

**LIGHTHOUSE**  
WORLDWIDE SOLUTIONS

# Isokinetic High Pressure Diffuser

Operating Manual



# *Lighthouse Worldwide Solutions*

***Lighthouse Isokinetic High Pressure Diffuser***

***Operating Manual***

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Manufactured by:

Lighthouse Worldwide Solutions

1221 Disk Drive

Medford, Oregon 97501

LWS Part Number 248083215-1 Rev 3

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# About this Manual

This manual describes the installation and use of the Lighthouse Isokinetic High Pressure Diffuser.

## Text Conventions

The following typefaces have the following meanings:

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**WARNING: A warning appears in a paragraph like this one. A warning tells you that doing something incorrectly could lead to loss or improper storage of data. A warning paragraph is boxed and begins with "Warning" in boldface.**

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<i>italics</i>	Represents information not to be typed or interpreted literally. For example, <i>file</i> represents a file name. Manual titles are also displayed in italics.
<b>boldface</b>	Introduces or emphasizes a term.
<code>Courier font</code>	Indicates command syntax or text displayed by the diagnostic terminal.
<b>Bold Courier</b>	Indicates commands and information that you type. You can use uppercase or lowercase letters; in this manual, commands are shown in uppercase.
<i>Helvetica Italics</i>	Indicates a comment on a command or text output.

## Additional Help

For more information about the Lighthouse Isokinetic High Pressure Diffuser, contact Lighthouse Worldwide Solutions.

Service and Support:  
1-800-945-5905 (USA Toll Free)  
1-541-770-5905 (Outside of USA)

[techsupport@golighthouse.com](mailto:techsupport@golighthouse.com)  
[www.golighthouse.com](http://www.golighthouse.com)





# 1

# Safety

## Caution Label

A Caution label, reproduced below, is affixed to the body of your High Pressure Diffuser.

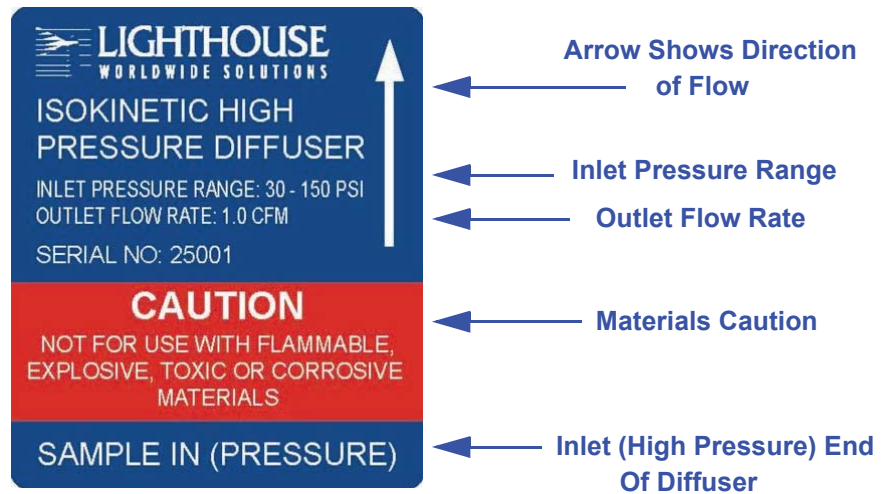


Figure 1-1 Caution Label

## Precautions

The Lighthouse Isokinetic High Pressure Diffuser is designed to provide safe, reliable operation. The following good practices will ensure the safety of both personnel and instrumentation:

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**WARNING:** *Do not block or plug the exhaust holes in the "Vented version, or plug the exhaust port on the "Captured Exhaust" version of the High Pressure Diffuser. This action will pressurize the particle counting instrument and will result in extreme damage.*

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1. Ensure that the high pressure source is turned off before installing or disconnecting the High Pressure Diffuser.
2. Be sure that the High Pressure Diffuser is installed so that air flows with the arrow: the end of the Diffuser marked **SAMPLE IN (PRESSURE)** is connected to the high pressure source.
3. Ensure that all fittings, connectors and adapters are tight (finger tight + 45°) before applying high pressure air to the inlet of the Diffuser.



# 2

## *Introduction*

### **Description**

The High Pressure Diffuser was designed for use with our Airborne Particle Counters in applications where the sample is under pressure. Standard applications include sampling of CDA, Nitrogen lines and other inert gases.

The unit is available in Vented and Ported versions. The Vented Diffuser allows the sample to vent into the test area, while the Ported version exhausts the gas outside the test area.

### **Manual Overview**

This operating manual describes how to set up, use and maintain the Lighthouse Isokinetic High Pressure Diffusers.

Unlike previous diffusers, the Lighthouse High Pressure Diffusers are designed to be isokinetic at all input pressures from 30PSI to 150PSI. By adjusting the length of the Diffuser, the output stream to be sampled can be set to 1.0CFM (or 0.1CFM, depending on the Diffuser model), thus providing accurate measurement capability regardless of the pressure at the input.

The Isokinetic High Pressure Diffuser is compatible with the entire line of Lighthouse SOLAIR and REMOTE laser particle counters.

## Type 1 Diffuser

Lighthouse offers two types of Isokinetic High Pressure Diffusers. The first type returns the unsampled portion of the air stream to open air, illustrated below.

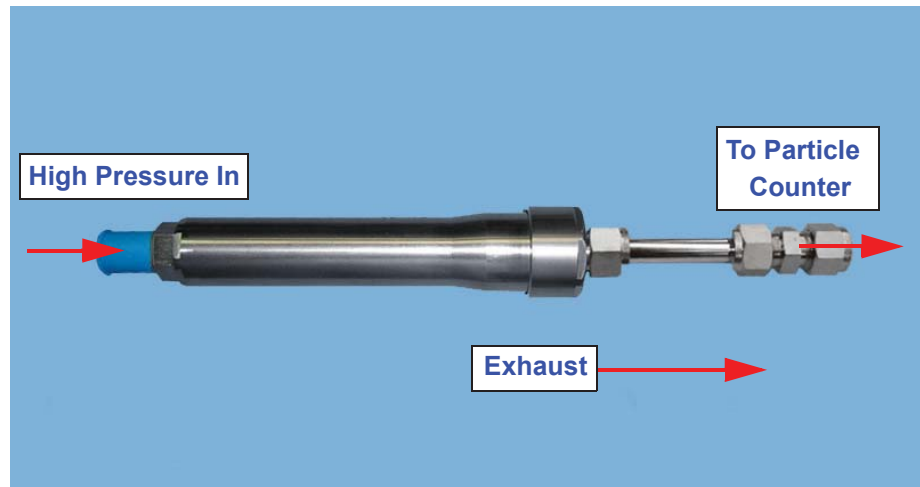


Figure 2-1 High Pressure Diffuser, Vented Return

Table 2-1 Specifications: Isokinetic High Pressure Diffuser with Vented Return

Material	Stainless Steel
Inlet Pressure Range	30-150 PSI
Outlet Flow Rate	0.1 CM or 1.0 CFM (depending on model, specify when ordering)
Flow Control	Metal Orifice
Isokinetic Sampling Port	Adjustable
Sample Fluid	Pressurized Air, Nitrogen, Inert Gases
Inlet and Outlet Ports	1/4 Metal Gasket, High Purity VCR Fitting - Inlet 3/8 Compression, Union Fitting - Outlet
Diameter	1.31" [3.3 cm] (at large cap)
Length	8.14" [20.7 cm] @ 30 PSI Setting 9.87" [25.1 cm] @ 150 PSI Setting
Weight	1.11 lbs [0.5 kg]
Cleanability	The five parts can be disassembled and easily cleaned. The three standard O-rings can be replaced.

## Type 2 Diffuser

The second type of Isokinetic High Pressure Diffuser features ported exhaust for those applications, such as measurement within a Nitrogen atmosphere, where it is undesirable to return the exhausted gases into the facility. The exhaust port is fitted with either a 1/2" or 14mm compression fitting, selectable upon ordering.

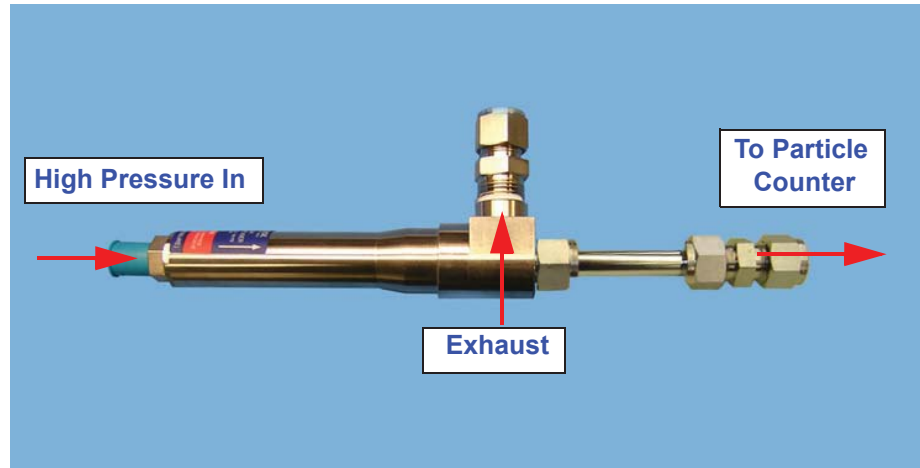


Figure 2-2 High Pressure Diffuser, Ported Exhaust

Table 2-2 Specifications: Isokinetic High Pressure Diffuser, Ported Exhaust

<b>Material</b>	Stainless Steel
<b>Inlet Pressure Range</b>	30-150 PSI
<b>Outlet Flow Rate</b>	0.1 CM or 1.0 CFM (depending on model, specify when ordering)
<b>Flow Control</b>	Metal Orifice
<b>Isokinetic Sampling Port</b>	Adjustable
<b>Sample Fluid</b>	Pressurized Air, Nitrogen, Inert Gases
<b>Inlet and Outlet Ports</b>	1/4 Metal Gasket, High Purity VCR Fitting - Inlet 3/8 Compression, Union Fitting - Outlet
<b>Exhaust Port</b>	Compression Fitting for a 1/2" O.D. Tube or a 14mm Tube
<b>Size</b>	1.31" [3.3 cm] by 3.08" [7.8 cm]
<b>Length</b>	9.1" [23.1 cm] @ 30 PSI Setting 10.83" [27.5 cm] @ 150 PSI Setting
<b>Weight</b>	1.65 lbs [0.75 kg]
<b>Cleanability</b>	The six parts can be disassembled and easily cleaned. The three standard O-rings can be replaced.



# 3

## *Unpacking, Inspecting and Installing*

### **Initial Inspection**

The Isokinetic High Pressure Diffuser has been thoroughly inspected and tested at the factory and is ready for use upon receipt.

### **Unpacking**

It is presumed that when the shipment was received, the following took place:

1. The shipping container was inspected for damage;
2. If the container was damaged, the shipper was notified immediately.
3. The instrument was carefully inspected for broken parts, scratches, dents and other damage before use, even if the container appeared to be undamaged, and
4. Any damages were reported to Lighthouse Technical Support at +1-800-945-5905 (USA) or +1-541-770-5905 (Outside of USA) before proceeding.

Verify the contents of the package against the shipping list. If anything appears to be missing, please contact your sales representative at Lighthouse Worldwide Solutions immediately at 800 945 5905 or [techsupport@golighthouse.com](mailto:techsupport@golighthouse.com).

1. Isokinetic High Pressure Diffuser
2. Four (4) side load retainer gaskets



**Figure 3-1 Side Load Retainer Gasket**

3. Operating Manual

**To maintain your warranty, keep the undamaged shipping container and all packing material for reshipment of the instrument for annual calibration. Order replacement containers and packing materials only from Lighthouse, directly, or from a Lighthouse-authorized distributor.**

## Shipping Instructions

Should it become necessary to return the unit to the factory for any reason, contact Lighthouse Customer Service or visit our website, [www.golighthouse.com/rma](http://www.golighthouse.com/rma), and obtain a Return Merchandise Authorization (RMA) number. Reference this number on all shipping documentation and purchase orders. After receipt of the RMA number, follow the shipping instructions below:



**WARNING:**

*If the instrument is damaged during a return shipment due to inadequate user packing, the warranty may be voided and may result in additional repairs being billed to the customer.*

4. Use the original container, nozzle caps and packing materials whenever possible. Remove any instrument battery and package it to ship separately - refer to [www.golighthouse.com/rma](http://www.golighthouse.com/rma) for detailed instructions. Remove attachments, such as TRH or Isokinetic probes, and package to prevent physical and ESD damage (TRH).
5. If the original container and packing materials are not available, wrap the unit in "bubble pack", surround with shock-absorbent material and place in a double-wall carton - the instrument should not rattle around when the carton is vigorously shaken. If the instrument is damaged during shipment due to inadequate user packing, the warranty may be voided and may result in additional repairs being billed to customer. You may contact Lighthouse to purchase a replacement shipping container and nozzle caps.
6. Seal container or carton securely. Mark "FRAGILE" and write the Return Merchandise Authorization (RMA) number on any unmarked corner.
7. Return the instrument to the address provided by your Lighthouse representative or the RMA website.

## Accessories

You can order several optional accessories to tailor the unit to your needs. These accessories include connectors, reducers, adapters and tubing. Contact your Lighthouse sales representative for prices and availability.

## Installation

The installation of the High Pressure Diffuser has two major steps: adjusting the air flow at the output of the Diffuser, and plumbing the device into your facility.

### Adjusting the Output Air Flow

**WARNING:** *Be sure the flow specification of your particle counter and that of the Diffuser are the same.*

The purpose of this section is to obtain the proper air flow (1.0 CFM or 0.1 CFM, depending on the Diffuser model and the particle counter to be connected to it).

The charts reproduced in Figure 3-2 and Figure 3-3 show the required length of the adjustment tube for proper flow rate out of the Diffuser. The adjustment lengths are identical for both the 0.1 CFM and 1.0 CFM models. One chart is for English measurements, the other is for Metric.

Following the charts, Figure 3-4 shows where the measurements and adjustments are to be made. The adjustments are identical for the Open Air and Captured Exhaust models.

The procedure for making the adjustments follows the diagrams.

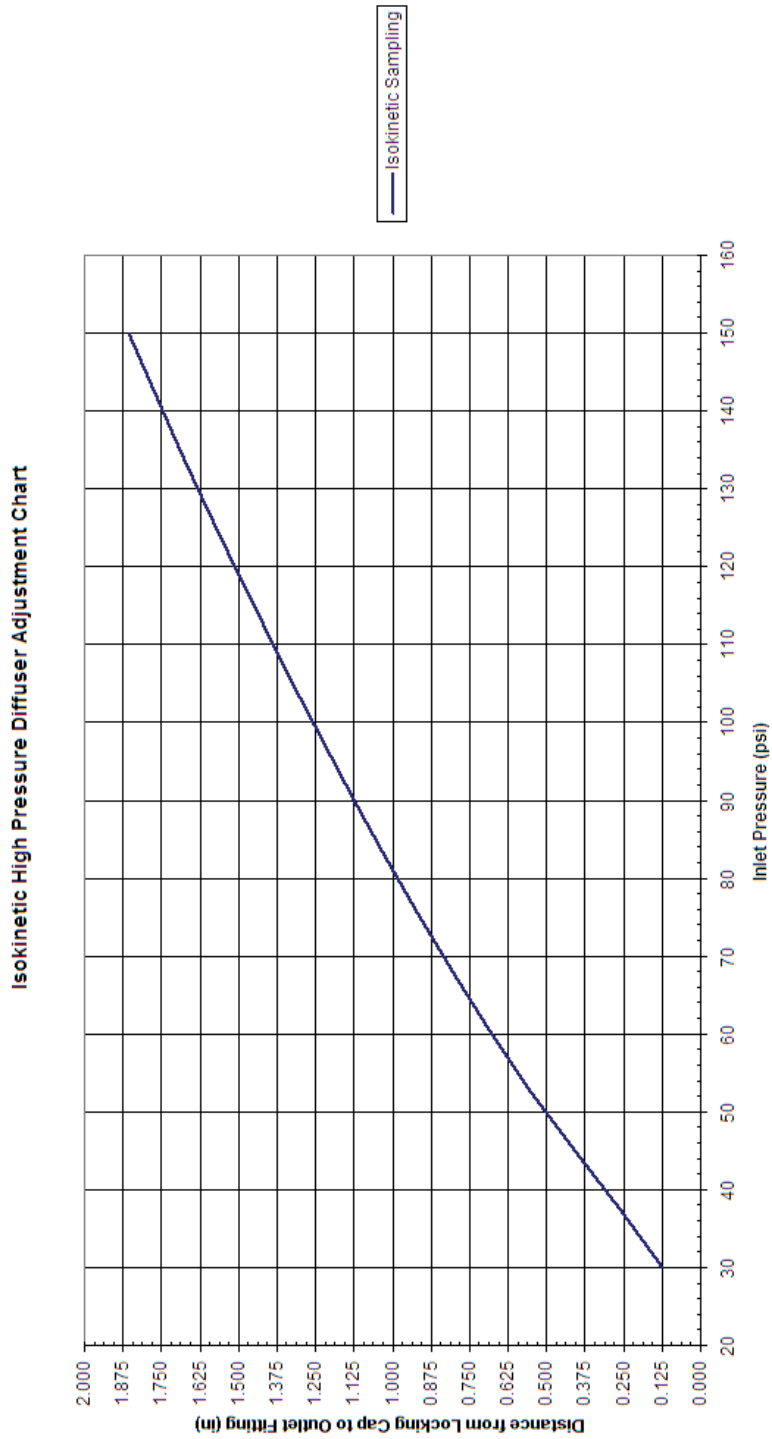
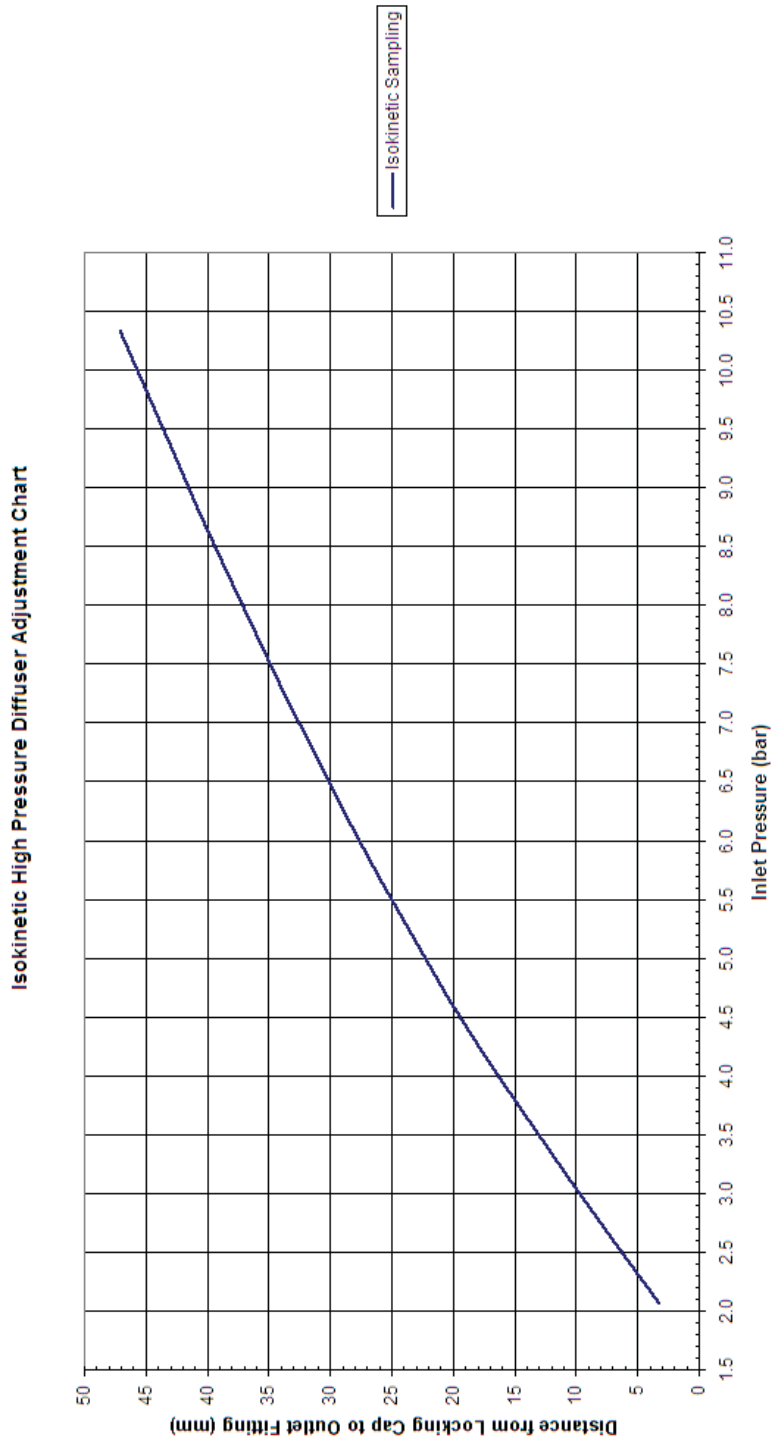


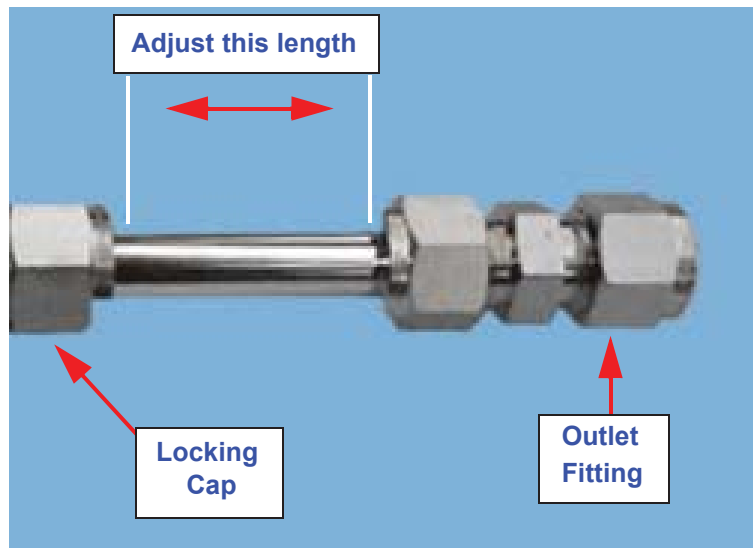
Figure 3-2 Isokinetic Adjustments - PSI and Inches



**Figure 3-3 Isokinetic Adjustments - bar and millimeters**

### Adjustment Procedure

1. Find your inlet pressure on the X axis of the appropriate graph.
2. Draw a vertical line from your inlet pressure to the Isokinetic Sampling curve.
3. At the intersection, draw a horizontal line to the left and read the proper length for the adjustment tube from the Y axis labels.
4. Loosen the Locking Cap so the Adjustment Tube length can be changed.



**Figure 3-4 Adjustment Tube**

5. Carefully adjust the length of the tube to match the length found in Step 3.
6. Tighten the Locking Cap. Be careful not to change the length of the Adjustment Tube. Tighten finger tight, then use a wrench to tighten another 45°.
7. Check to see the Adjustment Tube is the correct length.

## Connecting the Device Into Your Facility

The two styles of Isokinetic High Pressure Diffusers are shown below:

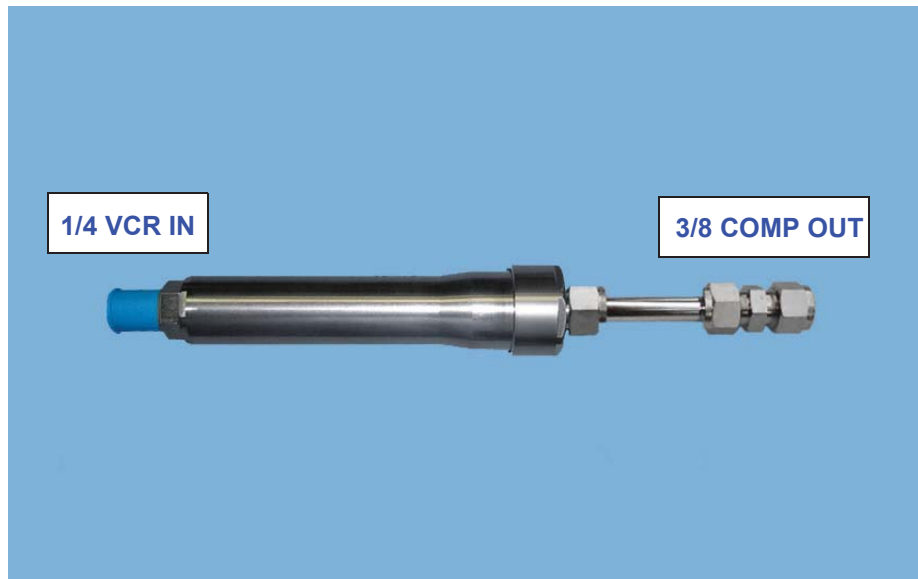


Figure 3-1 High Pressure Diffuser, Open Air Return

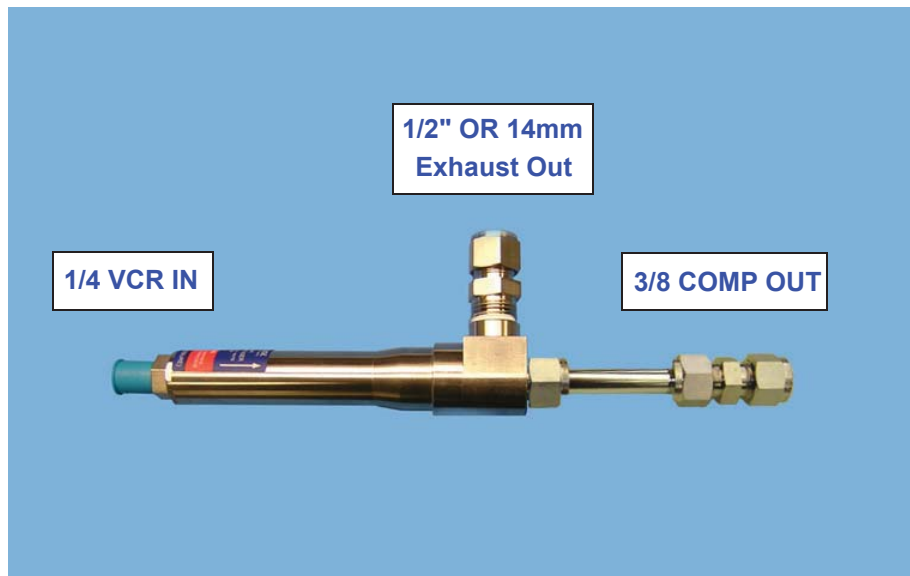


Figure 3-2 High Pressure Diffuser, Captured Exhaust

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**WARNING:** *Always use new Side Load Retainer Gaskets to ensure a good pressure seal.*

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**WARNING:** *Do not block or plug the exhaust holes in the "Vented version, or plug the exhaust port on the "Captured Exhaust" version of the High Pressure Diffuser. This action will pressurize the particle counting instrument and will result in extreme damage.*

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1. Attach a new Side Load Retainer Gasket to the 1/4 VCR male connector on the input end of the Diffuser.
2. Connect the Diffuser Input to your high pressure line using a 1/4 VCR female connector. Make the connection finger tight, then use a wrench to tighten another 45°.
3. Connect the adapter required for your operation to the Diffuser Output. Use a 1/4 VCR female connector between the Diffuser and your adapter. Make the connection finger tight, then use a wrench to tighten another 45°.
4. If your Diffuser model has the Captured Exhaust feature, connect the Exhaust Port of the Diffuser to your exhaust system. Loosen the nut on the Exhaust Port enough to slide your 1/2" or 14mm tubing through the clamping ferrules inside the nut. Tighten finger tight and use a wrench to tighten another 45°.

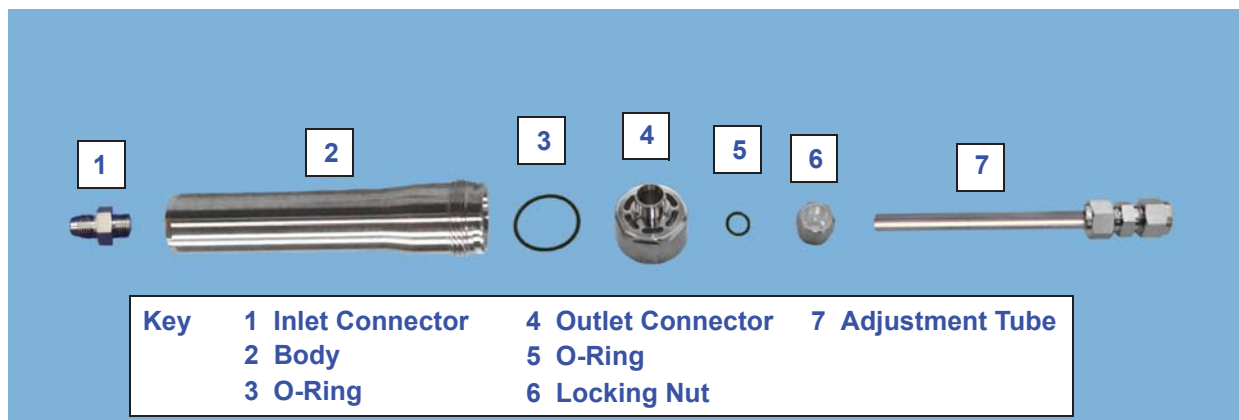
# 4 *Cleaning*

## Overview

The Isokinetic High Pressure Diffuser may become contaminated with particles, especially if it is used or stored in an uncontrolled environment. If you suspect the Diffuser is contributing to particle counts, clean it according to the procedure below.

## Cleaning the Diffuser

Figure 4-1 shows a disassembled Diffuser for reference. The Captured Exhaust version is identical except for the exhaust port.



**Figure 4-1 Isokinetic High Pressure Diffuser, Exploded View**

**WARNING:** *Ensure that high pressure has been removed from the inlet of the Diffuser before proceeding.*

In the following steps, numbers in parentheses refer to the exploded view above.

1. Remove power from the particle counter and disconnect it from the Adjustment Tube (7).
2. Remove the Diffuser assembly from the high pressure line.
3. Remove and discard the Side Load Retainer Gasket from the Inlet Connector (1).
4. Unscrew the Inlet Connector (1) from the Body (2).

5. Unscrew the Locking Nut (6) from the Outlet Connector (4). The Adjustment Tube (7) and Locking Nut (6) will slide out of the Outlet Connector (4) as a unit.
6. Slide the Locking Nut (6) off the Adjustment Tube (7). Discard the O-ring (5).
7. Remove the Outlet Connector (4) from the Body (2).
8. Remove and discard the O-ring (3) from the inside of the Outlet connector (4).
9. If your Diffuser has Captured Exhaust, remove the nut from the Return Line, along with the two ferrules underneath the nut.
10. Using a unidirectional-flow clean hood, spray all parts with solvent and flux remover.
11. Place all parts in an ultrasonic bath of clean deionized water. Cover with a clean hood and clean parts for 15 minutes.
12. Allow cleaned parts to dry in a clean environment.
13. Reassemble the Diffuser in a clean environment, reversing Steps 2-11. Use new O-rings (058772223 & 058772203) during assembly.
14. Reinstall the Diffuser, using new Side Load Retainer Gaskets on the 1/4 VCR fitting at the Diffuser's input end.

**Note:** *Be sure to note the position of the two ferrules inside the nut for easy reassembly.*



# A *Limited Warranty*

## Limitation Of Warranties:

- A. Lighthouse Worldwide Solutions (LWS) warrants that all equipment shall be free from defects in material and workmanship under normal use for a period of two years from date of shipment to Buyer except that LWS does not warrant that operation of the software will be completely uninterrupted or error free or that all program errors will be corrected. Buyer shall be responsible for determining that the equipment is suitable for Buyer's use and that such use complies with any applicable local, state, or federal law. Provided that Buyer notifies LWS in writing of any claimed defect in the equipment immediately upon discovery and any such equipment is returned to the original shipping point, transportation charges prepaid, within two years from date of shipment to Buyer and upon examination LWS determines to its satisfaction that such equipment is defective in material or workmanship, i.e. contains a defect arising out of the manufacture of the equipment and not a defect caused by other circumstances, including, but not limited to accident, misuse, unforeseeable use, neglect, alteration, improper installation, improper adjustment, improper repair, or improper testing, LWS shall, at its option, repair or replace the equipment, shipment to Buyer prepaid. LWS shall have reasonable time to make such repairs or to replace such equipment. Any repair or replacement of equipment shall not extend the period of warranty. If the Instrument is modified or in any way altered without the explicit written consent of LWS then the warranty is null and void. This warranty is limited to a period of two years, except as noted below, without regard to whether any claimed defects were discoverable or latent on the date of shipment. The length of warranty for pumps in the HANDHELD and REMOTE 'P' particle counters is one (1) year. Batteries and accessories with all products are warranted for one (1) year. Fuses and purge filters carry no warranty. If a third party battery is used in the product, the product warranty is null and void. If the battery is charged by a third party battery charger the battery warranty is null and void.
- B. If Buyer shall fail to pay when due any portion of the purchase price or any other payment required from Buyer to LWS under this contract or otherwise, all warranties and remedies granted under this Section may, at LWS's option, be terminated.
- C. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER REPRESENTATIONS, WARRANTIES AND COVENANTS, EXPRESS OR IMPLIED WITH RESPECT TO THE EQUIPMENT AND ANY DEFECTS THEREIN OF ANY NATURE WHATEVER, INCLUDING AND WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. LWS SHALL NOT BE LIABLE FOR, AND BUYER ASSUMES ALL RISK OF, ANY ADVICE OR FAILURE TO PROVIDE ADVICE BY LWS TO BUYER REGARDING THE EQUIPMENT OR BUYERS USE OF THE SAME. UNDER NO CIRCUMSTANCES SHALL LWS BE

LIABLE TO BUYER UNDER ANY TORT, NEGLIGENCE, STRICT LIABILITY, OR PRODUCT LIABILITY CLAIM AND BUYER AGREES TO WAIVE SUCH CLAIMS. LWS's SOLE AND EXCLUSIVE LIABILITY AND BUYERS SOLE AND EXCLUSIVE REMEDY, FOR ANY NONCONFORMITY OR DEFECT IN THE PRODUCTS OR ANYTHING DONE IN CONNECTION WITH THIS CONTRACT, IN TORT, (INCLUDING NEGLIGENCE), CONTRACT, OR OTHERWISE, SHALL BE AS SET FORTH IN THE SUBSECTION A HEREOF AS LIMITED BY SUBSECTION B HEREOF. THIS EXCLUSIVE REMEDY SHALL NOT HAVE FAILED OF ITS ESSENTIAL PURPOSE (AS THAT TERM IS USED IN THE UNIFORM COMMERCIAL CODE) PROVIDED THAT THE SELLER REMAINS WILLING TO REPAIR OR REPLACE DEFECTIVE EQUIPMENT (AS DEFINED IN SUBSECTION A) WITH A COMMERCIALY REASONABLE TIME AFTER RECEIVING SUCH EQUIPMENT. BUYER SPECIFICALLY ACKNOWLEDGES THAT SELLER'S PRICE FOR THE EQUIPMENT IS BASED UPON THE LIMITATIONS OF LWS'S LIABILITY AS SET FORTH IN THIS CONTRACT.

## Warranty Of Repairs After Initial Two (2) Year Warranty:

- A. Upon expiration of the initial two-year warranty, all parts and repairs completed by an authorized Lighthouse repair technician are subject to a six (6) month warranty.
- B. Other than the above, LWS makes no warranty of any kind, expressed or implied, except that the products manufactured and sold by LWS shall be free from defects in materials and workmanship and shall conform to LWS's specifications; Buyer assumes all risk and liability resulting from use of the products whether used singly or in combination with other products. If instrument is modified or in any way altered without the explicit written consent of LWS, then the warranty is null and void.
- C. WARRANTY REPAIRS SHALL BE COMPLETED AT THE FACTORY, BY AN AUTHORIZED SERVICE LOCATION, BY AN AUTHORIZED SERVICE TECHNICIAN, OR ON SITE AT BUYER'S FACILITY BY A LIGHTHOUSE AUTHORIZED EMPLOYEE. BUYER PAYS FREIGHT TO FACTORY; SELLER WILL PAY STANDARD RETURN FREIGHT DURING THE WARRANTY PERIOD. BUYER MAY SELECT A FASTER METHOD OF SHIPMENT AT ITS OWN EXPENSE.



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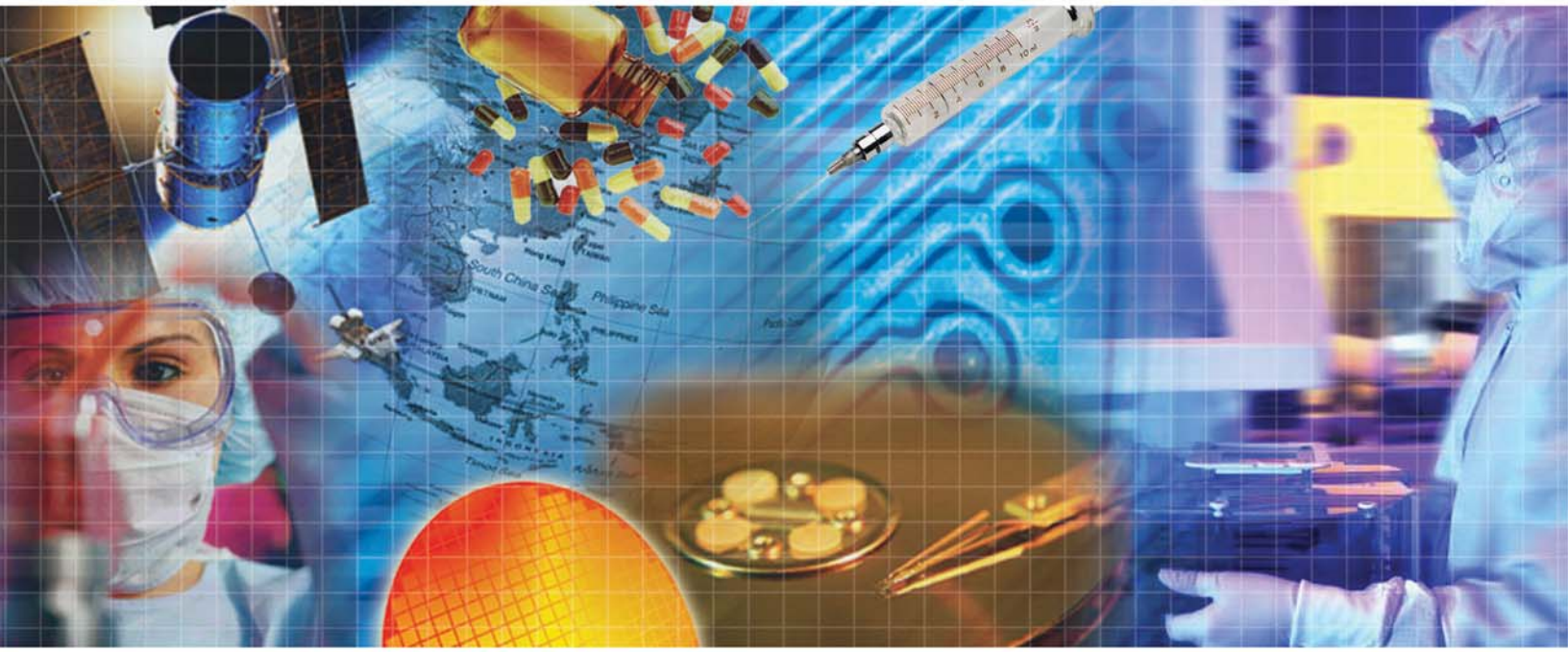
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    Warranty 1







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**[www.golighthouse.com](http://www.golighthouse.com)**