

Owner's Manual & Safety Instructions

Save This Manual Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

24c

ICON™

DIAGNOSTIC SMOKE MACHINE



59431

Visit our website at: <http://www.harborfreight.com>
Email our technical support at: productsupport@harborfreight.com

When unpacking, make sure that the product is intact and undamaged. If any parts are missing or broken, please call 1-888-866-5797 as soon as possible.

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⚠️ WARNING

**Read this material before using this product.
Failure to do so can result in serious injury.
SAVE THIS MANUAL.**

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WARNING SYMBOLS AND DEFINITIONS	
	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	Addresses practices not related to personal injury.

Important Safety Instructions - PLEASE READ

WARNING

When using appliances, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and personal injury, including the following:

- High concentrations of smoke fluid vapor in an enclosed area can displace oxygen and create a RISK OF SUFFOCATION and DEATH.** Always work in a well-ventilated area. This unit is intended for detecting small, nonhazardous leaks only.
- Flammable smoke fluid vapors are produced by this machine.** Do not use near ignition source.
- Wear ANSI-approved safety goggles during use.
- Engine hood crush hazard.** Use a supplemental hood support or prop rod whenever hanging the tool under a hood.
- Do not leave vehicle unattended.** Disconnect and remove tool, then shut off engine.
- Keep children away. Store idle tool out of the reach of children and do not allow persons unfamiliar with this tool or these instructions to operate this tool.** Children must never be allowed in the work area. When not in use, tool and accessories must be stored in a locked location. This product is not a toy.
- Keep work area clean and well lit.** Cluttered or dark areas invite accidents.
- Observe work area conditions.** Do not use tool in areas that are not well ventilated. Don't expose to rain. Keep work area well lit. Do not use in the presence of flammable gases or liquids.

9. **Use the right tool for the job.** There are certain applications for which this tool was designed. Do not modify this tool and do not use this tool for a purpose for which it was not intended.
10. **Stay alert.** Watch what you are doing, use common sense. Do not operate the tool when you are tired.
11. **Do not overreach. Keep proper footing and balance at all times.** Do not reach over or across running machines.
12. **Do not operate tool if under the influence of alcohol or drugs.** Read warning labels on prescriptions to determine if your judgment or reflexes are impaired while taking drugs. If there is any doubt, do not operate the tool.
13. **Maintain tools with care.** Keep tool and accessories maintained and clean for better and safer performance. Follow instructions for maintenance and changing accessories.
14. **Maintenance.** For your safety, service and maintenance should be performed regularly by a qualified technician using only identical replacement parts to ensure that the safety of the power tool is maintained.
15. **Check for damaged parts.** Before using any tool, any part that appears damaged should be carefully checked to determine that it will operate properly and perform its intended function. Any part that is damaged should be properly repaired or replaced by a qualified technician. Do not use the tool if any switch does not turn On and Off properly.
16. **Replacement parts and accessories.** When servicing, use only identical replacement parts. Use of any other parts will void the warranty. Only use accessories intended for use with this tool. Approved accessories are available from Harbor Freight Tools.
17. Contains Li-Ion battery. Battery must be recycled or disposed of properly. Do not open, crush, or incinerate.
18. Maintain labels and nameplates on the tool. These carry important safety information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
19. **The warnings, precautions, and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur.** It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

Smoke Fluid Safety

1. **Smoke fluid may be fatal if swallowed or inhaled.** Keep out of reach of children. Store locked up.
2. **Flammable smoke fluid produces toxic gases while burning.** Keep away from ignition sources.
3. Wear ANSI-approved safety goggles while handling.
4. **Environmental hazard. Avoid Spills.** Dispose of contents and container in accordance with applicable laws and regulations.



SAVE THESE INSTRUCTIONS.

Specifications

Power Supply	12VDC
Power Consumption	4.1-12.5A
Machine/Fluid Operating Temperature	30° to 110° F
Operating Modes	Air / Vapor
Maximum Input Air Pressure	150PSI
Maximum Output Air Pressure	0.5PSI

Functions



Setup



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

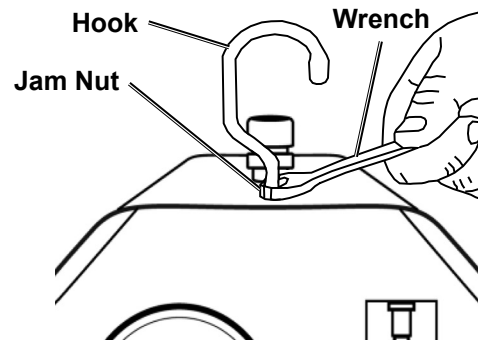


WARNING! High concentrations of vapor in an enclosed area can displace oxygen and create a **RISK OF SUFFOCATION and DEATH**. Always work in a well-ventilated area.

This unit is intended for detecting small, nonhazardous leaks only.

Hook Installation

1. Install the threaded end of the hook into the threaded port on the top of the smoke machine.
2. Tighten the jam nut with a wrench (not included).



LED Flip Light Charging

1. Place the LED Flip Light on a dry fireproof surface in a room where the temperature is from 50–104° F.

Note: If recharging a newly spent Battery Pack, allow it to cool completely before charging.

2. Battery Pack must be undamaged, and a Li-Ion type Battery Pack. **Do not charge a cracked, open, or leaking Battery Pack, or charge a non-recommended type of Battery Pack.**
3. Plug the Charger into a grounded, 120VAC, 60Hz receptacle.

4. Connect the LED Flip Light to the Charger.

Note: The Battery Pack's capacity will increase somewhat during the first few charging cycles. A fully discharged Battery Pack will take about 4 to 4-1/2 hours to fully charge. Recharging the Battery Pack for more than 4-1/2 hours can damage the battery cells.

5. While charging, the Battery Pack of the LED Flip Light and Charger may become warm to the touch. This is normal, and does not indicate a problem.
6. Allow the Battery Pack of the LED Flip Light to cool completely before using it.

Operating Instructions



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.



WARNING! High concentrations of vapor in an enclosed area can displace oxygen and create a **RISK OF SUFFOCATION and DEATH**. Always work in a well-ventilated area.
This unit is intended for detecting small, nonhazardous leaks only.

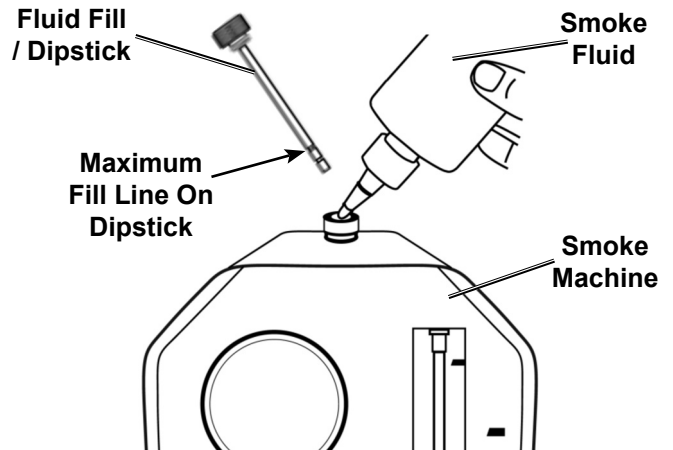
Smoke Fluid Filling / Level

1. Unscrew the Fluid Fill Dipstick and remove.
2. Examine the Fluid Fill Dipstick to determine fluid level.
3. Add fluid as needed. Do not overfill the fluid reservoir. Add small amounts, screw the Fluid Fill Dipstick in all the way and then unscrew it and check the fluid level. Fluid level should not be past the maximum fill line on the dipstick.

Note: Reservoir is approximately 2oz (60ml) in capacity.

Note: Do not add dyes, solvents, etc., as they can coat and/or harm critical sensors and components.

4. Check fluid level every 50-100 tests of the machine.



Smoke Machine Connections

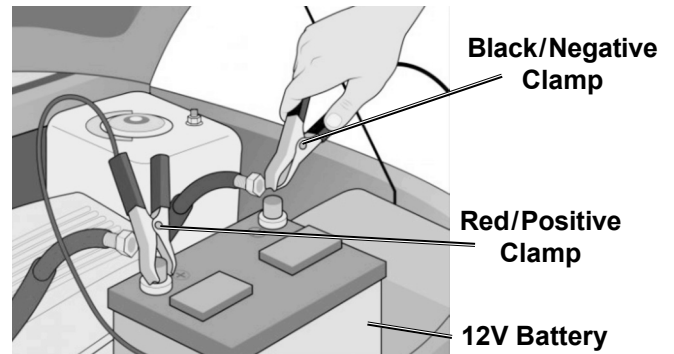
Power Source

Note: This machine requires a fully charged 12V Battery.

1. Disconnect the vehicle's battery cables from the 12V Battery, and insulate them to prevent contact or shorting with other cables, the vehicle, or 12V Battery.

Note: Some tests will require the vehicle's battery to be connected, with the ignition turned ON, and the engine turned OFF. Exercise caution when connecting the battery to prevent possible sparks or explosion.

2. Connect the Red Clamp to the positive (+) terminal on the 12V Battery.
3. Connect the Black Clamp to the vehicle's negative (-) chassis ground.



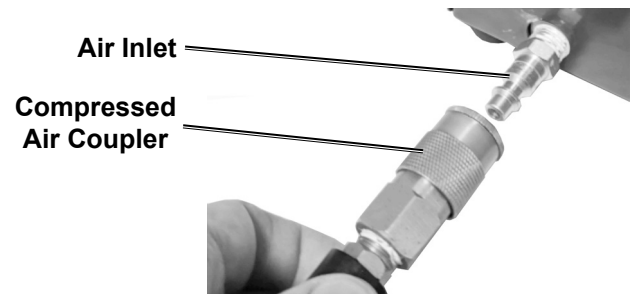
WARNING! TO PREVENT SERIOUS INJURY: Do not connect Black Clamp to the negative (-) battery terminal for possible sparks or explosion.

WARNING! TO PREVENT SERIOUS INJURY: Do not connect this machine to a battery charger or jumper box.

WARNING! TO PREVENT SERIOUS INJURY: Do not connect this machine while the engine is running. All testing is conducted with a vehicle's engine shut OFF.

Air Supply

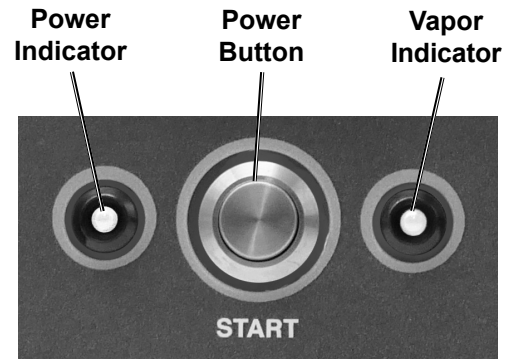
1. Connect compressed air to the Air Inlet at the rear of the machine.
2. Adjust the compressor's air regulator as needed for best performance. Do not exceed the recommended maximum input air pressure of 150PSI.



General Operation

Power/Vapor Indicator

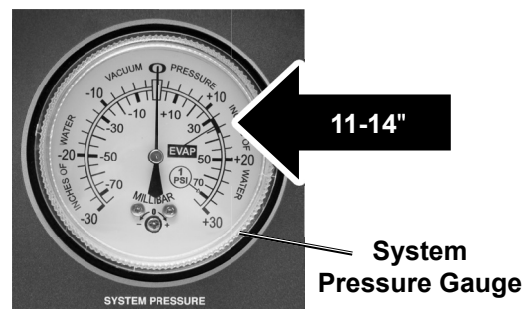
1. The Power Indicator should be lit when power cables are connected to a fully charged 12V battery using the proper polarity as described in "Power Source" on page 6.
2. Press the Power Button to turn on the machine; the Vapor Indicator should light, indicating vapor is being produced.
 - a. If the Vapor Indicator does not light with the Power Button in the ON position, battery charge is not sufficient.
 - b. If the Vapor Indicator is flashing, there is an open circuit or internal component fault.



System Pressure Gauge

The Pressure Gauge is used to determine if a leak exists in a sealed system under pressure.

1. Pressurize the system to approximately 11-14" of water column (0.5 PSI / 35 millibar).
2. Lock out sealed system by rotating Flow Control Knob clockwise all the way to close.
3. Observe the System Pressure Gauge:
 - a. Pressure holds - No leaks are indicated.
 - b. Pressure decreases - Leaks are indicated.

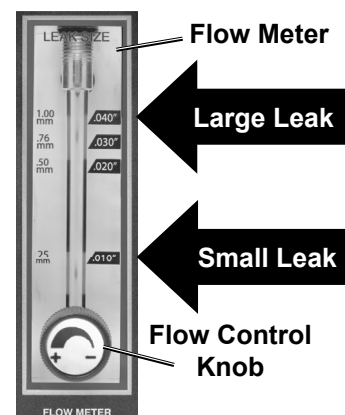


Note: Not all systems are designed to be 100% sealed, or designed to be 100% sealed at high pressures.

Flow Meter

The Flow Meter is used for system diagnostics.

1. Rotate the Flow Control Knob *counterclockwise* to increase smoke pressure.
2. Rotate the Flow Control Knob *clockwise* to decrease or stop air flow.
3. Observe the Flow Meter:
 - a. A small leak in the system under evaluation is determined when the Flow Indicator ball rises within the Flow Meter to the .02" to .039" level.
 - b. A large leak in the system under evaluation is determined when the Flow Indicator ball rises within the Flow Meter to .04" level or above.



Testing Procedures

WARNING! TO PREVENT SERIOUS INJURY: Smoke Fluid is flammable and produces toxic gases while burning. Keep away from ignition sources. All testing is conducted with a vehicle's engine shut OFF.

Pressure Loss Test

1. Connect the Smoke Machine with its appropriate adapter (as described in the following sections) to the system to be tested and input air until the system is fully pressurized (System Pressure Gauge reads approximately 11-14 inches of water column (0.5 psi / 35 millibar).
2. Turn Flow Control Knob to its fully closed position to seal the system being tested, then watch the System Pressure Gauge for signs of air pressure loss. If there is no loss of pressure, then there are no leaks in the system, and testing is complete.
3. If a loss of pressure (leak) is found, use the smoke machine to produce vapor to determine the leak source(s) as described in the following sections.

Diagnosing Intake System/Vacuum Leaks.

Use this procedure to diagnose leaks in manifolds, vacuum lines, EGR valves, oil seals, O-rings, solenoids, gaskets, ducting, diaphragms, throttle shafts, canisters, etc.

1. Remove the air filter housing from the ducting.
2. Place either the Cone Adapter or the Pass-Thru Adapter into the air intake duct (round inlet tubes only). **To Use the Pass-Thru Adapter:**
 - a. Twist the knob on the end of the bulb *clockwise* to seal the bulb.
 - b. Squeeze and release the bulb repeatedly until the Pass-Thru Adapter expands enough to seal the air intake duct.
3. Connect the Smoke Machine to the Cone or Pass-Thru Adapter, then conduct the "Pressure Loss Test" on page 8.
4. If leak(s) are found, turn the Smoke Machine ON, and open the Flow Control Knob to introduce Vapor to the system.
5. Use the LED Flip Light to locate leaks.
6. When the leak(s) are found, turn OFF the smoke machine, conduct repairs, then retest again until no leaks are found.
7. **If using the Pass-Thru Adapter:** Twist the knob on the end of the bulb *counterclockwise* to allow air to escape and the Pass-Thru Adapter to shrink and be removed.

Diagnosing Exhaust System Leaks

Use this procedure when the exhaust system is COLD with minimal thermal expansion (heat can cause the system to expand and seal small leaks, and melt plastic component of this kit).

1. Place either the Cone Adapter or the Pass-Thru Adapter into the tailpipe. **To Use the Pass-Thru Adapter:**
 - a. Twist the knob on the end of the bulb *clockwise* to seal the bulb.
 - b. Squeeze and release the bulb repeatedly until the Pass-Thru Adapter expands enough to seal the tailpipe.
 2. Connect the Smoke Machine to the Cone or Pass-Thru Adapter, then conduct the "Pressure Loss Test" on page 8.
 3. If leak(s) are found, turn the Smoke Machine ON, and open the Flow Control Knob to introduce Vapor to the system.
 4. Use the LED Flip Light to locate leaks.
- Note:** Hot catalytic converters will consume some of the vapor.
5. When the leak(s) are found, turn OFF the smoke machine, conduct repairs, then retest again until no leaks are found.
 6. **If using the Pass-Thru Adapter:** Twist the knob on the end of the bulb *counterclockwise* to allow air to escape and the Pass-Thru Adapter to shrink and be removed.

Diagnosing EVAP Leaks

Use this procedure to diagnose leaks in a vehicle's EVAP system.

1. Remove the green cap from the EVAP service port.

2. Remove the Schrader valve using the removal tool.
Note: Schrader Valve has left hand threads; turn clockwise to remove.
3. Connect the EVAP Port Adapter Kit to the EVAP service port.
4. Close the EVAP vent solenoid with a scan tool (not included) to isolate the EVAP system from the atmosphere.
Note: Intermittent solenoid may have failed if vent solenoid does not close.
5. Connect the Smoke Machine to the Adapter, then conduct the "Pressure Loss Test" on page 8.
6. If leak(s) are found, turn the Smoke Machine ON, and open the Flow Control Knob to introduce Vapor to the system.
7. Remove the fuel cap and watch until dense vapor is observed exiting the filler neck, and then replace the fuel cap.
8. Allow the machine to continue operating, and use the LED Flip Light to locate the leak(s).
9. When the leak(s) are found, turn OFF the Smoke Machine, conduct repairs, then retest again as described in this section until no leaks are found.
10. When finished, disconnect and remove the Smoke Machine and Adapter(s).

Maintenance and Servicing



Procedures not specifically explained in this manual must be performed only by a qualified technician.

TO PREVENT SERIOUS INJURY FROM TOOL FAILURE: Do not use damaged equipment. If abnormal noise or vibration occurs, have the problem corrected before further use.

Maintenance

1. **BEFORE EACH USE**, inspect the general condition of the tool. Check for:
 - leaking, swollen, or cracked battery pack,
 - loose hardware,
 - misalignment or binding of moving parts,
 - damaged cord/electrical wiring,
 - cracked or broken parts, and
 - any other condition that may affect its safe operation.
2. **AFTER USE**, wipe external surfaces of the tool with clean cloth.
3. Elevate the Smoke Machine and allow its entire vapor hose to hang downward.
4. Place a container underneath the vapor hose to capture fluid. Allow the vapor hose to drain for 5 minutes.
5. When finished, coil up the vapor hose and store the Smoke Machine and its accessories away from children and locked up.
6. Dispose of smoke fluid in accordance with applicable laws and regulations.
7. **⚠ WARNING! TO PREVENT SERIOUS INJURY: If the power cables of this machine are damaged, they must be replaced only by a qualified service technician.**

Battery Removal Instructions


Contains Li-Ion battery. Battery must be recycled or disposed of properly.

1. Remove four screws from LED Flip Light housing.



2. Separate the two halves of the housing to expose the battery.
3. Disconnect battery from unit and remove battery.
4. Recycle or dispose of battery properly.

Troubleshooting

Problem	Possible Causes	Likely Solutions
No power indicator.	<ol style="list-style-type: none"> 1. Polarity is reversed. 2. Battery is not fully charged. 3. Power cables are disconnected. 	<ol style="list-style-type: none"> 1. Swap power cable connections. 2. Charge or replace Battery. 3. Reconnect Power cables.
No vapor Indicator or vapor Indicator is flashing.	<ol style="list-style-type: none"> 1. Battery is not fully charged. 2. Open circuit or internal component fault. 	<ol style="list-style-type: none"> 1. Charge or replace Battery. 2. Have a qualified technician repair the machine, or replace the unit.
No air flow.	<ol style="list-style-type: none"> 1. No compressed air flowing. 2. Flow control knob is closed. 3. Hoses are kinked. 	<ol style="list-style-type: none"> 1. Check compressed air line is connected to machine. Turn on air compressor. 2. Open flow control knob. 3. Unkink hoses.
No / minimal vapor.	<ol style="list-style-type: none"> 1. Smoke fluid level is low. 2. Flow control knob is closed. 3. Hoses are kinked. 	<ol style="list-style-type: none"> 1. Add smoke fluid. 2. Open flow control knob. 3. Unkink hoses.
System pressure gauge / flow meter are bouncing.	Excess fluid present in the vapor hose.	Drain the excess fluid from the vapor hose.
 Follow all safety precautions whenever diagnosing or servicing the tool.		

Record Product's Serial Number Here: _____

Note: If product has no serial number, record month and year of purchase instead.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts. Reference UPC193175470843.

PLEASE READ THE FOLLOWING CAREFULLY

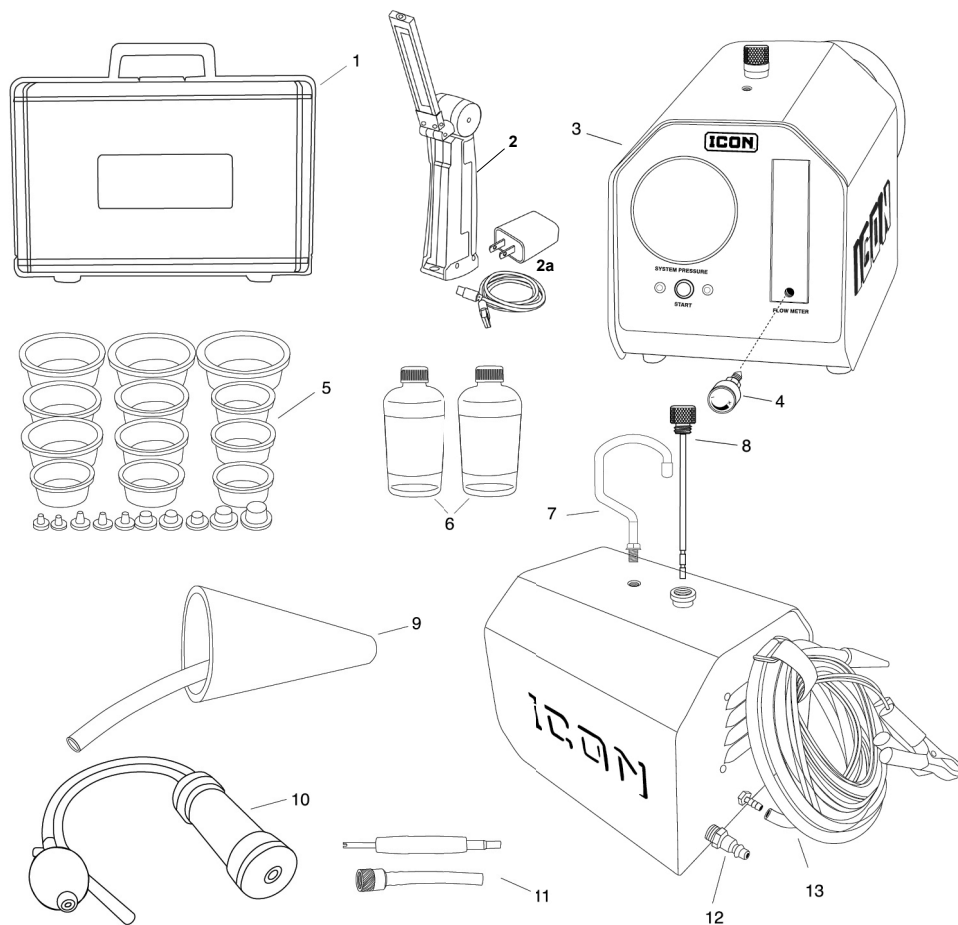
THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS LIST AND ASSEMBLY DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER OR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT, OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS, AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.

Parts List

Part	Description	Qty
1	Accessory Case	1
2	LED Flip Light	1
2a	Flip Light Charger and Cable	1
3	Smoke Machine	1
4	Flowmeter Knob	1
5	Cap Plug Kit (24pcs)	1
6	Smoke Fluid (2oz)	2

Part	Description	Qty
7	Hook	1
8	Fluid Fill / Dipstick	1
9	Cone Adapter	1
10	Pass-Thru Adapter	1
11	Evap Port Adapter Kit (2pcs)	1
12	Compressed Air Inlet	1
13	Smoke Hose	1

Assembly Diagram



Limited Warranty

This ICON product is warranted to the original purchaser to be free from defects in materials and workmanship for a period of one (1) year beginning on the date of purchase (or product receipt, if later). To obtain warranty service, the product or part must be returned to us with proof of purchase (e.g. in-store receipt or packing slip/invoice) and may require shipment by purchaser to a service center at purchaser's expense. If our inspection verifies a covered defect in materials or workmanship during the warranty period, we will, at our option, repair or replace the defective product. We will return repaired products within a reasonable time at our expense, but if we determine that there is no defect, or that the defect resulted from causes not within the scope of our warranty, then we will return the product to you if you pay return shipping costs.

This warranty does not cover any failure or damage that we determine is due directly or indirectly to normal wear and tear, misuse, use not for the intended purpose or not in accordance with the product manual, abuse, accident, rental, modification or alteration, unauthorized repair, improper installation, neglect, lack of maintenance, or any other failure not arising from defective materials or workmanship. Fraudulent returns or claims will be denied. The repair or replacement described in this warranty shall be your sole and exclusive remedy. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES, WRITTEN OR ORAL, AND ANY IMPLIED WARRANTIES ARE DISCLAIMED TO THE EXTENT PERMITTED BY LAW AND OTHERWISE LIMITED TO THE DURATION OF THE EXPRESS WARRANTY HEREIN. HARBOR FREIGHT SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY INCIDENTAL, INDIRECT, SPECIAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES OR COSTS ARISING FROM THIS WARRANTY OR THE USE OF THIS PRODUCT. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THESE LIMITATIONS MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.



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