

**INSTALLER: This manual
must remain in the unit
for owner/operator.**



OWNERS MANUAL

Transport Canada

B621 / 622



**Headwind
Solutions**

1.844.304.7277

www.headwindsolutions.ca

**CONGRATULATIONS
ON THE PURCHASE OF YOUR**



What is ShockerEDGE?

ShockerEDGE is a patent pending advanced technology that uses a Molecular Property Spectrometer (MPS) flammable gas sensor in conjunction with our own ShockerEDGE engine control system. The ShockerEDGE controller interprets the data from the MPS sensor, which is mounted in the engine's clean air intake stream and transmits the information to the visual display. The engine control parameters are preset to warn the operator at 2.5% Lower Explosive Limit (LEL) and to turn the engine off at 7.5% LEL. This is accomplished by connecting the ShockerEDGE controller to the engine control system (ECM or fuel shut-off solenoid). When the upper LEL is reached, the ShockerEDGE controller turns off the power to the ECM or fuel control solenoid and stops the supply of fuel to the engine. The engine **cannot** be restarted while hydrocarbons are still present inside the engine's air intake system. This will occur **before** the diesel engine ingests sufficient unburnt hydrocarbons to sustain an engine runaway situation or cause a gasoline engine to backfire and stop ignition hazards on hot surfaces, IE: exhaust manifolds, catalytic convertors, spark generating devices. Shocker EDGE detects airborne hydrocarbons. *It does NOT detect engine component failure.* Shocker EDGE is raising site safety to new levels that have never been obtainable before, by monitoring the atmosphere while the engine is running.

WHY Choose ShockerEDGE

EDGE is the only product on the market that displays real-time gas monitoring, and ensures you are truly protected.

The Display



Referred to as

DISPLAY

and within the display are multiple screens.
Ex: Details, Event Log, Graph, etc.

Information is shown in real-time on the display located in the operator's compartment.

Display features:

- Gas Identification
- LEL Concentration
- LEL Alarm Status – Green, yellow, red
- System State – Monitoring, fault, check events, etc
- Ambient humidity, temperature and pressure
- Event Log – Incidents & testing, graphs
- System Status – 37 system self-diagnostic events
- Details Screen – Set points, time, date, screen brightness, time out, etc

The display will:

- **Chirp at 2.5% LEL warning level**
- **Constant audible buzz at 7.5 LEL shutdown**

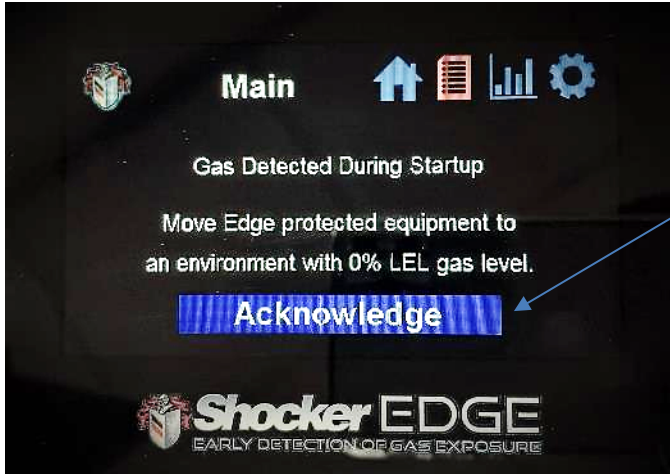
Auxiliary PASS, warning lamps and audible alarms can also be connected to the ShockerEDGE system.

**SYSTEM STARTUP MUST BE DONE IN A CLEAN AIR ENVIROMENT WITH AMBIENT
TEMP BETWEEN -40°c/-40°f TO 75°c/167°f**



Touch icon to clear starting alarm after monitoring is displayed.

IMPORTANT WARNING: System startup time is approximately 2-3 minutes and you are NOT protected until the display system reads **"MONITORING"**.



Tap this icon to confirm you have read this message and return to main screen.

System will not calibrate if hydrocarbons are detected on startup.

Possible causes:

- Engine flooded
- Airborne Hydrocarbons
- Ether in the air intake
- Contaminated air filter(s)
- Contaminated filter housing/piping
- Oiled type air filter used

CALL 1-844-304-7277 FOR MORE ASSISTANCE

Operation of Display

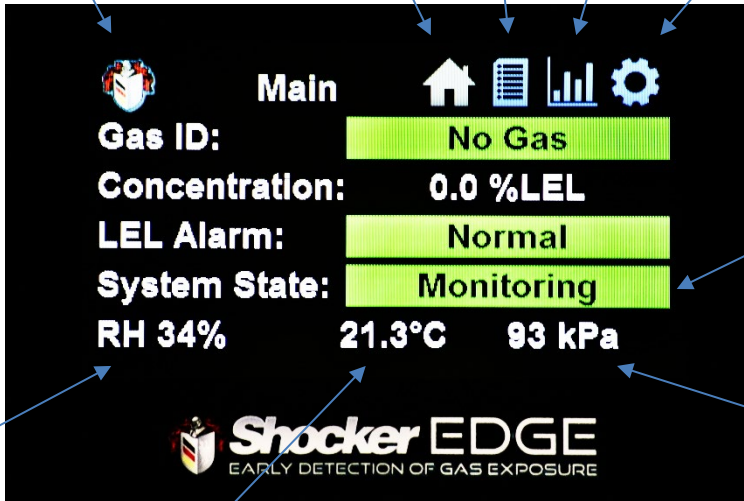
Press & hold for 2 seconds to open SVT Log

Home Page

Event Log (will flash red after an event has occurred). Press this icon to view & clear alarm

Graph

Details & Settings



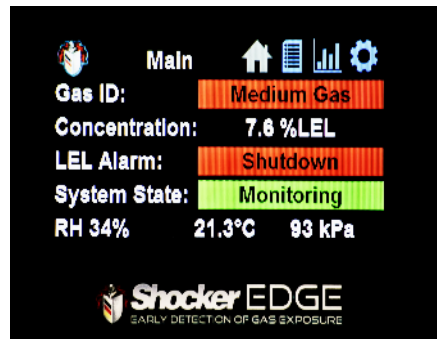
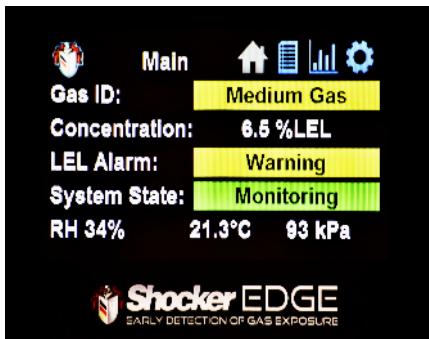
If a "fault event" occurs, it's indication will appear here

Relative Humidity

Atmospheric Pressure

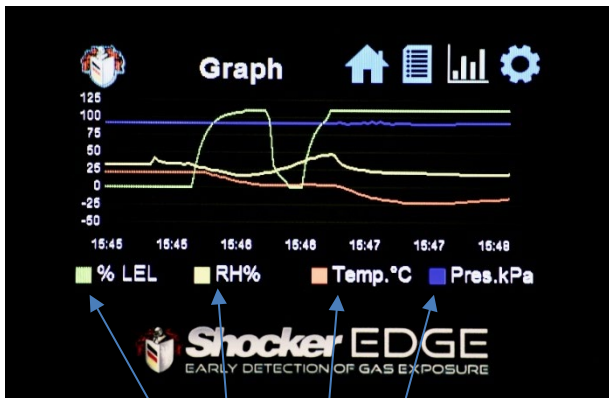
Intake Temperature in Celsius or Fahrenheit

Examples of "Warning" and "Shutdown" Screen





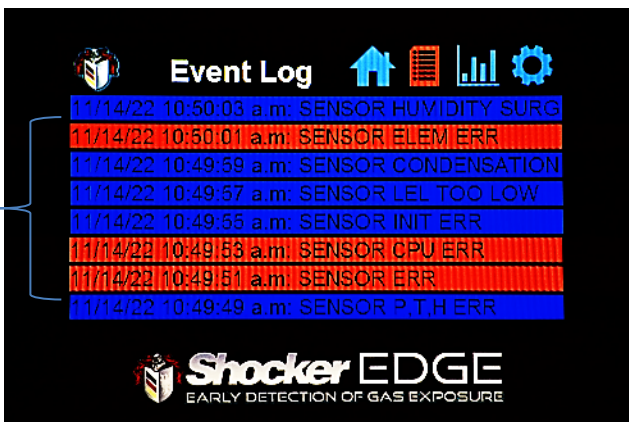
Normal
Warning
Shutdown



Press one of the four icons to remove or add a data line

Example of "Fault Event" Screen

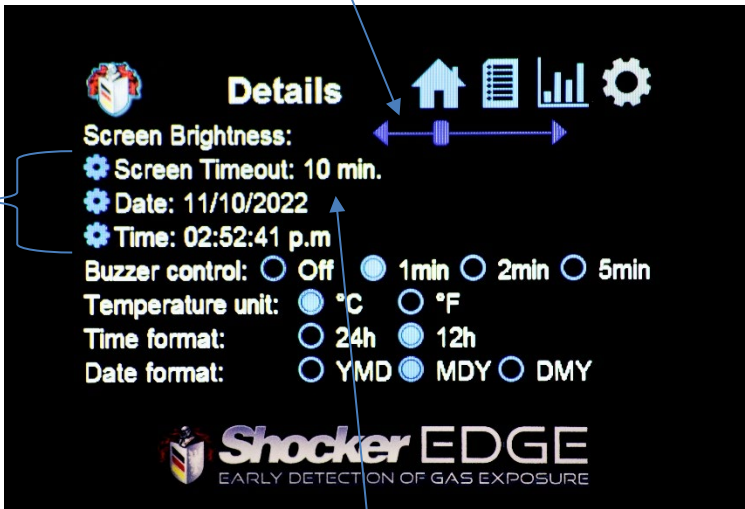
Examples of "fault" events



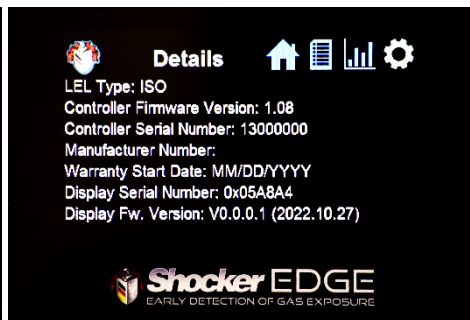
Press each gear symbol to edit:
Screen Timeout, Date, and Time
(follow exact layout when
entering information)

Details Screen

Screen brightness adjustment



Screen Timeout Function - IMPORTANT: The screen will shutoff following the amount of time selected. The screen will illuminate in event of alarm or system change, and shutoff after selected screen timeout has passed. When using this function, it is the **OPERATOR'S RESPONSIBILITY** to check system state by tapping on the display to illuminate.



Back up Battery

The display is equipped with a 2032 button battery, this battery should be replaced every 4 years. Please send display to Headwind Solutions for replacement.

DOES THIS SYSTEM REQUIRE MAINTENANCE OR TESTING?

YES! TEST YOUR CONTROLLER WEEKLY AND COMPLETE SVT EVERY 90 DAYS MINIMUM

Testing the Controller

With the engine running, press and release the “test” button. The engine will shut down, the display will alarm, and log the event. Make sure EDGE system works as intended and trips all functions that are connected.



- 1) Press and release the button to test the functionality of the electronics.
- 2) Press and hold the test button for 7 seconds to enable 1 minute bypass mode.

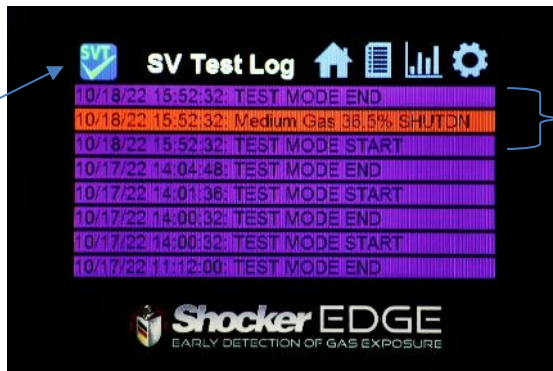
Timestamp	Event Description
10/25/22 10:10:08	EDGE DISCONNECTED
10/25/22 09:30:40	No Gas 0.0% NORMAL
10/25/22 09:30:40	Light Gas 6.3% WARNING
10/25/22 09:29:36	Medium Gas 14.4% SHUTDOWN
10/25/22 09:29:36	MONITORING
10/25/22 09:29:36	BYPASS
10/25/22 09:28:32	CONTROLLER TEST END
10/25/22 09:28:32	CONTROLLER TEST STARTED

Sensor Verification Test (SVT)



PPE gloves and safety glasses required

1. Begin test on a *cold non-running engine* in a clean air environment
2. Press and hold the Shocker emblem for 2 seconds to open the SVT Log
3. Press and hold SVT icon for 2 seconds to put the display into test mode (will time out in 3-minutes)
4. Remove the blue SVT port cap on sensor housing
5. Install the nozzle on SVS can
6. Place nozzle from SVS can against filter element on test port
7. Give one burst from the SVS can (approximately 1-2 seconds)
8. Check SVT log for WARNING or SHUTDOWN events. Wait 10 seconds, if no event shows on display, repeat Step 7. If no event has shown after a max of 3 attempts, call TECH SUPPORT @ 1.844.304.7277
9. Allow for gas to dissipate to 0% LEL or use the BYPASS function. ONLY use the bypass function if the home screen reads an LEL of less than 50% in the intake piping
10. Reinstall the blue cap on the sensor housing, finger tight - this is the responsibility of the owner/operator. Improper installation may cause damage to the engine
11. Start the engine



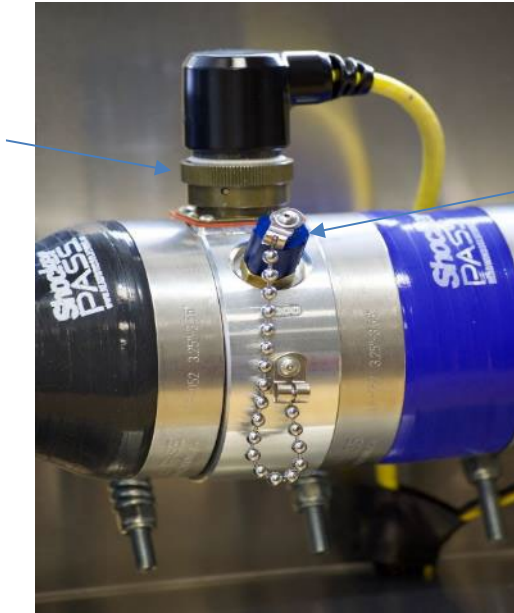
Press and hold for 2 seconds to start test (SVT icon will flash when it's in test mode)

Successful Test

****REMINDER****

YOU ARE NOT PROTECTED ONCE YOU ACTIVATE BYPASS MODE

Sensor Connector



SVT Port Cap

Important Reminders:

- Inspect wiring every 90 days
- Check all connectors for visible damage
- Check that the sensor connector is tight, if the sensor connector has been disconnected from the housing, the sensor base gasket must be replaced
- Check hose for holes or cracks, and replace as required
- Inspect clamps for tightness or damage
- If using starting fluid on diesel engines, the MPS sensor **must** be removed if spraying air filter housing
- When cleaning mass airflow sensor – the MPS sensor **must** be removed
- The sensor has temperature protection - **shutdown at -58°c/-72°f and 88°c/190°f**

GAS CLASSIFICATION

CLASS 1: Hydrogen

Molecular Weight: 2.0 [g/mol]

Density: 0.09 [kg/m³]

Number of Carbons: 0



CLASS 2: Hydrogen Mixture

Avg. Mol. Weight: 1-14 [g/mol]

Avg. Density: 0.1-0.6 [kg/m³]

Number of Carbons: varies

This classification is unique as it guarantees the presence of hydrogen and another flammable gas



CLASS 3: Methane/Natural Gas

Avg. Mol. Weight: 16 to 19 [g/mol]

Avg. Density: 0.6-0.9 [kg/m³]

Typical Number of Carbons: 0-2

Gases having molecular properties similar to that of methane may be classified as methane (e.g. ammonia, acetylene)



CLASS 4: Light Gas (or Light Gas Mixture)

Avg. Mol. Weight: 25 to 75 [g/mol]

Avg. Density: 1.2-2.5 [kg/m³]

Typical Number of Carbons: 1-4

Example Gases: Ethane, Propane, Isopropanol



CLASS 5: Medium Gas (or Medium Gas Mixture)

Avg. Mol. Weight: 50 to 120 [g/mol]

Avg. Density: 1.5-4.0 [kg/m³]

Typical Number of Carbons: 2-8

Example Gas: Pentane



CLASS 6: Heavy Gas (or Heavy Gas Mixture)

Avg. Mol. Weight: 80+ [g/mol]

Avg. Density: 3.5+ [kg/m³]

Typical Number of Carbons: 6-

Example Gases: Octane, Toluene, Xylene



GASES

Gas	Formula	Class ⁶	Detection Range [%LEL]	% Volume of gas at 100 %LEL (ISO 10156)	MPS Accuracy 0 to 50 %LEL (ISO 10156)	% Volume of gas at 100 %LEL (IEC60079-20-1)	MPS Accuracy 0 to 50 %LEL (IEC60079-20-1)
butane	C ₄ H ₁₀	4	0-100	1.8 %VOL	±5 %LEL	1.4 %VOL	±5 %LEL
ethane	C ₂ H ₆	4	0-100	3.0 %VOL	±5 %LEL	2.4 %VOL	±5 %LEL
hydrogen	H ₂	1	0-100	4.0 %VOL	±5 %LEL	4.0 %VOL	±7 %LEL
isobutane	HC(CH ₃) ₃	4	0-100	1.8 %VOL	±5 %LEL	1.3 %VOL	±9 %LEL
isobutylene	C ₄ H ₈	4	0-100	1.8 %VOL	±5 %LEL	1.8 %VOL	±5 %LEL
isopropanol	C ₃ H ₈ O	4	0-100	2.0 %VOL	±10 %LEL	2.0 %VOL	+20 %LEL
methane	CH ₄	3	0-100	5.0 %VOL	±3 %LEL	4.4 %VOL	±3 %LEL
MEK	C ₄ H ₈ O	5	0-100	1.4 %VOL	±5 %LEL	1.5 %VOL	+16 %LEL
pentane	C ₅ H ₁₂	5	0-100	1.5 %VOL	±5 %LEL	1.1 %VOL	±6 %LEL
propane	C ₃ H ₈	4	0-100	2.1 %VOL	±6 %LEL	1.7 %VOL	±8 %LEL
propylene	C ₃ H ₆	4	0-100	2.4 %VOL	±5 %LEL	2.0 %VOL	±5 %LEL
acetone	C ₃ H ₆ O	5	0-100	2.5 %VOL	±20 %LEL	2.5 %VOL	±24 %LEL
ethylene	C ₂ H ₄	4	0-100	2.7 %VOL	-12 %LEL	2.3 %VOL	-14 %LEL
heptane	C ₇ H ₁₆	5	0-100	1.1 %VOL	±12 %LEL	0.85 %VOL	±15 %LEL
octane	C ₈ H ₁₈	6	0-100	1.0 %VOL	±12 %LEL	0.8 %VOL	±15 %LEL
styrene	C ₈ H ₈	6	0-100	1.1 %VOL	-20 %LEL	1.0 %VOL	-17 %LEL
toluene	C ₇ H ₈	6	0-100	1.2 %VOL	±12 %LEL	1.0 %VOL	±13 %LEL
xylene	C ₈ H ₁₀	6	0-100	1.1 %VOL	±12 %LEL	1.0 %VOL	±13 %LEL

HWS has confirmed the MPS to detect difluoroethane, and diesel fuel(60°C). The MPS is also confirmed to detect other gasses including hexane, ammonia, acetylene, ethanol and methanol. The MPS does not detect Carbon Monoxide (CO) or Hydrogen Sulfide (H₂S).

CONTROLLER LED

LED Usage

There is a tri-color LED (**red**, **blue**, **green**) that signifies the operational status of the Shocker Edge controller. LED colors are assigned as follows:

- **RED** signals LEL detected
- **BLUE** signals operation of the gas sensor
- **GREEN** signals communications

Powerup-Normal

1. The **blue LED** blinks for ~1 second
2. The **green LED** blinks once after 3 seconds and then blinks every 25 seconds after approximately 2-3 minutes
3. The **red LED** will flash periodically

Powerup-Abnormal

1. The blue LED is constantly blinking means the sensor failed to start, reinitiate start up procedure
2. All colors blinking rapidly is an internal software issue, contact Headwind Solutions 1-844-304-7277

Event Log Messages

Class		Event Log Message	Details
Display	Red	EDGE comms fail	Comm failure controller to display
Alarm	Green	Gas ID/LEL % NORMAL	LEL- Normal - 0-2.49%
	Yellow	Gas ID/LEL %WARNING	LEL- Warning - 2.5-7.49%
	Red	Gas ID/LEL %SHUTDOWN	LEL- Shutdown - < 7.5%
Controller Status	Red	GAS SENSOR OFF	Powered down-needs restart
	Yellow	STARTING	Sensor powering up
	Green	MONITORING	Normal operation
	Red	FAILED	Sensor has failed
Sensor Status	Grey	BYPASS	LEL detection has been bypassed
	Green	SENSOR NORMAL	Sensor working normally
	Blue	SENSOR COMM ERR	CRC-sensor detected a comm error
	Blue	SENSOR COMM ERR	Bad parameter-comms error
	Red	SENSOR FAIL	Failed execution of command
	Red	SENSOR FAIL	Insufficient memory
	Blue	SENSOR COMM ERR	Error in command received
	Blue	SENSOR COMM ERR	Incomplete command received
	Blue	SENSOR AO ERR	Analog out malfunction
	Blue	SENSOR VOLT ERR	Internal voltage out of range
	Blue	SENSOR REF VOLT ERR	Reference voltage out of range
	Blue	SENSOR P,T,H ERR	Pressure/Temp/Humidity out of range
	Red	SENSOR ERR	Malfunction
	Red	SENSOR CPU ERR	Microcontroller error
	Blue	SENSOR INIT ERR	Initialization error
	Blue	SENSOR LEL TOO LOW	Level less then-15% LEL
	Blue	SENSOR CONDENSATION	Condensation detected
	Red	SENSOR ELEM ERR	Element malfunction
	Blue	SENSOR HUMIDITY SURGE	Suspected humidity surge
	Blue	GAS SENSOR STARTING	Will not report LEL for 104 seconds
Red	GAS DETECTED AT STARTUP	Gas at startup-move to clean air	
Red	GAS SLOW BUILD DET	Detection of a slow buildup of gas	
Over Current	Green	SENSOR CURRENT NORMAL	Current draw normal
	Red	SENSOR CURRENT HIGH	Over current-check wiring
Shutdown	Green	CONTROLLER TEST END	Shutdown test ended
	Brown	CONTROLLER TEST START	Start shutdown test

Test Button

The “test” button on the front of the controller can be used for two purposes:

- Providing a test simulation of a high LEL being detected.
- Providing a temporary bypass by putting the controller in a normal state if a high LEL is detected.

LEL Test

Upon pressing and holding the “test” button, the blue LED will turn on, and if it is released before 5 seconds then the controller will simulate a LEL high gas detection.

LEL Bypass

Upon pressing and holding the “test” button, the LED will turn blue. If it is pressed for greater than 5 sec, the blue LED will start flashing. If the “test” button is released while the LED is flashing blue, the following will occur:

1. Terminates any LEL high gas detection
2. Sets Engine Shutdown pins 1-7 closed
3. Opens the Hold Valve pin 5
4. Turns off the Positive Air Shutdown pin 11

Operation of these outputs (2-4) is disabled for 60 sec.

Warning

Before initiating the bypass mode on the ShockerEDGE System—You must test your environment for airborne hydrocarbons—The atmosphere must read 0% LEL and intake piping below 50% LEL before using the ShockerEDGE bypass mode! **YOU ARE NOT PROTECTED IN BYPASS MODE!** Headwind Solutions assumes no responsibility for damage or incidents while in bypass mode.

Maintenance

Every 90 days

- Perform SVT
- Inspect all wires and cables for wear
- Inspect all connections for corrosion and ensure they are tight
- Inspect controller, display, and mount for damage
- Inspect hoses and clamps if applicable

Yearly

- All the above
- Remove sensor and inspect dust screen for cleanliness (if cleaning required spray SVS on the sensor @ a 30–45-degree angle. Do not spray at a 90-degree angle as damage to the sensor could occur. Sensor base gasket must be replaced before reinstalling sensor.



**RECOMMENDED
REGULAR
MAINTENANCE**

- **TEST CONTROLLER WEEKLY**
- **SVT COMPLETED A MINIMUM
ONCE EVERY 90 DAYS**
- **INSPECT HOSES & WIRES**
- **CHECK CLAMP TIGHTNESS**
(Torque clamps to: 9Nm - 6.6 ft./lbs. - 79.6 in./lbs.)

Go to www.headwindsolutions.ca for Owners Manual instructions

IMPORTANT

Minimum 12 GA wire must be used on the power and ground supply.
Do not extend power and ground harness wires; doing so will void the warranty.

Connect controller to battery direct power

Connect display only to key-on key-off power

Warranty Disclaimer

Headwind Automotive Solutions Ltd. (“Headwind”) wants you to be completely satisfied with your ShockerEDGE product (the “Product”). That is why Headwind offers a one-year limited warranty (the “Warranty”) to the original purchaser or end user (the “Purchaser”) for any Product sold. This Warranty does not cover any components sold by anyone other than Headwind.

Headwind will replace any defective Product part or entire Product which breaks or fails to function under normal use, so long as the failure is due to a defect in material or workmanship. This Warranty extends only to the repair or replacement of the defective part and does not extend to the cost of any repairs performed by the Purchaser.

To access this Warranty protection, the Purchaser must provide Headwind with written notice of any claimed defects with the product within ten (10) days after the Purchaser discovers the defect, along with proof of purchase. If approved for inspection, Headwind will issue an RMA# to be affixed on the return box and any paperwork accompanying the shipment, including the proof of purchase. Product returned for repair or replacement under this Warranty must be shipped with freight prepaid by the Purchaser to Headwind and will be returned freight collect.

This Warranty will be considered void in the following circumstances:

- a) If the Product has been modified, neglected, improperly maintained, misused, abused, accidentally damaged, tampered with, or if it appears that the damage to the Product has been caused by a failure to provide proper maintenance.
- b) If the Product has been exposed to the elements, including but not limited to floods, fire, lightning, storm, hurricanes, tornadoes, etc.
- c) If the Product has been subject to repairs not authorized in writing by Headwind
- d) If written notice of the defect is not provided to Headwind within one year of the purchase of the Product, or within ten (10) days of discovery of the defect, as stated above.

Headwind will charge the Purchaser for any costs arising if:

- a) The Purchaser fails to return the defective Product within 60 days of submitting a claim.
- b) The SKU of the returned product does not match the Product sold.
- c) The defective Product is returned with missing components.
- d) The returned Product is defective due to any of the circumstances detailed above rendering the Warranty void.

This limited Warranty will continue to protect the Product after any Warranty repairs are completed for the period of 90 days from the date of repair, or the remainder of the original warranty period for that Product, whichever is greater.

There are no express warranties offered by Headwind except for what is listed above. Headwind will not be liable for incidental or consequential damage resulting from the use of any Product or arising out of any breach of Warranty. All express or implied warranties, including warranties of the merchantability and fitness for a particular purpose are limited to the applicable warranty laid out above.

As there are many variables and requirements involved with any installation, Headwind assumes no responsibility or liability for actual use beyond that covered by this Warranty. Individuals purchasing ShockerEDGE products must look at all variables of their application and use their own judgment in evaluating product selection and determining product placement for each application and site requirements.

The Purchaser and/or End User is entirely responsible for the correct selection, installation, routine testing, use, and all maintenance of ShockerEDGE products.

**Check our website for
troubleshooting videos and tips:
www.headwindsolutions.ca**

**Sensor Verification Spray
GS-SVS**



SVT Log

Date:

Time:

Event:

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Complete SVT every 90 days minimum as per
Transport Canada Regulations

SVT Log

Date:

Time:

Event:

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Complete SVT every 90 days minimum as per
Transport Canada Regulations

SVT Log

Date:

Time:

Event:

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Complete SVT every 90 days minimum as per
Transport Canada Regulations

Installer/Operator

Must comply with one of the following three:

1. Apply the Equivalency Certificate “SH 13825” decal to the driver’s side of power unit, one will be supplied with every ShockerEDGE purchased (example below)
2. Keep the certificate within the Owner’s Manual on hand
3. Carry a digital copy of the Equivalency Certificate





Transportation of Dangerous Goods Directorate
L'Esplanade Laurier
300 Laurier Avenue West
Ottawa, Ontario
K1A 0N5

Direction générale du transport des marchandises dangereuses
L'Esplanade Laurier
300, avenue Laurier Ouest
Ottawa (Ontario)
K1A 0N5



Equivalency Certificate
(Approval issued by the competent authority of Canada)

Certificate Number: SH 13825
Template Number: N/A
Certificate Holder: Headwind Automotive Solutions Ltd.
Mode of Transport: Road
Effective Date: November 4, 2022
Expiry Date: November 30, 2024

LEGEND

For this equivalency certificate, documents referred to by an abbreviation have the following meaning:

TDG Act: *Transportation of Dangerous Goods Act, 1992*

TDG Regulations: *Transportation of Dangerous Goods Regulations*

CSA B621: CSA Standard B621, "Selection and use of highway tanks, TC portable tanks, and other large containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8, and 9", published by the Canadian Standards Association (CSA), as amended from time to time,

CSA B622: CSA Standard B622, "Selection and use of highway tanks, TC portable tanks, and ton containers for the transportation of dangerous goods, Class 2", published by the Canadian Standards Association (CSA), as amended from time to time

**THANK YOU FOR
CHOOSING**



Manufactured in North America.

Check our website for

troubleshooting videos and tips.

www.headwindsolutions.ca

Toll Free: 1-844-304-7277

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1.01/16 Dec 2023