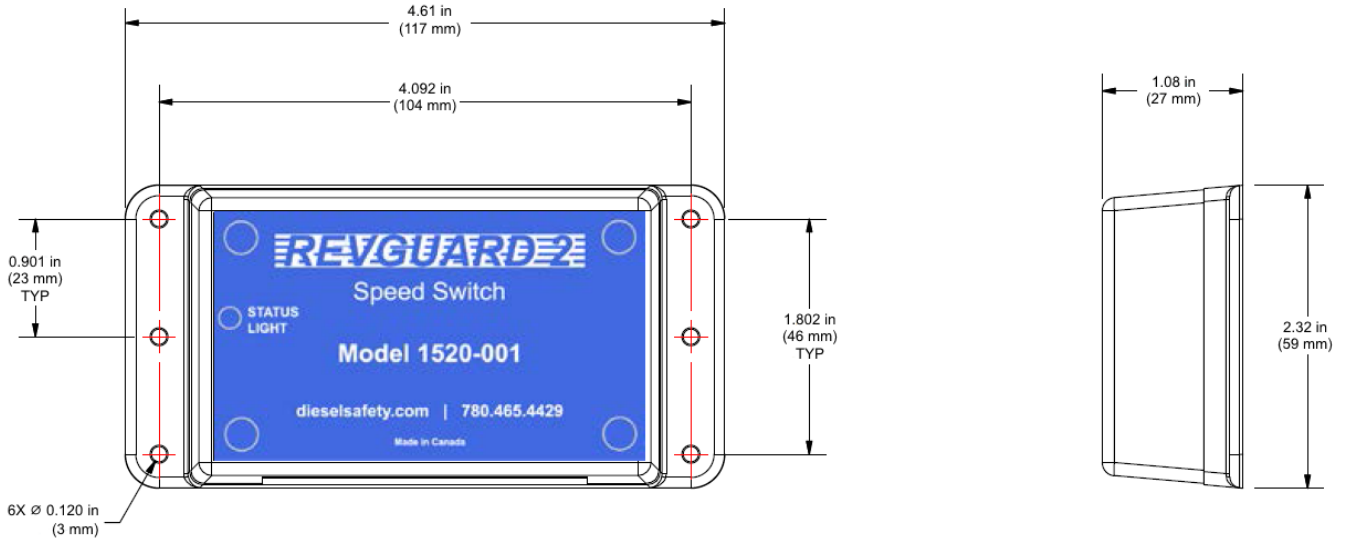
**For technical assistance, call +1 780-465-4429.**

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## A. PRODUCT DESCRIPTION

Revguard 2 is a surface mounted speed switch. Overall dimensions are given below.



<b>Input Power:</b>	Supply Voltage	Standard 12 or 24 VDC with reverse polarity protection (10.8 – 26.2 VDC)
<b>Input Signal:</b>	Frequency Range Input Amplitude Input Signal Type Setpoint Repeatability	10 Hz – 10,000 Hz 1VAC – 20VAC Sine wave or square wave (from alternator/mag. pick-up) Less than 1% Deviation
<b>Output Signal:</b>	Contact Relay	4A max (trip indicated by red LED)
<b>Operating Temperature Range:</b>		-40° C to 85° C (-22° F to 167° F)
<b>Certification:</b>	Ingress Protection	IP54

## B. SYSTEM DESCRIPTION

The Revguard 2 Speed Switch is designed to monitor engine RPM and immediately shutdown the engine in the event of an overspeed condition. The module monitors engine RPM using a frequency based signal typically from a flywheel sensing magnetic pickup device, or a signal from the engine alternator. When the engine speed exceeds the programmed trip point, Revguard 2 will immediately activate an output signal that can be used to trigger an Air Intake Shutoff Valve system or other related hardware.

Revguard 2 activation kits include a momentary toggle switch (for remote interface/function) and a LED indicator light (for remote system feedback).

Refer to the Programming section of this manual for instructions detailing the set-up process of RPM presets. No calculations or knowledge with respect to drive ratio of the alternator is required during Revguard 2 configuration/teaching.

This system can be connected to several styles of shutdown systems. Connection diagrams for several popular shutdown systems are shown in this document below. Contact the factory if the shutdown system you want to interface with is not shown.

The system is powered using a standard 12V/24V battery.

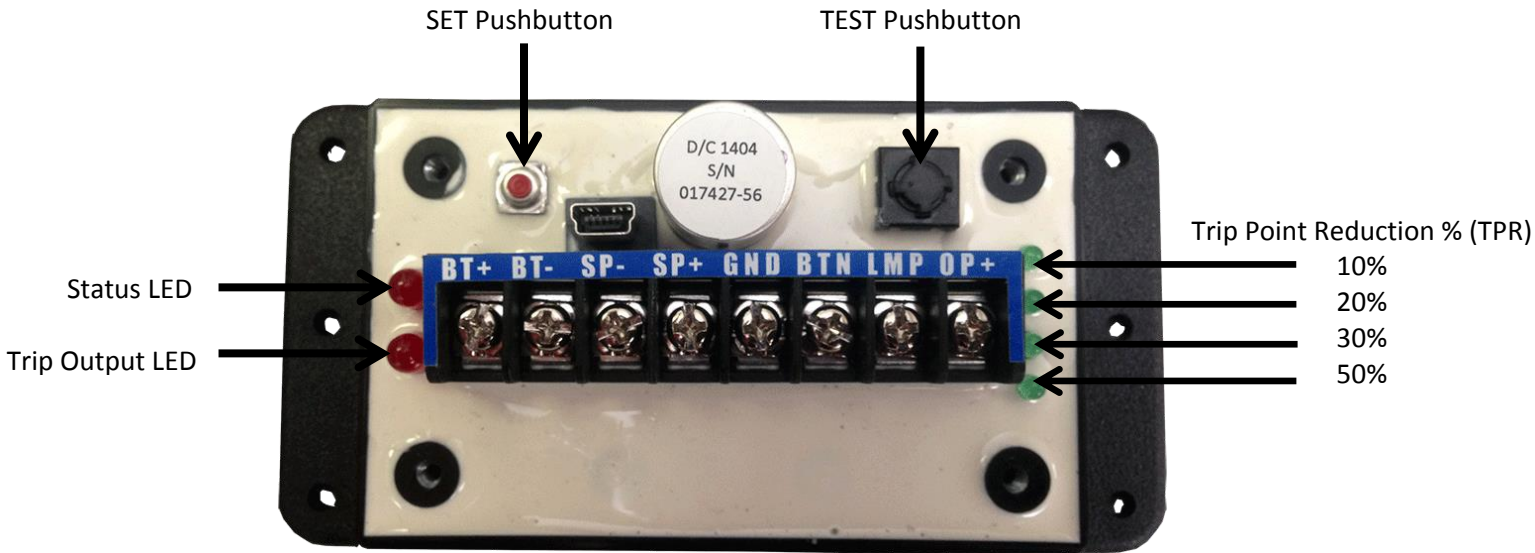
## C. CONNECTION / WIRING

### Revguard 2 Speed Switch Module

Remove the four (4) fasteners and lift the blue cover (see Figure 1) to reveal the Revguard 2 module shown in Figure 2.



**Figure 1:** The Revguard 2 module lies underneath the blue cover.



**Figure 2:** Buttons and LEDs on the Revguard 2 Speed Switch Module

Before using this product, the installer must obtain the proper power supply for the system. The system will function with any standard 12V or 24V battery system. The power should be continuous and not switched/keyed off when the engine is turned off. Additionally, a safe mounting site for the module should be determined before making any connections.

For safe operation, ensure that ambient temperature at the mounting site is between -40° C and 85° C (-22° F to 167° F) and that the unit will not be subject to immersion or excessive splash/spray (IP54). Typical installation locations include under dash or inside a protective enclosure.

#### Terminal Strip

The terminal strip is comprised of 8 terminals. Revguard 2 comes with crimp-on for terminals to allow for easy wire connection to the terminal strip.

**BT+/BT- Terminals** – the purpose of these terminals are to provide power to the Revguard 2 module. Revguard 2 will function with any standard 12 or 24 V system. However, wiring from Revguard 2 should not be directly connected to the battery and must be interfaced with the appropriate circuit breaker (see the appropriate connection diagram for your shutdown system).

**SP+ / SP- Terminals** – the purpose of these terminals are to provide the input signal to the Revguard 2 module. The incoming signal may originate from an alternator or a magnetic pick-up device rated at 10Hz – 10,000Hz with an amplitude of at least 1V but no more than 20V. In noisy environments, the operator may opt to shield and/or twist the positive and ground wiring to ensure that EMI is mitigated from surrounding non-Revguard 2 components. In this case the wire shield should be connected to the GND terminal on Revguard 2.

Note: With some alternator connections only the SP+ terminal needs to be connected as long as the alternator and Revguard2 share a common ground.

**GND Terminal** – the purpose of this terminal is to provide an electrical return path for the momentary remote switch and the remote LED.

**BTN Terminal** – The purpose of this terminal is to provide connection for a remote switch. The remote switch must be momentary normally-open style. When connected, the momentary switch and the TEST pushbutton will have the same function and can be used interchangeably.

**LMP Terminal** - The purpose of this terminal is to provide connection for a remote LED light. The wire from the LMP terminal should connect directly to the positive terminal of the remote LED. When connected, the remote LED light will function in the same way as the Status LED. This terminal can source a maximum of 200mA.

**OP+ Terminal** – the purpose of this terminal is to provide the trigger signal to the shutdown system. This terminal has a maximum output capability of 4 Amps.

#### Revguard 2 Activation Kit

To ensure proper function it is recommended that only Revguard 2 activation kits (AK2) are utilized with Revguard 2. Several activation kits are available for properly interfacing Revguard 2 to various shutdown system types. See Table 1 below to select proper kit for your shutdown system.

Activation Kit	Activation Method	Battery	Cover Style for Remote Switch	External Relay
AK2-E1-RM*	Electric	12V	Military	Yes
AK2-E1-RT	Electric	12V	Thumbguard	
AK2-E2-RM*	Electric	24V	Military	
AK2-E2-RT	Electric	24V	Thumbguard	No
AK2-E1-XM*	Electric	12V	Military	
AK2-E1-XT	Electric	12V	Thumbguard	
AK2-E2-XM*	Electric	24V	Military	
AK2-P1-T	Pneumatic	12V	Thumbguard	
AK2-P2-SM	Pneumatic	24V	Military	No
AK2-P1-M	Pneumatic	12V	Military	

**Table 1:** Revguard 2 Activation Kit Configurations

\*Chalwyn name branded kits available by adding -CH to kit number (e.g. AK2-E1-XM-CH)

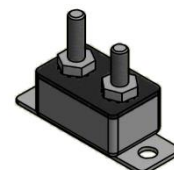
#### Major Kit Components

##### Circuit Breaker (12V/24V at 30A)

Revguard 2 and the shutdown system are to be directly powered from a 12 or 24 VDC battery. The circuit breaker is necessary to prevent excessive damage/fire in the event of a short or internal hardware failure. The circuit breaker is sized to provide the necessary current to activate the shutdown system. If an alternate fusing arrangement is desired, contact the factory to determine the circuit protection will work correctly.

It is imperative that wiring from Revguard 2 and/or the relay are not connected directly to the battery (circumventing the circuit breaker).

Revguard 2 and the shutdown system should not be connected to a keyed-on power source. If the user attempts to key-off during a runaway situation, both Revguard 2 and the shutdown system will be unpowered and will not function.



**Figure 3:** Circuit Breaker

### Major Kit Components - continued

#### External Relay (12V/24V at 80A)

As the output of Revguard 2 is limited, some shutdown systems will require an external relay. Shutdown kits are available for all valve styles with the appropriately sized relay. The connection diagrams indicate when an external relay is required. The provided relays are sized to correctly handle the large inductive loads that occur in some shutdown valves. Contact the factory if you desire to utilize an alternate relay style.

Kits requiring a relay come complete with the appropriate spade terminals and connection block for the relay.

**Note:** The shutdown system will not function if an external relay is not utilized as documented in the circuit diagrams below.



Figure 4: Relay

#### Remote Momentary Switch

Revguard 2 has a provision for a remote momentary switch interface. The remote switch simulates the function of the TEST pushbutton on Revguard 2. This permits the user to remotely interface with Revguard 2. The remote momentary switch is especially important in situations where the user opts to install the module in hard-to-reach areas due to operational considerations.

The remote switch must be a momentary normally - open switch style. Other switch styles will not function correctly with Revguard 2.

The momentary switch is included in all Revguard 2 activation kits. The switch may be equipped with a safety thumb guard or a military style cover that protects from accidental discharge (depending on the kit ordered).



Figure 5: Remote Momentary Switch (center);  
Thumbguard (left); Military Cover (right)

#### Remote Status LED (12V/24V)

Revguard 2 has a provision for a remote output lamp which allows the user to remotely monitor the Revguard 2 Status LED. The remote Status LED is especially important in situations where user opts to install the module in a location where the on-board Status LED light is obstructed from line-of-sight view.

The remote Status LED has the exact same functionality as Revguard 2's Status LED, and thus the interpretations provided above for LED behaviour also apply to this component.

All Revguard 2 activation kits include the remote LED. Kits also include push-on terminals for the LED spade terminals.

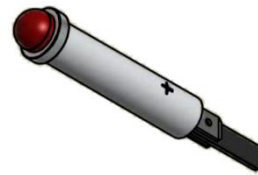


Figure 6: Remote Status LED

#### Pneumatic Solenoid (12V/24V)

Air-actuated valves require a pneumatic solenoid for system shutdown activation. The pneumatic solenoid is electrically controlled and must remain normally-closed during regular operation. During a shutdown attempt, the pneumatic solenoid allows pressurized air to flow through the valve's air line closing the valve shut. Only pneumatic activation kits include the pneumatic solenoid.

The pneumatic solenoid must never be mounted directly on the valve itself. The solenoid should be installed in a location free of excessive heat, vibration and contaminants.



Figure 7: Pneumatic Solenoid



## Connection Diagrams

Using the table below reference the appropriate connection diagram for your shutdown system:

Valve Style	Actuation	Possible Activation Kit(s)	See Figure Below
Amot 4261/4262 Chalwyn SVX Rigsaver	Two wire electric solenoid (12/24VDC)	AK2-E1-RM AK2-E1-RT AK2-E2-RM AK2-E2-RT AK2-E1-RM-CH AK2-E2-RM-CH	Figure 8 - <i>Connection Diagram for Electric, 12V/24V Systems (non-ISE)</i>
Amot 4261/4262 Rigsaver Roda Deaco Swing Gate	Pneumatic With 12/24VDC Pneumatic Solenoid	AK2-P1-T AK2-P1-M AK2-P2-SM	Figure 11 - <i>Connection Diagram for Pneumatic, 12/24V System</i>
Chalwyn SVR2/SVR3/SVR4 Roda Deaco RB2/RB4 Roda Deaco RB3A-XXXX-E2XX Roda Deaco Swing Gate	Three wire electric solenoid (12/24VDC)	AK2-E1-RM AK2-E1-RT AK2-E2-RM AK2-E2-RT AK2-E1-RM-CH AK2-E2-RM-CH	Figure 8 - <i>Connection Diagram for Electric, 12V/24V Systems (non-ISE)</i>
Roda Deaco RB3A-XXXX-E1XX	Three wire electric solenoid 12VDC (internal solenoid relay)	AK2-E1-XM AK2-E1-XT	Figure 9 - <i>Connection Diagram for Electric, 12/24V Systems (ISE)</i>
Chalwyn SVX	Pneumatic, to be interfaced with 24VDC pneumatic solenoid	AK2-E2-XM-CH	Figure 10 - <i>Connection Diagram for Pneumatic, 24V SVA-200 System</i>



## Electric Solenoid, 12/24V System (non-ISE)

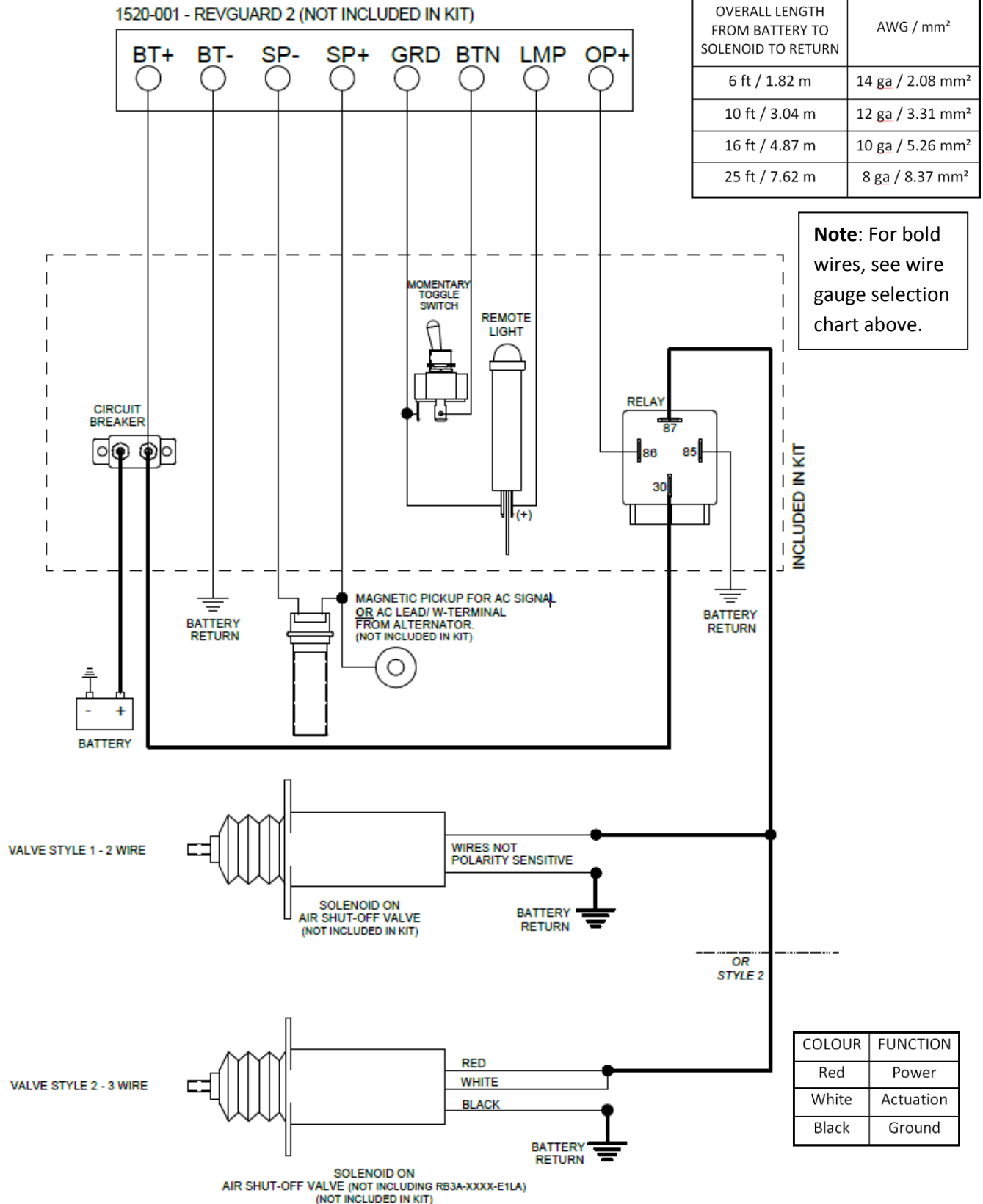


Figure 8: Connection Diagram for Electric, 12V/24V Systems (non-ISE)

## Electric Solenoid, 12V System (ISE)

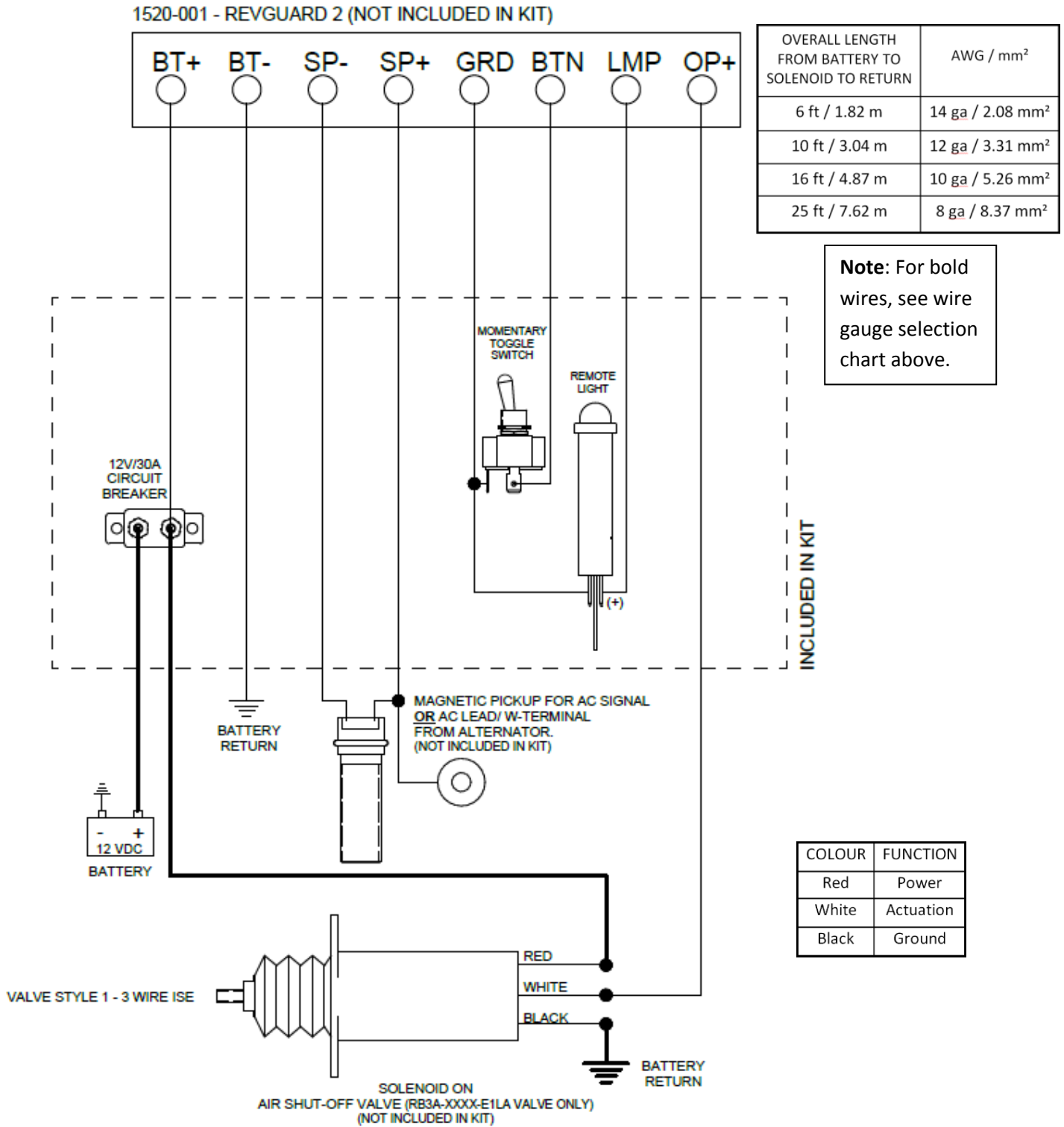
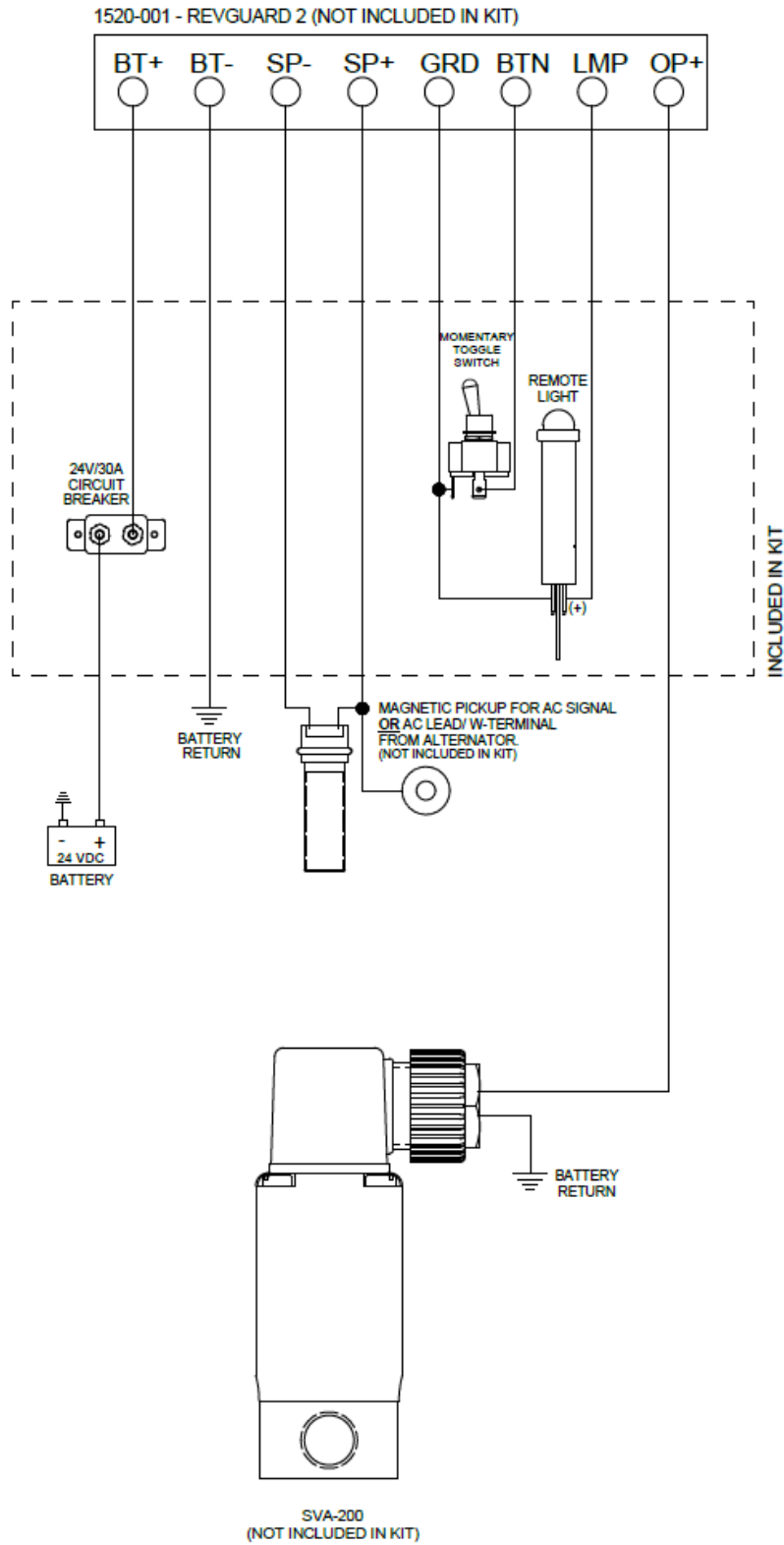


Figure 9: Connection Diagram for Electric, 12V Systems (ISE)

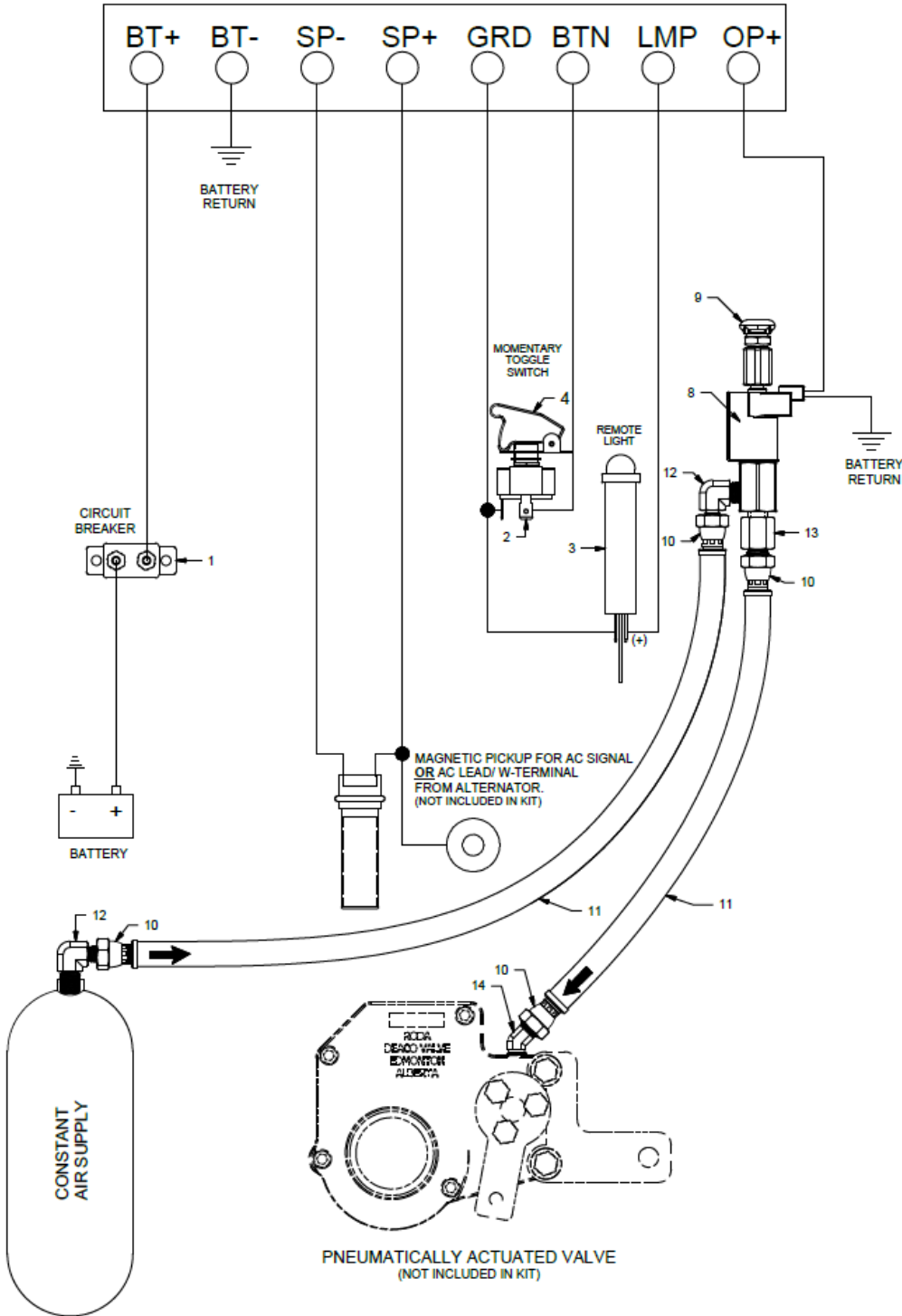
## Pneumatic Solenoid, 24V SVA-200 System



**Figure 10:** Connection Diagram for Pneumatic, 24V SVA-200 System

## Pneumatic Solenoid, 12/24V System

1520-001 - REVGUARD 2 (NOT INCLUDED IN KIT)

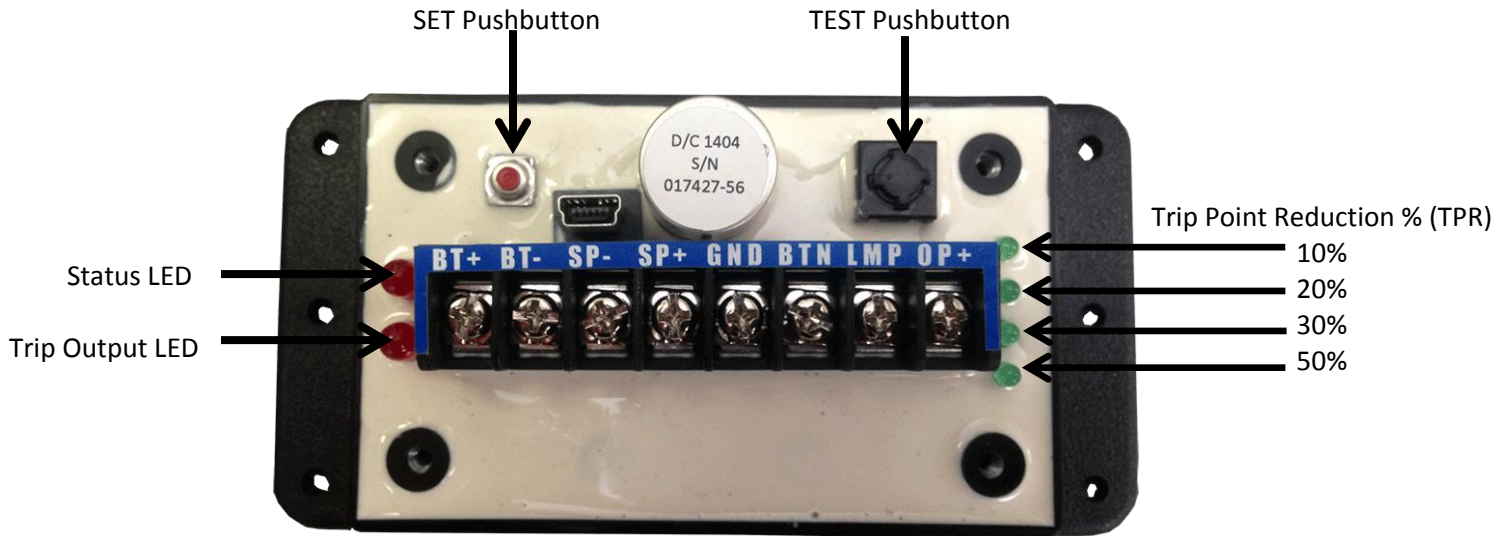


ITEM	DESCRIPTION
1	CIRCUIT BREAKER
2	MOMENTARY TOGGLE SWITCH
3	LED LIGHT-REMOTE STATUS INDICATOR
4	MILITARY STYLE- TOGGLE SWITCH COVER
5	TOGGLE SWITCH DECAL- RODA DEACO
6	CONNECTOR, F-CRIMP, FOR SWITCH
7	CONNECTOR, F-CRIMP, FOR INDICATOR LIGHT
8	SOLENOID, ELECTRIC/ AIR
9	AIR VENT, BREATHER
10	BRASS HOSEBARB PUSH LOCK, 1/4" HOSE
11	1/4" PUSH-ON HOSE, 250 PSI
12	BRASS FLARED 90° ELBOW, 1/4" TO 1/4" MPT
13	BRASS 1/4" FLARED CONN. TO 1/8" FPT
14	BRASS FLARED ELBOW, 45°, 1/4" TO 1/8" MPT
15	BRASS TEE, FEMALE THD, 1/8 X1/8 X 1/8 EXTRA HARDWARE FOR SUPPLY LINE CONNECTION
16	BRASS HEX NIPPLE, 1/8" EXTRA HARDWARE FOR SUPPLY LINE CONNECTION
17	BRASS 1/4" FLARED CONN. TO MPT EXTRA HARDWARE FOR SUPPLY LINE CONNECTION
18	CABLE TIES, 8" UV BLACK, 75 LBS EXTRA HARDWARE FOR SUPPLY LINE CONNECTION

**Figure 11:** Connection Diagram for Pneumatic, 12/24V System

## D. PROGRAMMING AND OPERATION

Revguard 2 has four modes of operation including: configuration/teach mode, run mode, test mode, and error mode. The lights on the unit will indicate to the user the current mode of operation.



**Figure 12:** Buttons and LEDs on the Revguard 2 Speed Switch Module

Operation Mode	Status LED	Trip Point Reduction LEDs	See Page
Configuration/Teach	Rapid flash	One of the green LEDs will be illuminated	14
Run	Off	All green LEDs off	15
Test	Rapid flash (only while pressing and holding test pushbutton for greater than 5 seconds)	One of the green LEDs will be illuminated	16
Fault (Error)	Slow Flash	All green LEDs off	16

### 1. Configuration/Teach Mode:

Used to program the RPM limitation. The engine should be “off” at the start of this process. If Revguard 2 has not been previously configured, the operator should enter configuration/teach mode upon apply power to the unit. The user may enter the configuration/teach mode by pressing and holding the Set pushbutton for longer than 5 seconds while the module is in Run Mode.

When Revguard 2 is in Configuration/Teach Mode, the Status LED, and one of the four green LEDs on the right hand side will be solid on.

Revguard 2 allows the user to program the engine shutdown threshold at an engine speed lower than the actual shutdown threshold in order to avoid over-revving and damaging the engine during the teach process. A “trip point reduction percentage” (TPR) is utilized for this purpose.

### Teach Engine Speed = Desired Engine Shutdown Speed x (1 - TPR)

Revguard 2 is capable of 4 TPRs:

Trip Point Reduction Percentage (TPR)	Typical Application
10%	Fixed Speed Engine
20%	Fixed Speed Engine
30%	Fixed Speed Engine
50%	Variable Speed Engine

Example: User wants the shutdown system to trigger at 4000 RPM with a variable speed engine. A TPR of 50% is selected allowing the user to teach the system at 2000RPM.

Once in configuration/test mode, one can cycle through the four available TPRs as indicated by the green LED’s on the right hand side of the module by pressing the red SET pushbutton.

Each time the SET pushbutton is pressed and released, Revguard 2 will cycle to the next TPR.

Once the desired TPR has been selected, start the engine and raise the engine speed to the teach speed and hold steady. Press and release the TEST pushbutton to register the teach speed to Revguard2. At this point, all lights will extinguish and the unit will enter Run mode.

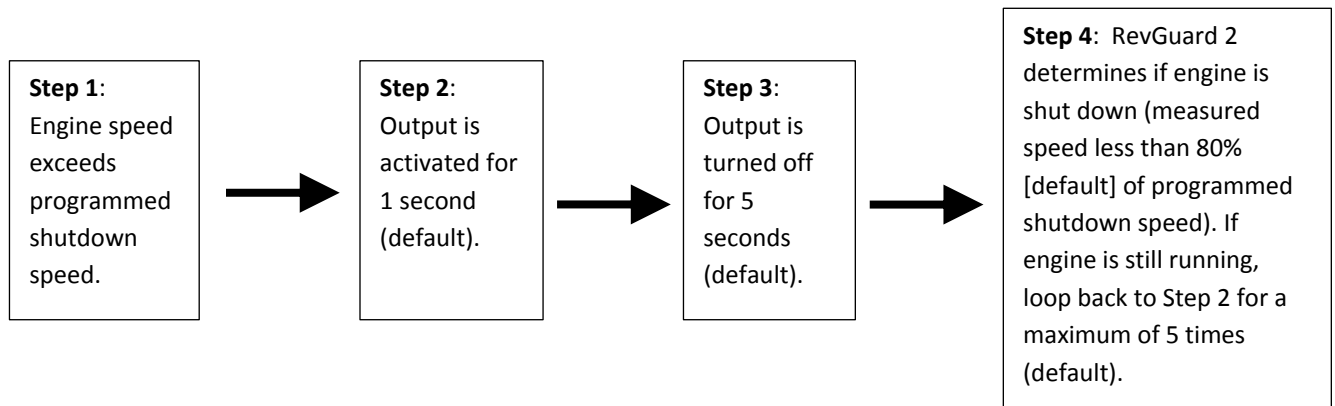
If one wishes to exit configuration mode with a previously configured module (i.e. operator reneges on decision to change the TPR setting from a previous one), the red SET pushbutton is pressed and held until all lights extinguish. This indicates the module has returned to Run Mode.

### 2. Run Mode:

This is Revguard 2's normal operating state. Run mode is automatically accessed after start-up. During run mode, all LEDs remain off. No user input is required.

Revguard 2 continuously compares the actual engine RPM to the previously programmed shutdown threshold during this state. If engine RPM speed surpasses the programmed RPM limit, the unit immediately activates an output signal to trigger the shutdown system. When the output is activated the Trip Output LED is illuminated. If Revguard 2 does not detect that the engine has shutdown it will continue to pulse the output to achieve an engine shutdown.

### Engine Shutdown Sequence



The Status LED remains solid-on and both pushbuttons remain inactive during the entirety of this sequence. When the engine has shut down, the Status LED remains on for 15 seconds (default) and then returns to the normal Run mode.

If the engine shutdown sequence does not result in successfully shutting down the engine, Revguard 2 will enter Fault (Error) Mode.

### Test State -

Revguard 2 can also be used to test the shutdown system or manually trigger a shutdown. There are two approaches that can be used for testing/manually triggering:

Trigger Regardless of Engine Speed – Simply pressing and immediately releasing the Test Button will trigger the shutdown system regardless of engine speed or whether engine is on/off. Revguard 2 will enter the shutdown sequence as described in the run mode section above.

Trigger with Engine Speed - Because it is not desirable to reach such high RPM levels (red-line) to verify the functionality of the system, the operator can test the system at the trip point reduction (TPR) engine speed (as described in the teach mode section above). If the user presses and holds the Test Button for five seconds the status LED will illuminate and the appropriate TRP LED will illuminate. While continuing to hold the test button slowly increase the engine speed. At the TPR engine speed (Teach Speed) Revguard 2 will enter the shutdown sequence as described in the run mode section above.

If either test does not result in an appropriate shutdown, see the troubleshooting section below.

### 3. Fault (Error) Mode:

#### **WARNING**

If RevGuard 2 enters the fault mode it means that the shutdown system has failed. In the event of an actual over-speed situation, all personnel should immediately move to a safe distance from the engine/vehicle. Failure to do so could lead to serious bodily injury or even death.

Fault Mode is entered only when Revguard 2 reaches the programmed number of output attempts and the engine has not been shut down.

Once fault mode is activated, the Trip Output LED will be turned off and the Status LED will begin flashing on and off. Revguard 2 will continue to remain in this state until the condition is acknowledged by the user and the TEST pushbutton is pressed and held for longer than 5 seconds to clear the fault and return the unit to run mode. All other buttons remain inactive during this time.



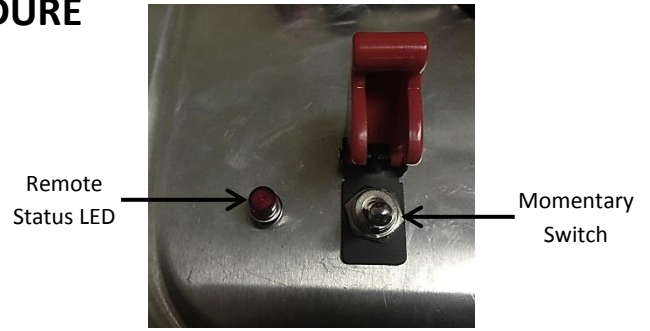
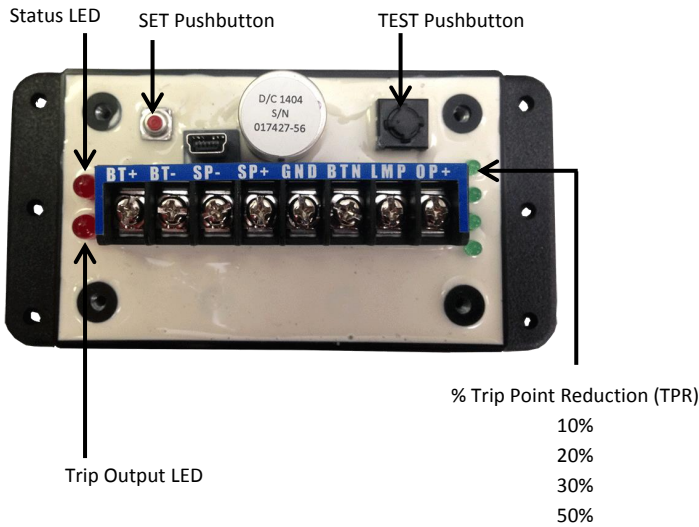
## LED Indicators

<b>Status LED</b> (on Revguard 2 module or remote)	
<b>Behaviour</b>	<b>Indication</b>
Slowly flashing on/off after the "SET Pushbutton" is pressed for 5 seconds.	Unit is in configuration mode and is ready to be programmed. See Step 2 through Step 5 of the applicable RPM programming procedure found on page 18 of this document.
Rapidly flashing on/off after the "TEST Pushbutton" has been held for 5 seconds.	Unit is in test mode and ready for testing. See the testing procedure found on page 19 of this document.
Slowly flashing on/off after module power-up.  OR  Slowly flashing on/off without pressing the "SET" or "TEST" Pushbuttons.	Revguard 2/ shutdown system has faulted.  See page 16 for more details.
Solid on for 10 - 15 seconds.	The valve has been tripped and Revguard 2 detected a successful shutdown.
Solid Off	Revguard 2 is in normal operation.

<b>% Trip Point Reduction LED</b>	
<b>Behaviour</b>	<b>Indication</b>
10% LED (topmost LED) – Solid On	When activated (i.e. "SET Pushbutton is pressed), the Engine Shutdown Speed will be set to the Teach Engine Speed divided by a factor of 0.90.
20% LED (second LED from the top) – Solid On	When activated (i.e. "SET Pushbutton is pressed), the Engine Shutdown Speed will be set to the Teach Engine Speed divided by a factor of 0.80.
30% LED (third LED from the top) – Solid On	When activated (i.e. "SET Pushbutton is pressed), the Engine Shutdown Speed will be set to the Teach Engine Speed divided by a factor of 0.70.
50% LED (bottommost LED) – Solid On	When activated (i.e. "SET Pushbutton is pressed), the Engine Shutdown Speed will be set to the Teach Engine Speed divided by a factor of 0.50.

<b>Trip Output LED</b>	
<b>Behaviour</b>	<b>Indication</b>
Flashing on/off	Revguard 2 is attempting to stop the engine: When the light is on, the output trigger signal is activated.
Solid Off	Revguard 2 is not attempting to trigger a system shutdown.

## E. STEP-BY-STEP PROGRAMMING PROCEDURE



### Constant RPM Engines (Compressor Generators)

Refer to the above illustrations on this page. With an appropriately powered module:

1. Press and hold the SET pushbutton until the Status LED flashes on and off.
2. Determine which % Trip Point Reduction (TPR) LED is lit:
  - a. If 10%, 20%, or 30% TPR LED is lit, proceed to Step 3.
  - b. If 50% TPR LED is lit, press and release the SET Pushbutton to toggle through each TPR LED until the 10%, 20%, or 30% TPR LED is illuminated. TPR election is the preference of the installer and depends on the circumstances of the engine. Contact technical support if not sure. Note elected TPR for use in Step 3.
3. Use the table below to locate the elected TPR (chosen in Step 2), then, take note of the factor on the same row to the right.

% TPR Election	Factor
10%	0.90
20%	0.80
30%	0.70

Determine the Desired Engine Shutdown Speed and multiply this value by the noted factor. This is the "Teach Engine Speed" value. Record this value below.  
Teach Engine Speed: \_\_\_\_\_

4. Rev and hold engine at the Teach Engine Speed recorded in Step 3.
5. While engine RPM is held at the Teach Engine Speed, push and release the TEST pushbutton once to program the RPM threshold (or alternatively, press and release the remote momentary switch). All LED's on the module should now turn off.

You have finished programming Revguard 2 to trip at the Desired Engine RPM Shutdown Speed. The module is ready for normal operation.

### Mobile Equipment with Variable RPM Capability

Refer to the above illustrations on this page. With an appropriately powered module:

1. Press and hold the SET Pushbutton until the Status LED flashes on and off.
2. Determine which % Trip Point Reduction (TPR) LED is lit:
  - a. If 50% TPR LED is lit, continue to Step 3.
  - b. If 10%, 20%, or 30% TPR LED is lit, press and release the SET Pushbutton to toggle through each TPR LED until the 50% TPR LED is illuminated.
3. Determine the Desired Engine Shutdown Speed and multiply this value by the Trip Point Reduction value (0.50). This is the "Teach Engine Speed" value. Record this value below.  
Teach Engine Speed: \_\_\_\_\_
4. Rev and hold engine at the Teach Engine Speed recorded in Step 3.
5. While engine RPM is held at the Teach Engine Speed, push and release the TEST pushbutton once to program the RPM threshold (or alternatively, press and release the remote momentary switch). All LED's on the module should now turn off.

You have finished programming Revguard 2 to trip at the Desired Engine Shutdown Speed. The module is ready for normal operation.

## Testing Programmed RPM Threshold (All Cases)

1. Ensure Revguard 2 is configured and working in run mode under normal operation by verifying all LEDs are off. If Revguard 2 is in configuration mode, press and hold the SET Pushbutton to return to run mode. If Revguard 2 is in fault mode, press and hold the TEST Pushbutton/Momentary Switch for at least 5 seconds to return to run mode.
2. Press and hold the TEST Pushbutton/Momentary Switch and do not release. The Status LED will flash on and off and the programmed TPR percentage will be solid-on.
3. While the TEST Pushbutton/Momentary Switch is firmly held, increase engine RPM until the Teach Engine Speed is reached. At this point, the shutdown system will activate. Reduce the engine RPM below the Teach Engine Speed. If the valve fails to trip, see the Troubleshooting Guide.
4. Inspect for "Check Engine" or fault code lights. Use the appropriate scan tool to reset codes generated by this test.
5. Press and hold the TEST Pushbutton for longer than 5 seconds to return the unit to service. All LED's should turn off.

## F. MAINTENANCE

To ensure proper operation of the Revguard 2 Shutdown System, regular attention to the fundamental functionality of the product is required. The following maintenance schedule is recommended to be performed monthly.

- Ensure that all electrical wires are properly supported and free from damage.
- Ensure that all terminals on the module and all terminals to the adjacent components are tight and secure.
- Ensure that there is no electrical corrosion to the terminals.

## G. TROUBLESHOOTING GUIDE

PROBLEM	RECOMMENDED ACTION
Status LED flashing slow and the unit is not reacting to commands from either button.	<p>If status light does not clear, unit is in fault state. Press and hold the TEST Pushbutton for 5 seconds to clear.</p> <p>If issue still present, disconnect power to unit for 30 seconds. Reconnect power and retest.</p> <p>If issue persists, power on unit – press and hold the TEST Pushbutton until run mode is entered. Re-program and retest.</p>
Trip Output LED is illuminated but valve does not close.	<p>Check wiring connections to valve and relay (if equipped).</p> <p>If valve solenoid still does not function despite receiving adequate power and being correctly wired (per the applicable connection diagram), the valve (ASOV) may need to be serviced/repaired.</p> <p>If relay (if equipped) is tripping, check power into and out of relay.           <ol style="list-style-type: none"> <li>i. If there is no input power into relay, check feed circuit.</li> <li>ii. If there is no power from relay but input power is good and relay trips, replace relay.</li> </ol> </p>
Revguard 2 does not respond to any inputs.	<p>Check and verify that Revguard 2 is receiving the appropriate power supply.</p> <p>If Revguard 2 is not powered appropriately, re-check the wiring configuration.</p>
Revguard 2 trips the valve as soon as it is connected without the engine running.	<p>Check the ground wire to the module. Revguard 2 must have a reliable battery return connection. Repair ground as necessary.</p>
“Check Engine” light comes on after valve is tripped.	<p>Clear the code. Re-start the engine and run normally.</p> <p>NOTE: At times, tripping the valve may generate or set a code in the ECM. On many vehicles, it is best to shut down the engine normally, trip the valve, and then try to start the engine normally to show the safety inspector successful air intake shutdown.</p>
During testing, valve does not trip at the Teach Engine RPM.	<p>Refer to the applicable connection diagrams from Section D of this document.</p> <p>Perform a detailed visual inspection for the configuration and integrity of the following items:           <ol style="list-style-type: none"> <li>i. Wiring between the alternator (or magnetic pick-up) and Revguard 2 module.</li> <li>ii. Wiring between valve’s actuation hardware and Revguard 2 module.</li> <li>iii. Wiring to and from the relay (for manually activated systems).</li> </ol> </p> <p>If problems persist, attempt to re-teach the shutdown speed and re-test.</p>

## TROUBLESHOOTING GUIDE (Continued)

PROBLEM	RECOMMENDED ACTION
<p>Revguard 2 will not accept programming. It is in configuration mode but will not accept engine RPM setting.</p>	<p>Verify the following conditions for each component:</p> <ul style="list-style-type: none"> <li>a. Alternator               <ul style="list-style-type: none"> <li>i. Alternator signal must come from "R" stud or one of the stator windings.</li> <li>ii. Alternator signal must be an AC signal from 1 to 20 VAC.</li> <li>iii. Alternator signal must be between 10 to 10,000 hertz.</li> </ul> </li> <li>b. Magnetic Pick-Up               <ul style="list-style-type: none"> <li>i. Magnetic pick-up must be installed 1/2 to 1 turns from bottoming out.</li> <li>ii. Magnetic pick-up must receive a clean and unshared signal. The ECM and Revguard 2 both require their own clean signal.</li> </ul> </li> <li>c. Vehicle ECM Tach Output Signal               <ul style="list-style-type: none"> <li>i. ECM signal output must be a frequency, not a voltage.</li> <li>ii. ECM signal must use independent output signal line with no other connections. Do not share line.</li> </ul> </li> </ul>

## H. WARRANTY

The warranty on new Revguard 2 products is one year from date of shipment. All warranty claims must be approved by customer service prior to returning the product.

This warranty does not cover components supplied by others. Warranty claims on such components will be allowed only as per limits extended by those suppliers.

The Revguard 2 warranty does not cover any product that has been abused, repaired or altered, or put in service for which it was not intended. AMOT Controls Corporation reserves the right to change material and design without prior notice and is not responsible for any inconvenience this may cause.

Because of the many variables and requirements associated with any particular installation AMOT Controls Corporation, Roper Industries, Inc. or any of their affiliated entities assume no responsibility or liability for actual use beyond that covered by this warranty.

Individuals using the Revguard 2 product must analyze all aspects of their application design and exercise their own independent judgment in evaluating product selection and determining product appropriateness for their specific application and system requirements. Responsibility for proper selection, use, and maintenance of any product remains solely with the purchaser and end user.

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